Post-Katrina, Pre-Deployment Medical Intelligence

Marcel J Casavant MD FACEP FACMT
Medical Director, Central Ohio Poison Center
casavant@chi.osu.edu
Post-Katrina, Pre-Deployment Medical Intelligence

- Pre-Katrina Hazards of the Land
- Post-Hurricane / Flood Hazards
- Evacuation / Refugee Hazards
- Insurgency Hazards
- Deployment Advice
Sources

- CDC & WHO
- ProMed.org
- FEMA & DHS
- CNN & weatherchannel
- Yahoo! Newsgroups: domestic preparedness, homeland security
- Medical Literature
- After-action reports
- LA poison center / DOHH
Pre-Katrina Hazards

• Animals
  – Snakes
  – Spiders
  – Fire ants
  – Alligators + / or Crocodiles

• Mosquito-borne diseases
  – Encephalitis
  – West Nile
  – Dengue
Snakes

- Elapids: coral
- Crotalids: rattlesnakes, cottonmouth = water moccasin, copperhead
Pygmy rattler
TIMBER RATTLER
Water moccasin
copperhead
Crotalid Bites

- Local: pain, swelling, necrosis, compartment syndrome
- Neuro: weakness, fasciculation, paresthesia
- Cardiovasc: vasodilation, pulm edema, shock
- Coagulopathy & thrombocytopenia
- Rx: monitor site, swelling, limb, CNS, coags, vitals 8-12 hrs; Td, +/- ABx, antivenin if progressive edema or serious systemic effects
- Compartment syndrome is very rare; fasciotomy is usually not indicated
- Consult Med Tox (?), Hand/Ortho/Gen surgery
Elapid Bites

• Often dry bites; but Sxs may be delayed > 12 hrs
• Nausea, vomit, confusion, excitation & euphoria, fasciculations, weakness, +/- resp arrest
• Rx: Td, +/- ABx, specific antivenin (sometimes) available: usually indicated if coagulopathy or mod/severe neuro tox
• Consult Med Tox (?)
Spiders

- Black Widow: painful, some redness & swelling; pain and cramps move from site to back and abdomen; need analgesics, benzos, rarely calcium or antivenin.

- Brown Recluse: non-painful bite, evolves over days to skin lesion with some necrosis. Strongly consider differential diagnosis: lots of things blamed on spiders are really other diseases. Treatment is just supportive; fancy antidotes don’t help.
Hazard: Fire Ants

- Multi stings per ant
- 1 – 100s ants
- Pain, Allergy, Low BP
- Rx: removal: brush off with cloth
- Rx: epi, diphenhydramine, steroids, analgesics, fluids

TX Dept Agriculture
Alligator

- Consult National guard
mosquito
Flavi: Saint Louis Enc (SLE)  Alpha: Eastern Equine Enc (EEE)  Bunya: California Enc (CE)

Flavi: West Nile Enc (WNV)  Alpha: Western Equine Enc (WEE)  Alpha: Highlands J Enc (HJ)
## SLE: Initial Symptoms

<table>
<thead>
<tr>
<th>Initial Symptoms</th>
<th>N</th>
<th>Y</th>
<th>%Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>21</td>
<td>39</td>
<td>74</td>
</tr>
<tr>
<td>Headache</td>
<td>26</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>Vomiting</td>
<td>44</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>Light Sensitivity</td>
<td>42</td>
<td>18</td>
<td>35</td>
</tr>
<tr>
<td>Neck Stiffness</td>
<td>40</td>
<td>20</td>
<td>37</td>
</tr>
<tr>
<td>Tremor</td>
<td>29</td>
<td>31</td>
<td>56</td>
</tr>
<tr>
<td>Disorientation</td>
<td>44</td>
<td>16</td>
<td>33</td>
</tr>
<tr>
<td>Confusion</td>
<td>40</td>
<td>20</td>
<td>37</td>
</tr>
<tr>
<td>Coma</td>
<td>56</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Muscle Weakness</td>
<td>35</td>
<td>25</td>
<td>46</td>
</tr>
<tr>
<td>Rash</td>
<td>57</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Joint Pain</td>
<td>49</td>
<td>11</td>
<td>18</td>
</tr>
</tbody>
</table>

## Admitting Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>3</td>
</tr>
<tr>
<td>Fever/Nausea/Vomiting</td>
<td>2</td>
</tr>
<tr>
<td>Encephalitis</td>
<td>7</td>
</tr>
<tr>
<td>Meningitis</td>
<td>9</td>
</tr>
<tr>
<td>Headaches</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
</tbody>
</table>
West Nile Fever: Human Disease

- Incubation period usually 5 (3) to 15 days
- Asymptomatic
- Febrile, influenza-like illness with abrupt onset
- Moderate to high fever
- Headache, sore throat, backache, myalgia, arthralgia, fatigue
- Rash, lymphadenopathy
- Acute aseptic meningitis or encephalitis
- CNS involvement and death in minority of cases
- Most fatal cases >50 years old; 4-18% of hospitalized die
- RX: Supportive care
Dengue

• Mosquito-borne
• Incub 4 – 7 days, then fever, HA, Nausea, vomit, myalgia, rash; face & eye flushing, pain, edema; young children: mild viral syndrome; usually no adenopathy
• RX: fluids, analgesic (no NSAIDS), supportive care
Post-Katrina Hazards

- Animals
- Animal-borne diseases
- Food Poisoning
- Chemical Exposures
- Smoke Inhalation
- Skin Punctures
- Tetanus
- Mold
Hazard: Animals

• Avoid wild / stray.
• Even pets have instincts.
• Secure food sources.
• Remove dead animals.
• Get help.
Raccoons spread Rabies

- 50K – 100K deaths/yr; recent survival in USA
- Incubate 2 – 90 d; no Sx
- Prodrome 2-10 d: viral Sx
- Acute phase: 0 – 10 d: neuro Sx, hypervent, hydrophobia, hyperactive, paralysis, anxiety
- Coma 0-14 d, shock, apnea, arrhythmia, arrest
Leptospirosis

- From raccoons, pets, birds, contam. water, rodents
- Pneumonia, fever, conjunctivitis, adenopathy, aches, diarrhea → liver, kidney, brain
- Dx: serology, or dark-field microscopy
- Rx: IV Pcn G if severe, else amox or doxy

http://themalms.com/tenYearFieldTrip/
Rash of Rat-bite fever
Rat bite fever

- *Streptobacillus moniliformis* or *Spirillum minus*, which are part of normal oral flora of rodents, including squirrels.

- **Transmission**: bites, contaminated food, milk or water.

- **Incubation**: 1 to 36 days.

- **Symptoms**: Fever, chills, cough, malaise, headache, local lymphadenitis, nonpruritic morbilliform or petechial rash involving the palm and soles, migratory polyarthritis.

- **Treatment**:
  - Procaine Penicillin 600,000 units IM bid for 7-10 days.
  - Tetracycline 30 mg/kg/day po in four divided doses, or
  - Streptomycin, 15mg/kg/day IM in two divided doses for PCN allergic patients

- **Mortality untreated**: 10%, with most deaths caused by endocarditis and pneumonia.
Food Poisoning

Come On In
An aerial view of a convenience store in Pass Christian, Miss., with no roof, as a customer, right, is helped by the store's employee, left, on Friday.

AP PHOTO
Food poisoning

- **Salmonella**: Causes moderate illness with nausea, vomiting, crampy diarrhea, and headache. In people with impaired immune systems salmonella can become a life-threatening illness. It is transmitted by undercooked foods such as eggs, poultry, dairy products, and seafood. Treatment: antibiotics only in severe cases: carrier state may be prolonged. Ciprofloxacin 250 mg bid X 7 days or TMP/SMX

- **Campylobacter**: Causes mild illness with fever, watery diarrhea, headache, and muscle aches. It is transmitted by raw poultry, raw milk, and water contaminated by animal feces. Treatment: Erythromycin 50 mg/kg (max 2 g) or Ciprofloxacin 250 mg bid 7-10 days for adults.

- **Staphylococcus aureus**: Causes moderate to severe illness with rapid onset (1-7 hours) of nausea, severe vomiting, dizziness, and abdominal cramping. This contaminant produces a toxin on foods such as cream-filled cakes and pies, salads and dairy products.

- **Bacillus cereus**: Causes mild illness with rapid onset of vomiting, with or without diarrhea and abdominal cramping. It is associated with rice (mainly fried rice) and other starchy foods such as pasta or potatoes.
Food poisoning

- **Escherichia coli (E coli):** Causes moderate to severe illness that begins as large amounts of watery diarrhea, and then turns into bloody diarrhea. There are many different types of this bacterium. The worst strain can cause kidney failure and death (about 3-5% of all cases). It is transmitted by eating raw or undercooked hamburger, unpasteurized milk or juices, or contaminated water.

- **Shigella (traveler’s diarrhea):** Causes moderate to severe illness with fever, diarrhea containing blood or mucus or both, and the constant urge to have bowel movements. It is transmitted in water polluted with human wastes. Treatment: Cipro 250 mg po bid or Bactrim.

- **Clostridium botulinum (botulism):** Causes severe illness affecting the nervous system. Symptoms start as blurred vision. The person then has problems talking and overall weakness. Symptoms then progress to breathing difficulty and inability to move arms or legs. Infants and young children are particularly at risk. It is transmitted in foods such as home-packed canned goods, honey, sausages, and seafood. Treatment: Antitoxin.

- **Vibrio cholera:** Causes mild to moderate illness with crampy diarrhea, headache, nausea, vomiting, and fever with chills. It strikes mostly in the warmer months of the year and is transmitted by infected, undercooked, or raw seafood. Because cholera not commonly found in the U.S. Gulf States area, it is very unlikely that they would occur after Hurricane Katrina. Treatment: Doxycycline 300 mg po as a single dose; children TMP/SMX as 5mg/kg.
Food poisoning

Viruses

- **Norwalk virus**: nausea, vomiting, diarrhea, abdominal pain, headache, fever. These symptoms usually resolve in 2-3 days. It is the most common viral cause of adult food poisoning and is transmitted from water, shellfish, and vegetables contaminated by feces, as well as from person to person.

- **Rotavirus**: vomiting, watery diarrhea, fever. It is the most common cause of food poisoning in infants and children and is transmitted from person to person by fecal contamination of food and shared play areas.

- **Hepatitis A**: fever, loss of appetite, and fatigue followed by jaundice, dark urine, light stools. It is transmitted from person to person by fecal contamination of food and water, or hand-to-mouth activity.
Food Poisoning

Parasites:

- **Giardia** (beaver fever): watery diarrhea, abdominal cramps and greasy stools often lasting 1-2 weeks. *Giardia* is found in soil, food, water, or surfaces that have been contaminated with the feces from infected humans or animals. Symptoms of giardiasis normally begin 1 to 2 weeks (average 7 days) after becoming infected.

- **Cryptosporidium**: large amounts of watery diarrhea lasting 2-4 days. Symptoms of cryptosporidiosis generally begin 2 to 10 days (average 7 days) after becoming infected with the parasite. May become a long-lasting problem in people with poor immune systems (such as people with kidney disease or HIV/AIDS or those on chemotherapy for cancer). It is transmitted by contaminated drinking water.

- **Treatment**: Anti-Parasitics Nitazoxanide or Metronidazole
Food Poisoning

- Oral > IV hydration
- ABx if bloody or mucoid stool or if ? Sepsis
- Anti-diarrheals if watery stools
- Generous antiemetics
- Regular diet as tolerated
Chemical Exposures

- Carbon Monoxide
- Hydrocarbons
- Smoke
Carbon Monoxide

- A major killer after hurricanes
- Sources: GENERATORS, idling boats & vehicles, indoor grills, power washers
- Invisible, odorless, tasteless (might see or smell exhaust fumes though)
- Headache, weakness, fatigue, nausea/vomiting, dyspnea, cardiac ischemia or arrhythmia, confusion, coma, seizure, death
- Great mimicker: CO could look like viral syndrome, stress, fatigue
Carbon Monoxide

- Always suspect it, and ask about exposures.
- Treat with 100% oxygen until carboxyhemoglobin level measured.
- Hyperbaric oxygen for selected patients: especially if coma, pregnant, cardiac ischemia.
Chemical: Hydrocarbons

Katrina's Impact

Covered in Water
This Mobile, Ala., service station is underwater after Katrina’s surge hit the Gulf Coast.
Hydrocarbons

- In / on contaminated water
- Eye, nose, throat, GI irritation
- Supportive care
- Watch for aspiration (even tiny doses), anemia (after large oral doses)
Katrina's Impact

Ablaze
A fire burns on the east side of New Orleans following an explosion which jolted residents from sleep early Friday morning. In the aftermath of Hurricane Katrina, firefighters say they will let the fire burn itself out. Additionally, two other fires burned in separate parts of New Orleans on Friday.
Smoke

RX

• fresh air
• Supportive care
• Brochodilators / steroids
Puncture Wounds

Katrina's Impact

Clean Up Begins
Crews begin to clean up the destruction left by Hurricane Katrina on Friday in Gulfport, Miss.
Katrina's Impact

Shoe In
Jeremiah Ward wears his make-shift shoes after he was rescued Tuesday in the 9th Ward of New Orleans.
Punctures

- Always suspect foreign body
- Expect unusual pathogens after contaminated water contact (gram negatives, enterics) or seawater contact (Vibrio vulnificus)
- Clean / irrigate / don’t close
- ABx: maybe not just for Staph & Strep spp.
- dT if needed
- Tetanus prone: TIG (with crush, delayed presentation, contamination: many post-disaster wounds really are tetanus prone)
Vibrio vulnificus

• From seawater on wounds, or undercooked seafood/shellfish; NOT contagious
• Susceptible: elderly, OR liver disease, OR immunocompromised patients
• Wounds: get red, swollen, hemorrhagic, blistered; bacteria spread → sepsis
• Rx: doxycycline + 3rd gen cephalosporin + aggressive cleaning & surgical debridement
• Vibrio vulnificus wounds: 20% mortality
### Tetanus Immunization

<table>
<thead>
<tr>
<th>History</th>
<th>Non-tetanus prone wound</th>
<th>Tetanus prone wound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown or less than 3 injections</td>
<td>Td</td>
<td>Td plus tetanus immune globulin</td>
</tr>
<tr>
<td>At least 3 injections: (last injection: 0-5 years)</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>At least 3 injections (last injection: &gt; 5 years)</td>
<td>None</td>
<td>Td</td>
</tr>
<tr>
<td>At least 3 injections (last injection: 10+ years)</td>
<td>Td</td>
<td>Td</td>
</tr>
</tbody>
</table>

- Tetanus prone wounds: > 6hrs old; contaminated, infected, puncture, crush, burn, frostbite
- Tetanus immunization: safe in pregnancy.
Tetanus – Prone Wound

• Fairly uncommon in most USA emergency departments
• Fairly common after major disaster: contamination, delayed presentation to health care, crush, already infected, burn or frostbite
• If tetanus prone: need TIG unless you know patient has had at least 3 Td or DPT shots already
Tetanus

- Acute, often fatal: Clostridium tetani
- Incubate <24 hr → months
- Sx: hypertonia, contractions, trismus (75%), neck rigidity, rigidity spreads: jaw, face, limbs, trunk: extensor rigidity
- Rx: find, debride, clean wound; TIG IM, Td IM; ?ABx (metronidazole); prophylactic intubation with paralysis, sedation; supportive care
Mold

- Spores and off-gassing: not ghostly or mysterious.
- More sensitive: asthma, allergies, lung dz
- More susceptible to infection: immunosuppression (N-95 mask helps)
- Sx: irritation (eyes, nose, throat, lungs) with tearing, redness, wheezing, dyspnea), skin rash
- Rx irritation: fresh air, asthma/allergy Rx
- Rx infection: antifungals IV
- Cleanup: 1 cup bleach in 1 gal water
Evacuation / Refugee Hazards

- Diarrhea
- Dehydration
- Heat-Related Illness
- Communicable diseases
- Meds & Vaccines
  - Side effects
  - Drug Interactions
  - Withdrawal
Dehydration

- **Associated conditions:** fever, heat exposure, nausea, vomiting, diarrhea, lethargy, diseases such as diabetes, no access to safe drinking water.

- **Signs & Symptoms:** weakness, dizziness, tachycardia, orthostatic hypotension, dry mucous membranes, poor skin turgor, decreased urinary output.

- **Treatment:**
  - Carbohydrate/electrolyte-containing drinks along with water. Oral rehydration should be taken by patient in small, frequent volumes (spoonfuls or small sips); see attached table for recommended volume and time period.
  - Cool the person, if there has been heat exposure.
  - If there are signs of significant dehydration (elevated resting heart rate, low blood pressure), fluids are generally given through an IV.
  - Antimotility agents such as Lomotil® or Immodium® should be considered only in patients who are NOT febrile or having bloody/mucoid diarrhea.
  - The decision to treat with antimicrobial therapy should be made on a patient-by-patient basis, on clinical grounds, which may include: Fever, Bloody or mucoid stool, Suspicion of sepsis.
Heat related Conditions

Presentation:

• **Heat cramps:** Pain and cramps occur in the muscles

• **Heat exhaustion:** Symptoms include weakness, dizziness, anxiety, lack of muscle coordination, palpitations, headache, muscle cramps, diarrhea. People who experience heat exhaustion are tired but not confused.

• **Heat stroke:** Characterized by any or all of the symptoms of heat exhaustion and altered mental status.
Heat Related Conditions

Treatment:

- **Heat cramps**: A person should rest and drink water or an electrolyte solution (for example, Gatorade). Stretching or directing pressure on the muscles may decrease cramping.

- **Heat exhaustion**: A person should rest in a cool location and elevate the feet about 12 inches. A person should also drink water or an electrolyte solution. IV fluids should be administered if available. Untreated heat exhaustion may lead to heat stroke.

- **Heat stroke**: Treatment consists of rapid cooling. Ice should be placed in the person's armpits and groin area. The person should be dampened with a water spray, wet sponges, or wet towels. Air should be blown over the person with a fan. Cool IV fluids should be infused if available.
Viral Hepatitis: A & B

- **Sx:** anorexia, nausea, vomiting, fever, jaundice, pruritus, dark urine, light stools (grey or clay-colored) +/- enlarged, tender, or nodular liver, +/- splenomegaly
- **A:** contaminated food / water; hand-to-mouth
- **B:** IVDA, STD, dirty needle, transfusion
Tuberculosis

- At risk: elderly, homeless, prisoner, sheltered, crowded
- Primary inf: ASx (usually), pneumonitis (rare), progressive & fatal (very rare unless immunosuppressed)
- Reactivated TB: **systemic** (night sweats, fatigue, wt loss); **pulmonary** (productive cough, hemoptysis, pleuritic chest pain, +/- pleural effusion); **extrapulmonary** (bone / joint, adrenal, CNS, GI, GU, pericardial, peritoneal)
Tuberculosis

• Suspect it!
• Isolate patient to protect staff & others.
• Check PPD (false neg if immunosuppressed)
• Rx: usu start 4 drugs: rifampin, pyrazinamide, ethambutal, INH
Influenza

• Influenza season approaching rapidly
• High population density in shelters, less handwashing, poor respiratory etiquette all increase risks
• Rx: hydration, analgesic/antipyretic, consider antiviral meds, consider prophylaxis once disease suspected in a community (e.g. shelter)
Orlando, Fla., August 31, 2005 -- Tim Butler, FEMA Disaster Employee from Boise, Idaho receiving inoculation from Reshanda Crayton. Leif Skoogfors/FEMA
Vaccines

- Pain, fever, rare neuro reaction, common “viral” reactions
- Caution in pregnancy
- Caution if immunosuppression
- Caution if prior reactions
- Consult an expert
Meds: Drug Side Effects

- GI common
- CNS rare
- CVS rare but deadly
- MANY DRUG – DRUG INTERACTIONS

- Consult a good reference or drug expert
Insurgency Hazards

- Save Sentimental for later.
- Shot / shot at: police, national guard, EPA, medical helicopter, coast guard, local fire dep’t, civilians, children.
- Stay together, follow the rules, 100% accountability, no joke.
As Soldiers form up to manifest in the background, Sgt. Richard Kauth of the 540th Quartermaster Company, his son, Richard Jr., and his wife, Cynthia, join for one last tearful good-bye. US Army photo by Sgt. Stephanie L. Carl
Deployment

- What to bring: checklist
- Health / fitness
- Personal / family / financial / work
- Communications plans
“He’s training with the CERT because he has a niece in New Orleans, and no one’s heard from her.”

- news
Katrina's Impact

Help Stuck
A Red Cross truck sits flooded with other vehicles in front of a hotel just off Interstate 10 in Pascagoula, Miss., as Hurricane Katrina batters the area, Monday.
Magic Box

- Even newly-federalized volunteers have none.
- We’re all vulnerable.
- Be careful.
- ICS has Safety Officer, but
  - Watch out for yourselves.
  - Watch out for each other.
- Teams have sanitarians, but
  - Wash your hands.
  - Only official food / drink.
Stress Effects

- Stay healthy
- Debrief
- Take time
- Use resources
- Don’t fear “touch-feely”
- Don’t expect “business as usual” on return
Handwashing

• Frequently
• Thoroughly
• Soap & water
  – Or alcohol-based gel cleaner
Reference?

• Don’t expect WWW, printer, library

• Do bring pocket guides, maybe texts

• Surf the web now, and print.

• Electronic devices: may not recharge; may not connect, may get wet / lost / stolen.
Skin Creams

• Lots of sunscreen
• DEET or picaridin bug repellant but wash off
• Alcohol based hand wash
Poison Control

- All centers in affected areas either working, relocated & working, or covered by other centers per disaster plans
- Staffed by nurses, pharmacists, physicians 24/7
- Best number for all: 800-222-1222 (national number allows re-routing in disasters to functional centers)