Emergencies in the School Setting

Connecticut Association of School Based Health

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NO FINANCIAL DISCLOSURES
I Don’t Have Enough Stress at Work......
Emergencies in the School Setting

Stratify by Age

• Daycare
• Pre-School
• Grade School
• Middle School
• High School
• College
• Graduate School

Stratify by Type of Emergency

• Accidental
• Non-Accidental (Abuse)
• Medical
• Behavioral/Psychiatric
• Surgical
• Sports Related/Trauma
• Intrinsic/Extrinsic
Sit Back and Relax......
School–Based EMS Calls

Majority are injuries
- extremity sprain
- extremity fracture
- head/neck injury
- laceration

Most common medical complaints
- difficulty breathing
- seizures

Knight et al
The Preparedness of Schools to Respond to Emergencies in Children

A National Survey

• 68% have managed a life-threatening emergency activating EMS in past year

• 86% have MERP (medical emergency-response plan)
  - school nurses, ALPs, physicians, athletic trainers, EMS, identify at risk students
  - emergency care plans, CPR, AED (AAP/AHA)

Olympia, Wan, Avner Pediatrics 2005
School Personnel Responses

Self-Report of High Confidence Level
- Respiratory Distress/Airway Obstruction
- Profuse Bleeding/Extremity Fracture
- Shock in a Diabetic

Self-Report of Lower Confidence Level
- Cardiac Arrest
- Overdose
- Seizure, Heat Illness
- Head injury
Phew! I don’t feel comfortable with those either!
American Academy of Pediatrics (AAP) Committee on School Health and the American Heart Association (AHA)

Guidelines stressing the need for school leaders to deal with life-threatening medical emergencies in children
Guidelines

• Establish emergency-response plans
• Efficient and effective campus-wide communication system for each school with local EMS
• Establish and practice MERP (Medical Emergency Response Plan)
• First aid
• CPR
• Equipping/AED
Equipment

AED (automated external defibrillator)
- Recommended by AHA and NASN
- 32% have one on campus

Risk of sudden cardiac arrest: 0.5-1.0 per 100,000 children and young adults who participate in school athletics

CPR
- 83% of school nurses were certified
Drills/Practice
Preparedness for 12/14/12
Preparedness for 12/14/12
Triage and Resource Allocation
Debriefing
Back to School
What You Wanted to Hear: Assessment and Management of Life-Threatening Emergencies

- Cardiac Arrest/Syncope/Emergencies in Athletes
- Behavioral Emergencies
- Anaphylaxis/Bites/Food
- Head Injury
- Overdose

........real cases from the recent past
Cardiac: Syncope? Seizure?

**Syncope**: sudden brief loss of consciousness associated with loss of postural tone
- 15% of adolescents
- Usually benign etiology
- Life-threatening = **cardiac** (arrhythmia or structural)
- Metabolic, prolonged QT, aortic stenosis, hypertrophic cardiomyopathy
Just Yesterday....

• Previously well, 12 year old girl
• Getting ready for dress rehearsal at school
• She was having her hair straightened for the play....
• Suddenly collapses...pale...few myoclonic beats
• EMS activated
• Awake upon ambulance arrival and transported to Yale
Hair-Grooming Syncope

- Paroxysmal, non-epileptic event
- 5-16 years of age
- 75% females
- Associated with orthostatic hypotension
- Pain, nerve stimulation
- Neck flexion/extension
- Compression of vasculature
Primary Electrical Disturbances

• **Long QT Syndrome**: disorder of myocardial repolarization, increased risk of *sudden death*

• **Polymorphic Ventricular Tachycardia**

• **Acquired LQTS**: eating disorders, anorexia, wrestlers, medication induced!

• **Romano-Ward Syndrome**: purely cardiac

• **Jervell and Lange-Nielsen Syndrome**: LQTS and sensorineural deafness (story)
Structural Heart Disease

Sudden Death in Athletes: majority structural

• **Hypertrophic Cardiomyopathy**: 1/500, hypertrophy of left ventricle...**Exertional Syncope**!

• **HCM**: most common cause of sudden death during exercise

• **Coronary Artery Anomalies**: compression>ischemia>syncope or sudden death

• **What about the PPE??** Prevention???
Structural Heart Disease

- Arrhythmogenic Right Ventricular Cardiomyopathy
- Valvar Aortic Stenosis
- **Dilated Cardiomyopathy**
- Pulmonary Hypertension
- **Acute Myocarditis (Coxsackie A/B and Adenovirus)**
- **Exercise and Fever!*****
Actual Case (Wrestler)

- 15 year old boy with PMHx of atrial fibrillation
- S/P ablation and cleared to return to sports
- Collapses at school at wrestling practice
- Syncope!
- EMS activated
- Transported to nearest hospital
- Syncope
- Life Star to Yale-Children’s
Our Young Wrestler

- PED sick, but stable
- **Differential:**
  - Performance enhancing drugs/steroids/testosterone/GH?
  - Complication of the ablation, rhythm disturbance, some cardiac event?
  - Trauma?...denied just warming up....
Case Progression

• Ryan dies 3 hours later in our PICU
• Cardiac tamponade (300 ml)
• Trauma???
• Obtain another history!!
• Denied.....
• Autopsy/Cardiac Pathologist
• 4 Months later the answer!!!!
Another Wrestler!!!

- 17 year old boy, arrests in school gym, no past medical history
- CPR, intubated, IV access
- Transported to Yale-Children’s from school
- Major electrolyte disturbance!
- What the heck was that!?
Denouement

- Wrestler
- Trying to make a weight class
- Hefty bags in boiler room!
- Diuretics and laxatives
- Ventricular fibrillation
- PICU 3 days
- Full recovery
- Called school............
Life Threatening....

What about these?
Teenage Girl with Fever and Body Aches

- 17 years old
- Previously well
- Fever to 104°F
- Vomiting
- Headache
- Sent in by student health
- Skin...makes you think.....
Yes, Toxic Shock

Predisposing factor?
Teenage Girl with a High Fever

- Yong lady was sent in by ambulance secondary to a temperature to 105°F.....no history....
- Fluids, diazepam, Poison Control Center
- Parents arrive....
- Fever rose despite intervention ≥ 107°F
- In the PICU fever up to 108°F
- Dies in the PICU !! that evening
- Lipstick
Cause of Death!

- Ingestion
- DNP (dinitrophenol)
- Weight loss product
- Internet
- New York
- Federal Bureau of Investigation
- FDA
- Incarceration
Shifting Gears
Behavioral Health Emergencies: Suicide

- 4th leading cause of death in all children
- 3rd in 10-19 year age group
- Increasing rates in females: 10-14 years
- YRBSS: 7-9% of adolescents attempted suicide in preceding 12 months

Predisposing Factors: Psychiatric disorder, prior attempt, family history, abuse, exposure to violence

Precipitating Factors: access, alcohol/drug use, exposure to suicide, social stress/isolation

Psychosocial Assessment HEADSS

- Home
- Education, Employment, Eating, Exercise
- Activities, Hobbies
- Drugs
- Sexual Activity, Sexuality
- Suicide, Depression

Goldenring/Cohen 1988
Headache and Depression

- Anemia
- Structural
- Hypothyroidism
- Wood’s Lamp
Actual Case
One November Morning

- Second grade boy comes down to your office with headache and vomiting.
- Sick contacts??
- Ah...Mom is home sick too!
- Then, the sibling (in fourth grade) is sent down with vomiting and headache and is achy.
- Most likely the FLU!
- Right?
Headache and Vomiting Continued

• They stay in your office a few hours
• Mom could not come in..too weak and nauseated
• The kids look much better by lunch time and return to class
• The next day they are not at school.....
• Evening News!
Denouement

CARBON MONOXIDE POISONING!!!!!!!
“sick contacts”
Headache and nausea and vomiting
Why did they get better at school?
What happened overnight?
What if you have a clinical suspicion?
Everyone needs a CO detector!
Our PED Waiting Room on a Saturday
Line Outside Your Office!
Little Less Severe.....
Dental Trauma
Preferred
Why Do You Get Brain Freeze?
Why Do you Get Brain Freeze!? (Sphenopalatine Ganglioneuralgia) anything for relief?
Abdominal Pain

So Many Possible Causes....
Abdominal Pain

• A 15 year old young lady comes to your office with abdominal pain and nausea
• She has vomited the last four mornings in a row
• The most likely diagnosis is?
Further History

- She denies sexual activity
- Her last menstrual period was in September
- Seven months ago....
- What do you do now?
Pseudocyesis

- ‘False Pregnancy’
- 300 B.C.
- Hippocrates
- Mary Tudor, Queen of England
- Multiple False Pregnancies
- Origin of phrase: ‘Bloody Mary’
Abdominal Pain

• Seven year old boy
• Belly pain
• Sent down to your office
• Vomits
• Looks sick
• You call his parents
• He starts crying and then shares....
Uh Oh!
What’s The Problem?
Other School Emergencies?

Something We See Everyday Referred in from Schools
Anaphylaxis

- Potentially fatal disorder
- Increasing rate of occurrence
- Not always recognized
- Criterion 1
  - Acute onset (skin, mucosal tissue)
  - Respiratory compromise
  - Reduced blood pressure
Anaphylaxis

- Criterion 2 (two or more)
  - Skin-mucosal tissue
  - Respiratory compromise (wheeze, stridor, dyspnea)
  - Reduced BP or syncope, hypotonia, incontinence
  - Persistent GI symptoms (crampy pain or vomiting)
Anaphylaxis

• Criterion 3
- Reduced BP after exposure to a known allergen

Signs/Symptoms of Anaphylaxis
- Cutaneous: (90%) flushing, itching, angioedema
- Respiratory: (70%) discharge, congestion, throat, choking, cough, wheezing, dyspnea
- GI: (40%) nausea, vomiting, diarrhea, cramping
- CVS: (35%) dizziness, tachycardia, hypotension, collapse
Anaphylaxis Question

• You are at a H.S. and a 15 year old known asthmatic with a severe tree nut allergy asks to use the restroom after eating a cookie made with filberts. You noticed she appeared a bit flushed and she said she was going to vomit. The next best thing to do would be:

a. Administer her EpiPen
b. Have the principal call 911
c. Call her parents to have them meet you at the ER
d. Give her some Benadryl (diphenhydramine)
e. All of the above
Anaphylaxis Question

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Anaphylaxis

• Intramuscular Epinephrine!!!!!
• Diphenhydramine alone will not save a child!
• Activate Emergency Medical Services
• Asthmatics tend to be higher risk
• Filberts are stinkin tree nuts!
• Sneezing, rash, coughing, vomiting, diarrhea, abrupt change in mental status...think ANAPHYLAXIS
Other Things That Scare Us

HIGH SCHOOL MUSICAL

Watch HIGH SCHOOL MUSICAL on Disney Channel!
Concussion/Mild Traumatic Brain Injury

- Zurich: “a complex pathophysiological process affecting the brain, induced by traumatic biochemical forces”
  1. Impulsive force transmitted to the head
  2. Rapid onset of short-lived impairment
  3. Neuropathological changes/reflect a functional disturbance
  4. Graded clinical symptoms +/- LOC
  5. No abnormality on standard structural neuroimaging
mTBI

• 3.8 million recreational- and sport-related concussions occur annually in U.S.
• 8.9% of all H.S. related injuries
• **Girls have higher rates:** weaker neck muscles? Higher reporting? Soccer, Basketball
• LOC < 10%
• Headache is the most frequently reported symptom
• Evaluate for retrograde (before event) and anterograde (after event) amnesia
mTBI

• **Immediate Motor Phenomenon**: tonic posturing, convulsion...benign. Brief seizure immediately after...benign.

• Seizure **after** a concussion is more worrisome!**

**More Serious Injury**

severe headache, seizures, focal neurologic findings, repeated emesis, excessive drowsiness, difficulty awakening, slurred speech, disorientation, neck pain or irritability
IMAGING

• Any patient with WORSENING symptoms
• Loss of Consciousness > 30 seconds higher risk of intracranial injury
• CT scan is the superior imaging modality in first 24-48 hrs
• MRI after 48 hrs looking for cerebral contusion, petechial hemorrhage and white matter injury
Neuropsychological Testing

• ANAM (Automated Neuropsychological Assessment Metrics)
• CogState
• HeadMinder
• ImPACT
• Pencil/Paper testing

• Baseline testing before start of season!
• Serial Sevens..........
Management

- **Avoid** activities that may slow recovery
- Theoretical risk of NSAIDS or aspirin
- Cognitive rest (shorten days, reduce workload), avoid standardized tests acutely/Reintegration into school/make-up time
- Avoid driving (slowed reaction times)/Restrict physical activity/May 2009 Zackery Lystedt Law, WA
- “When in doubt, sit em out!” (min 7-10 days)
- 3 or more concussions in 1 season, symptoms for > 3 months.....prolonged away period from sports
mTBI Question

- A 14 year old helmeted freshman football player has a head-to-head collision with a junior. The freshman has no LOC, but has a bad headache, vomits twice and can’t remember who scored last. The next best step would be:
  a. Return to play
  b. Neuropsychiatric testing
  c. Medical evaluation and possible imaging
  d. Close observation on the bench
mTBI Question

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  a. Return to play
  b. Neuropsychiatric testing
  c. Medical evaluation and possible imaging
  d. Close observation on the bench
Best Answer

• Yes, medical evaluation and imaging if:
  - worsening headache
  - altered mental status
  - persistent vomiting
  - any history of a bleeding disorder
  - boggy soft tissue swelling
  - any focal deficits
  - irritability
  - history of another recent head injury
But You’re AWAKE!!
Heat-Related Illness

- Heat Cramps
- Heat Exhaustion
- Heat Stroke: \( T > 40^\circ C/104^\circ F \), CNS dysfunction and environmental heat exposure. +/- lack of sweating
  - Classic: younger children/chronic medical problem
  - Exertional: heavy exercise in hot, humid weather
Teenage Athletes and Heat Illness

• 3rd major cause of death
• 2nd cardiac
• 1st traumatic

• American football players
• August/overweight/ADHD meds, creatine
• Preventable with hydration and awareness
Heat-Related Illness

A 15-year-old football player complains of headache and muscle cramps after practice. He appears weak and flushed with dry, hot skin. He has cool clammy hands and loses consciousness on the playing field.

The best way to cool him would be:

a. Immerse in school pool
b. Ice packs to axilla and groin
c. Move to shady area and spray with water and fan him
d. Give him Tylenol and Motrin
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Water Spray with Fanning!!!

• Evaporative cooling!
• Cooling rates approached 0.15°C per minute or 0.27°F per minute!

• Heat Stress: **CTM** (critical thermal maximum) exceeded. Degree of elevated body temperature and duration of heat exposure that can be tolerated before cell damage occurs.
• Human CTM **42°F** (45mins-8hrs)
Ingestion/Overdose

- If clinical suspicion
- 1-800-222-1222
- Poison Control Center
Summary

• Syncope/Sudden Cardiac Arrest: Structural and Prolonged QT and Occult Trauma and Metabolic
• Ingestion/Weight Loss....fever
• Fever in a female...
• Depression/Suicide: HEADSS assessment...focality
• Headache and Vomiting: carbon monoxide
• mTBI/Concussions: worsening headache, vomiting, loss of consciousness
• Anaphylaxis: INTRAMUSCULAR EPINEPHRINE and transport!
• Heat-Related Illness: EVAPORATIVE COOLING
• Ingestions: 1-800-222-1222
THANK YOU!