First Aid for Cyclists
New York Cycle Club SIGs
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Goals for This Evening

• **Basic info**: trauma, first aid, first responder, communicating effectively with 911

• **Take Home Tips**: To prevent road injuries

• **How to maximize the chance of full recovery after an accident**

• **Your personal cyclist’s first aid kit**
Trauma Facts

- Definition of Trauma:
  - *Serious injury or shock to the body resulting from violence or accident*
- # 1 cause of death under 40
- Only cancer & heart disease more deadly
- Trauma deadliest under 35
- 50 million serious injuries in U.S. annually
- 10 million are disabled from trauma
- 80,000 disabled from brain and spine trauma
Trauma Facts (cont’d)

- Trauma patients fill 12% of hospital beds
- A perspective:
  - Lung cancer: 70,000 deaths
  - Breast cancer: 70,000 deaths
  - Colon cancer: 55,000 deaths
  - Trauma:

  140,000 deaths
  - Trauma mortality is Increasing!
Cyclists Not Immune To Trauma

- >100,200,000 bicycles in U.S.A. in 2016
- 80% of American riders still don’t use helmets
- 600,000 ER visits from bike accidents
  - Williamsburg: 10-15 per week
- 20,000 cyclists hospitalized annually
- 80% deaths: from injuries to head, neck, spinal cord
- Most cycling deaths preventable
- Cycling injuries cost > $1 billion per year
- Car Bike Collisions: 20% of serious crashes
  - But 80% of fatalities
  - Rear enders rare (7%), but about 50% fatal
Trauma Deaths

• Distributed over 3 peak times
  - 1st peak: within seconds to minutes of injury
    • Little can be done for these serious injuries
  - 2nd peak: within minutes to 1 hour (or so)
    • The GOLDEN HOUR OF OPPORTUNITY
    • Deaths preventable with rapid, appropriate care
    • You can have the greatest impact here!
  - 3rd peak: within days or weeks
    • Infection/failure of vital organs
General Guidelines on the Road

• First Aid team forms immediately
• One to the victim
• One directs traffic away
• One clears the roadway
• One prepares to call 911 or flag a car
• To Leader: useful to practice team formation before ride departs
  - Rider responsibility to share potential medical risk
    • Allergies, Asthma, Diabetes, Heart Disease, Impl. Defibrillator, Seizures

PRIMUM NON NOCERE!
YOU CAN KEEP THE SITUATION SAFE!
A Typical Scenario

- Two bikes go down
- Crowd forms feeling helpless
- Good Samaritan removes victim’s helmet
- Someone helps rider up, gives Power Bar and water
- Someone checks the bike; it’s OK to ride

- WHAT DID THEY DO WRONG?

- WHAT CAN YOU DO TO MAINTAIN SAFETY?
How to call 911*

- Stay calm: Take a few deep breaths
  - Plan what to say before dialing
- Know what you’ll be asked:
  - Where is the emergency: try to be precise (nearest intersection)
  - Nature of the emergency: “Need medical assistance”
  - Describe what happened: be detailed, but precise
  - Your phone number: Don’t presume 911 knows your cell #

- Listen to the Operator and follow orders (help is on the way)
- Don’t hang up till instructed to
- MINIMUM: Know the accident’s location
- Be Patient; especially if you’re far from town
- Don’t presume someone else will call 911

*Edwin Roberts: Paramedic, triathlete, NYCC member
Neck and Spinal Cord Trauma

• “Mechanism of Injury” (crucial concept)
  - Direct compression of spine or spinal cord
  - Excessive flexion or extension of the neck
  - Primary injury (tear or laceration of the cord itself)
  - Secondary injury (at level of peripheral nerve cells or from edema after injury)

- Pearl of Wisdom: If there’s collapse at time of injury consider C-Spine injury first
Neck and Spinal Cord Injuries (cont’d)

• Mechanism of Injury (CRUCIAL CONCEPT)
  – Accurate recounting to medical professionals
• Brain, Neck, Spinal Cord & Spine injuries can be catastrophic
• Sometimes effects are delayed
• A trivial injury may become lethal
• MAYNARD SWITZER
Cspine Compression

Information

• Point 1
• Point 2
Neck and Spinal Cord Trauma (cont’d)

• Collision sport neck injuries down

The Football Experience*

• 1976: 110 C-spine injuries/34 quadriplegia
• 1990: 42 C-spine injuries/ 5 quadriplegia
• Rules, helmets, changed tackling techniques

The Cycling Experience

• Race rules changed, safety promoted, helmets improved, lighter, more fashionable

• *Torg, 1987, 1988, Haldemann, 1999
Prime First Aider Responsibility: Replay

- Team Springs to Action to protect victims and others
- CALL 911
- Maintain stable head and neck
- Try to clarify and don’t ignore mechanism of injury (even if rider says, “I’m O.K.”)
- Don’t remove helmet
- Don’t move rider if at all possible; keep same position
- Use logrolling technique only if rider must be moved
  - Demonstration of technique
- Use “YES” or “NO” questions
First Aider Responsibility (cont’d)

• Check A, B, C’s after protecting spine
  - Airway, Breathing, Circulation

• Simple **neurological assessment**
  - Orientation (time, place, person)
  - Memory (What happened?)
  - Ask if head or neck hurts?
  - **Don’t touch head or neck if there’s pain**
  - If no pain, gently palpate neck w/o moving it
  - Can you move fingers and toes?
The Primary Survey – Skeletal system

- Primum Non Nocere!
- 206 bones in the human skeleton
- Long Bones and Flat Bones
  - Long bones fracture with loading or twisting forces
  - Flat bones fracture with high energy impact – DANGER
- You can check for fractures reliably with your own two hands
- PALPATE long bones gently and note areas of tenderness
- COMMUNICATE this information to EMS or ER docs
Spiral Fracture Lower Leg

Information
- Point 1
- Point 2
Surgical Neck Fracture Humerus
Wrist Fracture
First Aider Responsibility (cont’d)

• When EMS arrives: share accident and first few minutes
  – Crucial to guiding injury classification & medical care
  – Make sure you clearly describe:

  • Mechanism of injury
  • Time of injury
  • Any loss of consciousness (even fleeting)
  • Any change in mental status (orientation, memory, level of consciousness, mood)
  • What’s happened since injury
CONCUSSION

• Very common: 250,000 in football alone

• Definition: Traumatic brain injury causing a change in mental status with or without loss of consciousness

• Mechanism of Injury: (brain hits skull)
  – Acceleration injury
  – Deceleration injury
Concussion (cont’d)

- Loss of consciousness if force great

- May have significant concussion WITHOUT loss of consciousness

- First aider takes control (patient can’t) and makes decisions from objective info.

- Grading concussion is useful for the decision maker
  - Guides workup, disposition and followup
Concussion (cont’d)

- Colorado Coma Grading Scale
- simple and easy to use in the field

Evaluates 3 things:
  a) Confusion, b) presence of amnesia, and c) loss of consciousness

1. **Grade I**: mild: Confusion w/o Amnesia, no Loss of Consciousness

2. **Grade II**: moderate: Confusion with retrograde or anterograde amnesia

3. **Grade III**: severe: Loss of consciousness (regardless of duration; even 1 second)
Grade I Concussion: In the E.R.

- **Grade I:** Confusion alone
- Triage to Urgent Care Area
- Frequent reevaluation (signs of amnesia, irritability, dizziness, hyperexcitability)
- May signal incorrect initial grading
- Rider may cycle carefully if no symptoms at rest and exertion after 45 min. of observation.
Grade II Concussion in the E.R.

- **Grade II**: Confusion with amnesia
- No more cycling today
- Triage to trauma, detailed neuro assessment; may need CT and X-Rays
- Observe often for worsening headache, nausea, vomiting, change in vision, changing neurologic signs and mental status (fall asleep easily, drowsiness, etc.).
- Admit to hospital if symptoms worsen or don’t improve
Grade II: Concussion – What’s Next

• Symptoms normally clear in hours to days
• May return to cycling after 1 week of no symptoms (may be a month after injury though).

• KNOW ABOUT:
• THE SECOND IMPACT SYNDROME
Grade III Concussion at the Scene

- **Grade III** (severe): E.R. evaluation needed
- **First Aid Team forms** (all done simultaneously)
  - One secures field/roadway & diverts traffic
  - One calls “911” and decides who will accompany patient to Emergency Room
  - One begins c-spine precautions (don’t remove helmet!)
    - EMS will stabilize and immobilize
  - A,B,C’s, “Are you OK, Are you OK?”
    - Airway, Breathing, Circulation
    - Do you need to begin CPR?, No smelling salts (EVER)
      Never, ever use smelling salts to speed return of consciousness
  - Mental Status: level of consciousness, orientation, memory: **POSSIBLE CONCUSSION!**
Grade III Concussion: At the E.R.

• You’re the patient’s advocate: Make sure:
• Triage to Trauma Immediately (not waiting room)
• Will have a THOROUGH neuro assessment and:
  - CT Scan
  - Head and/or spine films, urine/blood tests
  - Should be monitored at least several hours with frequent reassessments
  - Hospitalize overnight if no improvement or abnormal tests.
Grade III Concussion (now what?)

• Cyclist may ride after no less than 4 weeks
• Need time for brain to heal
• May be new symptoms with healing process
  – Dizziness, ringing in ear, headache, dysequilibrium
• But at least 2 weeks symptom free before active riding?
• Why ????
Heat Related Injuries

• Heat Cramps, Heat Exhaustion, Heat Stroke

• Heat Stroke: the #3 cause of death in high school athletes after neck trauma and heart disorders
Heat Stroke

- Cycling produces a lot of heat
- Heat must be dissipated (body = 98.6 deg)
- If heat remains & core temperature rises:
  - Metabolic abnormalities
  - Blood clotting disorders and hemolysis
  - Vital organ dysfunction
  - Organs fail
  - Seizures and DEATH are not uncommon
How do you dissipate heat?

• Four ways:
  - Evaporation
  - Convection
  - Conduction
  - Radiation

- < 68 deg F: heat loss via conduction & radiation
- >68 deg F: heat loss via evaporation (up to 85% excess heat lost by sweating)
Heat Stroke

• Risk Factors for Heat Stroke
  - High ambient temperature (>95 deg)
  - High humidity + high temperature
  - Excessive exertion
  - Dehydration
  - Heart disease, diabetes, hypertension, anorexia, bulimia, hyperthyroidism, fever, prior heat stroke, prescription medication, illicit drugs, advanced age
Heat Stroke (cont’d)

• Progression of bodily changes first
  - Dizziness, weakness, headache, malaise
  - May last very short time (if very hot and if exercise is intense)
  - May be missed, first sign: delerium and brink of collapse!
  - Skin may be moist or dry (it’s a myth about not sweating)
Heat Stroke: Mechanism

- Body’s heat production outstrips ability to cool down.
- Cooling system then shuts down and temperature rises precipitously
- Core temperature >105.8 deg.
- Skin feels very hot
- Heart races, breathing quickens, blood pressure drops (shock).
- This is a MEDICAL EMERGENCY
Heat Stroke: In the field

- Team forms simultaneously (rider probably fell off bike)
- One secures roadway and diverts traffic.
- One moves people, bikes & stuff off road
- One calls 911
- If collapsed, take neck precautions, do the A, B, C’s, rapid cooling imperative, fanning
  - If no obvious trauma (ie did not fall off bike) raise legs to improve blood flow to the heart
Heat Stroke: In the E. R.

- You’re the patient advocate again:
- To E.R. immediately; Triage to ICU area. There is a significant chance of death.
- Expect treatment to be with rapid cooling, EKG’s, frequent BP monitoring, IV fluids, correction of metabolic abnormalities, search for infection or toxicities, lots of blood tests, X-rays, urinary catheter.
- Should be admitted to ICU in hospital for aggressive treatment and monitoring.
Other Heat Related Illness

- **Heat Cramps** (severe muscle cramping from muscle dehydration, loss of sodium)
- **Heat Exhaustion**: Same mechanism as heat stroke, temperature < 104.9 deg F.
  - Serious metabolic consequences rare
  - Heat dissipation continues (still sweating)
  - Headache, cramps, nausea, vomiting
  - Death quite rare, but not impossible
Heat Exhaustion (in the field)

• Treatment:
  - Stop exercising immediately
  - Get out of the heat (or in shade)
  - Remove excess clothing (not all)
  - Aggressive re-hydration and cooling
  - Wet down and fanning
  - Get to hospital
  - Doesn’t need intensive care
Preventing Heat Illness

- Adequate Hydration before the ride if it’s hot out (especially if you perspire a lot)
- Fill your tank: “total clarity of urine.”
- Wear protective clothing, use sun block,
- Drink often
- If it’s really hot ( >95°F ), just go bowling!
BONKING or Hitting the WALL

- Why TV cameras at mile 22 of Marathons
- Glucose as the body’s fuel (glucose and glycogen)
  - Sites: blood, muscles, liver – WHILE EXERCISING:
    - Blood: <3 min of fuel in your blood stream (6 gm = 24 calories)
    - About 90 min of fuel in your liver (150gm = 600 calories)
    - Muscles: 10 min. fuel / pound of muscle
  - Why, even with normal blood sugar, muscles depleted of glycogen will fail and brain starts having lousy judgment
- Role of training, judicious sprinting and refueling
- Easy to confuse bonking with dehydration

- 70 mg glycogen / gm hepatic tissue  15mg glycogen/ gm muscle tissue  100mg glucose/100cc blood X 6L = 6gm glucose X 4cal/gm = 24 cal. Energy in circ. Blood volume
Hypoglycemia

• Prevention
  – Inform leader if diabetic, wear medic-alert bracelet
  – Prepare with proper fuel (hearty breakfast), refuel frequently.
  – Stop cycling and eat if developing symptoms: don’t be afraid to ask the leader to stop the ride!!!

• Treatment of Hypoglycemia:
  – Call 911 (even if symptoms seem to resolve)
  – DO NOT INJECT INSULIN
  – Useful to have: glucagon (by injection)
  – If fully conscious immediately provide sugary food or drink, follow this with ‘complex’ carbohydrate
  – Do not attempt to feed or provide drink to an unconscious person
Abrasions/Road Rash

• ABRASION: superficial injury skin and possibly some underlying soft tissue is scraped off after impact with roadway
• Team forms, secure roadway, divert traffic
• Check if mechanism of injury could cause head or neck injury
• If so, treat like concussion and protect head and spine (don’t remove helmet), call 911
• Use Examination Glove: Obvious bruises?, ripped clothes? Wet spots? Blood?
  Perform a brief skeletal survey:
  - Palpate limbs: Any tenderness, anything look funny?
Road Rash (cont’d)

• If I can walk on it, it’s not broken (WRONG)
• If mechanism of injury can break a bone, get X-ray
  – Common fracture sites: clavicle, shoulder, hands, wrist, ribs, ankles, pelvis
• Common injury sites: POINTS & TIPS: elbows, hips, shoulders, hands, knees, forearms.
Managing Road Rash

- Remove dirt, glass, sand with water
- If no water, whoever has the cleanest hands (use examination glove if you have one)
- Clean again with plain water and apply antibiotic ointment or cream
- Cover loosely if you have bandage, if not, leave open to air
- Wash and scrub with soap & water at first rest stop. Reapply antibiotic and bandage
Managing Road Rash (cont’d)

• Change dressings 1-2 times a day till scab
• Tetanus toxoid if last shot 10 years
• Tylenol, aspirin or ibuprofen
• Expect to feel achy all over for a few days
• Shave your legs ????????
Laceration

- Definition: Cut, gash in skin; may involve muscle, nerve, bone, arteries and veins
- If gushing: Direct Pressure (no tourniquet); 5 minutes, if no suggestion of spinal injury, raise affected limb
- Will need suture if large and deep
- Clean with water; may need antibiotics
- Get plastic surgeon if on face
- Tetanus toxoid
Your Personal First Aid Kit

- Health Insurance Card + MD name/phone
- Cell Phone
- Emergency contacts and personal list of meds, diagnoses and allergies
- Aspirin (or Tylenol, or Ibuprofen or Aleve)
- Bacitracin ointment
- Chapstick
- Water in at least one bottle
First Aid Kit (cont’d)

- Band Aids (a few sizes) or 4X4 or 2X2 gauze and tape
- Personal emergency meds (Epipen, asthma MDI, glucagon, hard candy)
- Examination gloves
- Train Pass
- Money and credit card
Prevent Accidents

• “He’s an accident waiting to happen”
• Pre Ride:
  - Plenty of sleep the night before (no EtOH)
  - Drink fluids and bring 2 bottles
  - Eat a good breakfast (don’t diet on your ride)
  - Fever? Feel crummy?: think twice about ride
  - Wear appropriate clothing
  - Sun block and eye protection
  - Pack pocket food
Prevent Accidents (cont’d)

- Pre-Ride (Bike):
  - Bring 2 tubes, appropriate tools and pump
  - Do the one minute bike check, especially:
    - Check tires, fill with air, no bald spots
    - Check brakes
      - Leader: permit only bikes with two brakes
    - Bars tight?
    - Shoes clip in and out; cleats not worn
    - Nothing hanging or loose on you or bike?
    - Front and rear lights if you might ride after dark
      - You Want To Be seen rear and front
      - Dress in bright clothing; reflective is best
      - Avoid the flashing/blink settings
Preventing Accidents

• On the ride
  - Know your riding partners, especially for pace lines
  - Make sure all ride predictably and safely
  - Don’t say “clear” at intersections
  - Watch out for end of ride pre-bonkers

  - DON’T BE THE CAUSE OR RESULT OF A SLOPPY RIDER CAUSING AN ACCIDENT
Rib Fractures

Information

• Point 1
• Point 2
Pleural Effusion

Information

• Point 1
• Point 2
Thank You!