Emergencies in the School Setting

Annual CTAAP Critical Issues in School Health
May 5, 2011
Karen Santucci, M.D.
Yale-New Haven Children’s Hospital
NO FINANCIAL DISCLOSURES
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
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
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.......
Emergencies in the School Setting

A National Survey of School Nurses

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

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

Self-Report of High Confidence Level
- Respiratory Distress/Airway Obstruction
- Profuse Bleeding/Extremity Fracture
- Anaphylaxis/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!
Assessment and Management of Life-Threatening Emergencies

- Cardiac Arrest
- Overdose
- Seizure
- Heat Illness
- Head Injury
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
Seizure/Syncope

**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
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)
Primary Electrical Disturbances

- **Brugada Syndrome**: 22-65 years of age (reported in toddlers). More likely during febrile illness, pseudo RBBB, ST segment elevation V1 to V3
- **Catecholaminergic Polymorphic Ventricular Tachycardia** (syncope from VT or VF induced by emotion/stress)
- **Pre-Excitation Syndrome**
- **Congenital Short QT syndrome**
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
Structural Heart Disease

• Arrhythmogenic Right ventricular Cardiomyopathy
• Valvar Aortic Stenosis
• Dilated Cardiomyopathy
• Pulmonary Hypertension
• Acute Myocarditis (Coxsackie A/B and Adenovirus)
A 17 year old previously healthy varsity basketball player makes a shot and suddenly collapses on the court floor. The coach can’t feel a pulse, starts chest compressions and EMS is activated. Sadly, the child is pronounced dead at the hospital. The most likely cause of death is:

a. Foul play
b. Hypertrophic cardiomyopathy
c. Toxin
d. Prolonged QT
Question

A 14 year old girl with severe depression was recently started on a psych medication. She collapses in the auditorium while at assembly. Her teacher can’t feel a pulse and starts CPR. An AED is available and detects a shockable rhythm. You get back a perfusing rhythm. The most likely cause of her collapse was:

a. Substance abuse
b. Overdose
c. Medication induced prolonged QT
d. Vasovagal syncope
Shifting Gears
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
• **Risk Factors**: Psych d/o, prior attempt, FHx, abuse, exposure to violence (predisposing)
• **Precipitating Factors**: access, alcohol/drug use, exposure to suicide, social stress/isolation
Depression/Suicide

- **Mental illness:** 25-30%
- **Psychiatry autopsy:** 60% DSM-III-R criteria
- **Depression:** recurrent somatic complaints w/o organic etiology, “acting out”, loss of appetite, poor school performance, change in sleep pattern*
- **Assessment:** Appearance? Loss of interest in school, friends, hobbies, sports. Ever considered?
- **Response:** “Yes” gets an immediate psychiatric evaluation. “Plan” gets emergency hospitalization
- **Consider:** Anemia, Hypothyroidism, Abuse, Start of Meds for Depression
Psychosocial Assessment HEADSS

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

Goldenring/Cohen 1988
Question

• A 17 year old straight ‘A’ student in H.S. who participated in many clubs and sports is now failing 4 subjects, not participating in afterschool activities and falling asleep in class. The most likely diagnosis is:

  a. Hypothyroidism
  b. Depression
  c. Oppositional Defiant Disorder (ODD)
  d. Senioritis
  e. Substance abuse
Discussion

• Most likely depression. A conversation needs to take place with the student. A HEADSS assessment will be very helpful.

• Is it okay to ask about suicide?
But You’re AWAKE!!
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

• 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. Call the school nurse and have her meet you in the restroom with an 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

- 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
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 std struct 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 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 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
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 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
• 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
Heat-Related Illness

- Heat Cramps
- Heat Exhaustion
- Heat Stroke: T> 40C/104F, 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
Teenage Athletes and Heat Illness

- 3rd major cause of death
- 2nd cardiac
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
Water Spray with Fanning!!!

• Evaporative cooling!
• Cooling rates approached 0.15C 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 **42F** (45mins-8hrs)
Ingestion/Overdose

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

• **Syncope/Sudden Cardiac Arrest**: Structural and Prolonged QT

• **Depression/Suicide**: HEADSS assessment

• **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!