Emergency Medicine

The *Basics* and a little bit beyond

Lee M. Lichtenstein, DMD
drlichtenstein@verizon.net

Emergency Medicine

All emergencies are not created the same

- Some start really BIG
- Some start *small* and grow bigger
- Some are quite noticeable
- Some aren't noticed until too late (if at all)
- Some are quickly rectified and fixed
  - (if you know what to do)
- Some are not fixable
  - (even if you know w\hat to do)

All emergencies are not created the same

- Who first “notices” the patient is in trouble
- Severity of problem
- Time until action
- Action plan and actual treatment
- Extent of emergency management
- Background, training, experience
- Call for “help”
- ‘Outcome’

A short side note

There can be other ‘emergencies’ -
not just ‘medical’

- Loss of electricity
- Fire
- Damage to building, collapse of building
- Water problem (flooding) & electricity

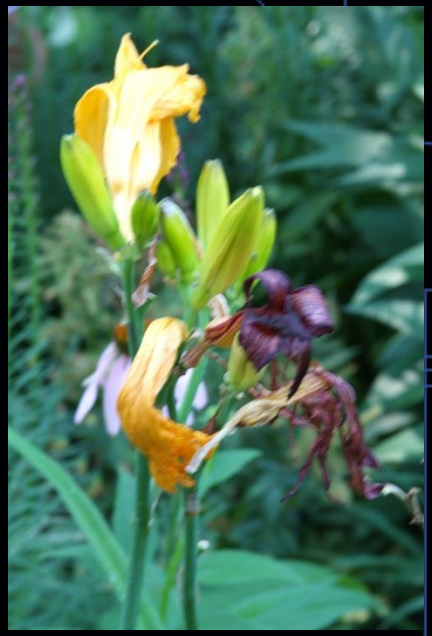
Where to Begin?

- Long before – preparation
- Staff training (cpr and other problems)
- Decide what you want, need and how you process
- Who to call for help (911, EMS, other doctor)
- Will you obtain the right stuff?
- Will you develop a standard protocol to reduce risks (patient evaluation)?

Reduce the *Risk* of Emergency

- Patient evaluation
- H&P on all new patients and review for returnees
- Medical Hx, Medications
- Current & past medical conditions (events)
- Surgical Hx, Allergies
- Do we need medical consults or lab work?
- Vital signs – at least blood pressure & pulse

Medical emergencies we'd most likely see:



1. Loss of consciousness
2. Respiratory distress
3. Chest pain
4. Cardiac dysrhythmias
5. Allergic & drug reactions
6. Altered sensation, change in affect
7. Blood pressure abnormalities

Loss of consciousness

- Syncope (common)
- Hypoglycemia (less common)
- CPR (rare)
- Acute adrenal insufficiency (rare)
- Thyroid storm (rare)

Treatment: Loss of consciousness

- Position “Trendelenburg” (head down, feet up)
- Assess: consciousness, airway, breathing ,circulation (ABCs)
- Diagnosis: medication, hypoglycemia, cva, seizure, anxiety
- Airway: head tilt, chin lift, etc.
- 100% Oxygen
- Vital signs
- Ammonia capsule, cold compress, reassure pt,
- Recovery < 20 minutes, (usually moments)

Respiratory distress

- Hyperventilation (relatively common)
- Laryngospasm (less common)
- Airway obstruction, choking (less common)
- Dyspnea (shortness of breath) (less common)
- Bronchospasm / asthmatic attack (rare)

Treatment: Respiratory distress

- Hyperventilation (stress, anxiety, panic attack)
- Terminate tx, remove “stuff from mouth”
- Position patient upright, semi recline
- Maintain airway, calm patient
- Vital signs (blood pressure, pulse)
- Reduce CO_2 elimination (paper bag)
- Advanced – sedation (midaz, diaz), call EMS

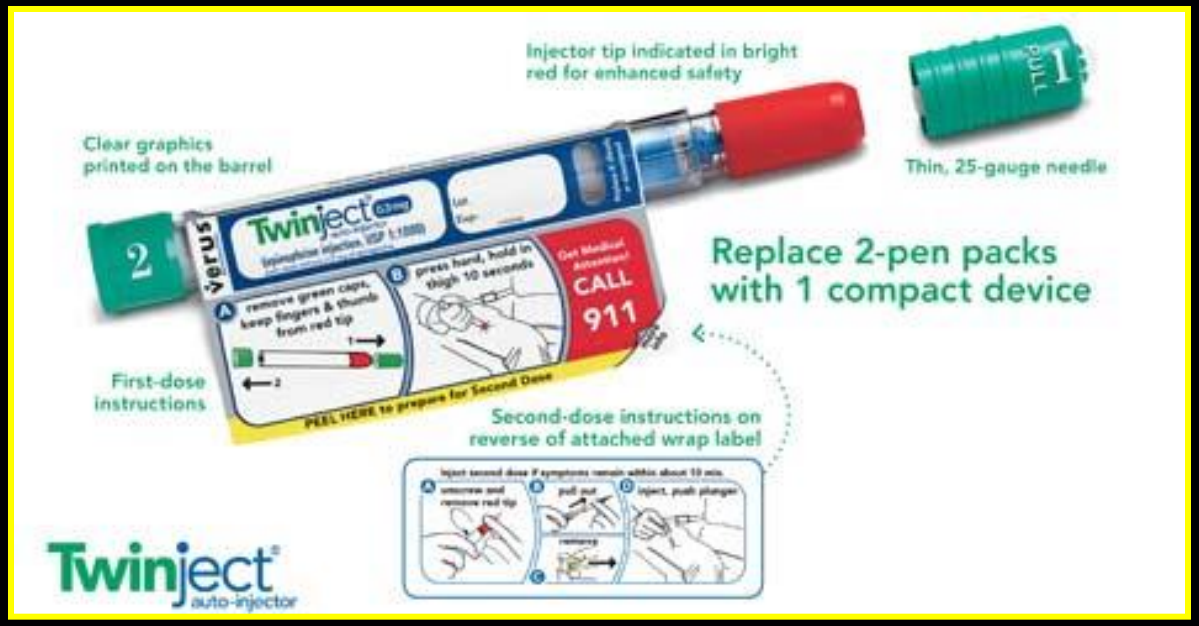
Treatment: Laryngospasm

- Protective reflex (prevent material entering larynx, trachea, lungs)
- Increased respiratory effort ("crowing sound")
- Fast Dx, pack surg site, suction pharynx
- Maintain airway, position tongue
- Advanced: positive pressure oxygen if full spasm
- Advanced: small dose sux (IM 3-4mg/kg)

Treatment: Bronchospasm, Asthmatic attack

- Generalized contraction of smooth muscles of bronchi & bronchioles
- Genetic, environment, immune, medication
- Labored breathing (expirational difficulty, wheezing)
- Tx early: upright position, 100% oxygen, manage airway
- Tx advanced: activate EMS, CPR, beta-agonists (albuterol)

  Epi 0.3 – 0.5 mg (1:1000 conc) SC (consider IM)



Epinephrine injection system

Where to get epinephrine injector system --- Besse Medical-

(these prices were in 2009, now $600 list price)

- **ORDER INFOBesse# DescriptionPrice**29301Twinject 0.3mg AutoInjector
- Single$51.99 29300
- Twinject 0.3mg AutoInjector Two-Pack$98.3730536
- Twinject 0.15mg AutoInjector Single$51.9930537
- Twinject 0.15mg AutoInjector Two-Pack$98.37
- Standard Invoice Terms and Shipping Fees Apply
- Offer not valid for any wholesaler or distributor customers.° **Twinject is available in 2 weight-appropriate strengths**. **° We are currently shipping Twinject with May 2009 expiration dates.**

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For more information on Twinject go to besse.com or call 1-800-543-2111

Emesis & Aspiration

Can result in infiltration of the lungs resulting in serious pulmonary complications

Causes:

- Liquid aspiration, Solid aspiration
- Foreign body, Gastric contents
- Unprotected airway
- Incomplete inflation of the ETT balloon
- Loss of vocal cord reflex

Signs, symptoms, manifestations emesis & aspiration

- Vary according to the type of material aspirated
- Liquid aspiration, most common
- Signs similar to an acute asthmatic attack
- Rales Dyspnea Tachycardia
- Bronchospasm Partial airway obstruction
- Cyanosis – occurs in a matter of seconds
- Followed by rapid, progressively developing hypotension

Signs, symptoms, manifestations emesis & aspiration

- Large foreign body:
  - Coughing & choking sensation
  - Stridorous breathing – crowing sound
  - Severe dyspnea
  - Inability to breathe
  - Cyanosis
  - Loss of consciousness

Signs, symptoms, manifestations emesis & aspiration

- Solid aspiration:
  - Acute respiratory obstruction
  - Asphyxia
  - Death may follow rapidly due to acute hypoxia secondary to airway obstruction or laryngospasm with reflex cardiovascular collapse

Signs, symptoms, manifestations emesis & aspiration

- Gastric contents are acid in nature
- The lower the Ph of the aspirated contents – the greater the morbidity
  - Coughing Stridorous breathing
  - Wheezing & Rales
  - Hypotension Dyspnea
  - Cyanosis

Treatment

- Depends on the level of anesthesia when it occurs ----- EARLY TX:
- Coughing patients will usually clear the contents from the tracheobronchial tree
- Patients should be placed upright to cough to attempt to clear the tracheobronchial tree

- Should not be reanesthetized or intubated with improvement being seen
- Position with head down and to the right side
- Suction the oropharanx of foreign material
- Administer 100% oxygen

TX, advanced emesis & aspiration

- Severe dyspnea with cyanosis, tachycardia, & hypotension:
  - Trendelenberg position, 15 down, on right side
  - Allows gravity to move vomitus to the trachea and away form the lungs
  - Clear vomitus with finger sweep
  - Large volume suction

Intubation considered:

- Place in supine position
- Administer appropriate dose of ‘sux’ for muscle relaxation and intubation to prevent laryngospasm
- Remove large particles with Magill forceps at time of intubation
- Oxygenate patient
- Auscultator lungs to determine if aspiration has occurred

- Monitor the pulse oximeter levels
- Manage bronchospasm
- Tracheobronchial lavage – not performed except to facilitate suction
- Intravenous steroids may be used
- Antibiotics – used if aspirated contents are purulent; antibiotics are used for secondary infection
- Activate EMS system immediately
- Transport patient to hospital for admission

Prevention emesis & aspiration

- Careful screening of pre-op patients
- Make sure patients are NPO for 8 hours for solid foods prior to anesthesia
- Clear liquids for adults and children – no less than 2 hours prior to surgery (LML says “3 hours”)
- Fasting time should not be compromised

- Prefer NPO past midnight the night before the tx
- Use of anesthesia techniques to maintain some degree of laryngeal reflex
- Normal gastric emptying time is 30 – 90 minutes
- This increases with apprehension, fear & anxiety, and pain
- LML ‘note’ – if in doubt, use techniques to secure the airway

Malignant Hyperthermia

- A genetically transmitted myopathy which is manifested by a greatly increased body metabolism, muscle rigidity & high fever
- Causes:
  - Succinylcholine
  - Volatile anesthetics (all halogenated):

    Halothane, Enflurane, Isoflurane, Sevoflurane, Desflurane

Malignant Hyperthermia

- Safe drugs:

Nitrous oxide Barbiturates ('Brevital')

Narcotics (fentanyl, meperidine)

Benzodiazepines (diazepam, midazolam)

Other tranquilizers (promethazine, hydroxyzine)

Ester & amide local anesthetics

Ketamine, Propofol, Etomidate, Benadryl

'non-depolarizing' muscle relaxants (atracurium, vecuronium)

Malignant Hyperthermia signs, symptoms, manifestations

- Tachycardia, tachypnea – early signs
- Masseter muscle – especially among children
- Mandible is clenched and cannot open for intubation
- Masseter may relax after dissipation of succinylcholine
- Clear onset may be delayed 10 - 30 min

Malignant Hyperthermia signs, symptoms, manifestations

- Unanticipated increase in end tidal CO_2 - occurs rapidly in 10 – 20 minutes
  - Most sensitive indicator
  - End-tidal CO2 may double or triple rapidly
- Hyperkalemia
- Cardiac arrest
- Total body rigidity – after admin of ‘sux’
  - Most specific sign

Malignant Hyperthermia signs, symptoms, manifestations

- Unexplained tachycardia
- Unexplained tachypnea
- Unstable blood pressure
- Ventricular arrhythmias
- EKG changes:
  - Elevated T waves – indicates hyperkalemia
  - Widened QRS – which may precede
    - Ventricular fibrillation
    - Cardiac arrest

Malignant Hyperthermia signs, symptoms, manifestations

- Respiratory / metabolic acidosis
- Temperature elevation – late sign
- Arterial blood gas (ABG)
  - Analysis: increase CO2

Malignant Hyperthermia treatment (advanced)

- Stop volatile inhalation anesthesia
- Stop succinylcholine
- Hyperventilate with 100% O_2 – use higher gas flow (≥ 10 L / minute)
- Dantrolene Sodium: 2 – 3 mg/kg rapid initial bolus
  - Continue dantrolene until signs subside
  - Mix dantrolene: each vial 20 mg dantrolene & 3 gm mannitol
  - Mix with 60 ml sterile water for injection, w/o bacteriostatic agent
- (new – Ryanodex)

Malignant Hyperthermia treatment (advanced)

- IV cold saline (not Ringer's lactate) 15ml/kg/15 minutes
- Lavage stomach, bladder, rectum, open cavities
- Surface cool with ice and hypothermic blanket
- Monitor hypothermic tx for hypothermia
- Treat hyperkalemia with hyperventilation
- Activate ACLS, transport to hospital (call & advise)
- ABG analysis, bicarbonate to correct met acidosis
  - With no ABG: 1 – 2 mEg/kg

Malignant Hyperthermia prevention

- Family hx, careful pre-op questioning
- May have increased levels of CPK (muscle bx)
- Dantrolene – for prevention and tx
- Immediate availability of treatment modalities
  - Hypothermia blanket (or equivalent)
  - Refrigerated IV solution

Malignant Hyperthermia treatment (advanced)

- Treat as inpatient (??? – LML case)
- Means to monitor end tidal CO_2, O_2 sat, core body temperature
- Dantrolene – 2.5 mg/kg IV over 30 minutes just prior to surgery
- (LML alternative: oral Dantrolene pre-op, anesthesia machine prep, case modification)
- New – *Ryanodex* (one vial?)