MEDICAL EMERGENCIES AT SEA

Beyond First Aid

“I have known the sea too long to believe in its respect for decency”

Joseph Conrad

Capt Sam Lyness, M.D., F.A.C.S.
Subjects

• Medical Planning and Prevention
• Communications
• Resources
• Triage
• Medical Kits
• Sea Sickness
• Lacerations and Major Hemorrhage
Subjects

- Burns
- Hypothermia
- Fractures
- Carbon Monoxide Poisoning
- Eye Problems
- Anaphylactic Shock
- Head Injury
Disclosures?

None
Disclaimer
(doctors differ)
SCENE:

Half-way between coastal USA and Bermuda (300nm from nearest landfall)

Between Los Angeles and Hawaii (1,000+nm from nearest landfall)

Half-way between Cape Charles and Newport, RI (1-125nm from nearest landfall)
Planning and Prevention
RESOURCES

Weiss and Jacobs

MARINE MEDICINE
A Comprehensive Pocket Guide
2nd Edition

2012
IMMUNIZATIONS

- Tetanus - every 10 years
- Polio - not needed if received once in adult years
- Hep A and B – advised if going to tropics
- Japanese B – Asia, India, Western Pacific
- Typhoid – areas of poor sanitation
- Yellow Fever - Africa and parts of Latin Am
- Measles - if born after 1956 and not had a second one on or after first birthday
Pre Voyage Briefing

• **Safety ++++** Captain should have access to health issues and medication list for all crew members
• HIPAA regulations may interfere
• Ask crew members to have more than enough of their personal medication, perhaps twice as much
COMMUNICATIONS

• VHF radio w/ or w/o DSC no good >25 off shore:

  Suggest: Satellite Phone
COMMUNICATIONS

• Iridium Satellite Phone:
  • Rental plans:
    $25 - $60/wk

  some are waterproof w/ built in GPS

  $1.75/min
Remote Medical International (RMI) :

George Washington Med Ctr, Wash, DC
MD on call 24/7, sign-up in advance, fee based
202-715-4219
206-734-3427

In 2010 Bermuda Ocean Racers covered for about $95 per boat.
TELEMEDICINE ASSISTANCE

• **Divers Alert Network (DAN):** started as diving emergencies only
  24 hr hotline, Duke University, Durham, NC
  800-446-2671

DANBOATER *Safe Passage Program*
  $60/yr –(family $100) membership, 24/7 hotline
  $150,000 global rescue, land and sea
  $25,000 medical repatriation
  $25,000 search and rescue

Sign up web site: DANBOATER.ORG
U.S.C.G District 5 Command
Hampton Rhoads
Rescue Coordination Center

Cape Hatteras to Delaware Bay
(for Annapolis-Bermuda Race)
beyond VHF range
757-398-6232
U.S.C.G. Atlantic City Sector
Rescue Coordination center
Off New Jersey shore
beyond VHF range (25nm)
609-344-6594
U.S.C.G. Montauk Sector
Rescue Coordination Center

Montauk Point area-Block Island Sound

631-668-2773
RESCUE

• Coast guard MH-60 helicopter~
  range: 700 nm, 180 kn
  Unlimited range in tandem with Coast
  Guard C-130 --- refuels in the air
• Coast Guard Cutters -16-35kn
• Coast Guard reconnaissance: HC 144A
• turboprop (2000 nm range, 240 mph)
Bounty  Oct 29, 2012, Hurricane Sandy

16 total crew
14/16 rescued in about 1 ½ Hrs
1 dead - found later that day
1 missing
LIABILITY

Who’s to blame?
Jones Act (1920):
owner at fault
Was vessel seaworthy?

Civil Tort:
Captain or Master at fault
Mental state of Capt/Master?
Did he/she act reasonably?
----the knowledge and ability to act reasonably under stress and make tough decisions with respect to human life.
Costa Concordia

32 dead
64 injured

Capt Francesco Schettino
Bounty  Oct 29, 2012,  Hurricane Sandy

Capt Robin Walbridge, 63

16 total crew
1 dead
1 missing
2 injuries
What is a doctor’s primary obligation to the sick and injured?

• SAVE LIFE?
• RELIEVE PAIN/SUFFERING?
Basically, to relieve pain and suffering, but depends on Triage!
TRIAGE:

“The sorting out and classification of casualties of war or other disaster, to determine priority of need and proper place of treatment.”
Key to Assessment

TRIAGE

1. Will survive and recover whether treated or not. Pain control is 1<sup>st</sup> priority

2. Will die whether treated or not
   Pain control is 1<sup>st</sup> priority

3. Treatment will make a difference between saving and losing life/limb
   Saving life/limb is 1<sup>st</sup> priority
PAIN CONTROL

• VICODIN or LORTAB
  - HYDROCODONE 5 mg with
    TYLENOL 325
  1-2 tabs every 4-6 hours as needed

Must get prescription from a doctor
ANXIETY/PANIC CONTROL

- Ativan (Lorazepam) 1.0 mg tabs
  1 tab twice or three times/day

Prescription from doctor
Saving Life

ABCs

• A  Airway
• B  Breathing
• C  Circulation

You learn these in CPR
What’s new in CPR?  
(Hands only CPR)

No more mouth to mouth breathing, rather 100/min chest compressions except in the following:

1. Children < 12
2. Known or suspected drug overdose
3. Drowning
4. CO poisoning

then 30/2 (compressions/breaths)
MEDICAL KITS
R.M.I.

$7,295
Medical Kits

A La Carte = more for less
Make your own

What I carry

HeartSine A.E.D.
Sea Sickness

Mal de Mer
Dr Graybiel
Astronaut Program
Sea Sickness
Dr Graybiel

A. Mental Phase
1. Malaise 1 = tiredness, sleepiness
2. Malaise 2 = apathy

B. Physical Phase
3. Vomiting
4. Prostration

C. Adaptation and Recovery-about 72 hours
Risk: Dehydration and Prostration
Sea Sickness
Dr Graybiel

Requires two medications:

One for physical symptoms = Phenergan 25 mg orally or rectally

One for mental symptoms and drowsiness caused by the Phenergan = Ephedrine SO4 mg 25 mg orally

Prescription items
Non-Prescription

- Dramamine (dimenhydrinate 50mg)
- Caffaine (NODOZ) 200mg tabs
Non-Prescription

- Dramamine (less drowsy)
  Meclizine 25mg (Bonine)
Sea Sickness

Scopolamine Transdermal
visual side effects

Prescription
STUGERON
(Not made nor sold in USA)

“PREVENTS OR CURES sea sickness w/o side effects”

- CINNARIZINE - 40 different preparations
- Mfg 1955 Janssen Pharm - Anti-histamine/ Calcium Channel blocker, 15mg, 25mg and 75mg (forte)
- Not FDA approved due to many reports of adverse reactions including coma and death
- Banned for use by pilots in US because it impairs judgment.
- Available from other countries (Canada) via internet $35 for 100 15 mg tablets
- CAUTION ADVISED
Sea Sickness Remedies

- Ginger Tablets
- Ginger Ale
- Ginger Snaps
- Acupressure (sea bands) on P6 acupuncture site - wrist
- Electrical stimulation at same site
- Aroma therapy
Assign victim to lookout duty or helmsman duty
Cuts and Lacerations

No wound has to be sutured

Just keep it clean
Irrigating solutions

1. Bottled water

or

2. Betadine 2 teas per pint of water (disinfected soln.)
How to stop major bleeding from lacerations of large arteries and veins
Chitin derivative (Chitosan): crab, lobster and shrimp shells.
Chitosan Hemostatic Agents

1. Celox

2. HemCon

both come as powder, gauze or pad

gauze is the most useful version, also
good for 3rd degree burns (later)
(short video)
HELPS TAPE STICK TO SKIN
Tourniquet

Still has some usefulness if employed temporarily:

• Apply to save life
• Limb is lost if tourniquet is on for more than 3-4 hours
BURNS

- 1\textsuperscript{st} degree – painful, touch pain, no blister
- 2\textsuperscript{nd} degree - painful, touch pain, blisters
- 3\textsuperscript{rd} degree - burn area usually black, is numb and insensitive to touch
Rule of nines
1<sup>st</sup> and 2<sup>nd</sup> Degree Burns
Burn area is painful to touch
Rx: Pain Control, Keep it clean
3rd Degree Burns

**Dressing Alternative:**
- Celox or HemCon Gauze.

Cooling and antibacterial
When to worry

1. >20% 2\textsuperscript{nd} Degree
2. >10% 3\textsuperscript{rd} Degree
   Leads to dehydration and shock. Must push fluids.
3. Burns, flash or flame, on face.
   Leads to airway obstruction. Must be prepared to perform cricothyrotomy

CALL FOR RESCUE
Flash burns of face and neck
Rusch QuickTrach

YouTube video available online
Heat Exhaustion vs Heat Stroke

**Heat Exhaustion:**
- Profuse perspiration
- Normal temp +/-
- Mentally clear

Problem: dehydration

Rx: Hydrate promptly
Rapid recovery

**Heat Stroke:**
- Little or no perspiration
- Temp = 104+ degrees F
- Delirium

Problem: failure of brain temp. regulation center, 4+ dehydration

Rx: rapid cooling, hydrate
Call for rescue

30% mortality
Fluid Formulas

Hydration fluids orally

1. ½ teasp salt and 3 Tbls of sugar per quart of water, or
2. Gatorade dilute to 1/3rd with water, or
3. Kool-Aid with ½ teasp salt per quart.
Immersion Hypothermia

Web Site:

COLD WATER BOOT CAMP USA
Dr Giesbrecht

click on the video or YouTube links
FOUR PHASES OF IMMERSION HYPOTHERMIA

1. Cold water shock- Respiratory crisis- may drown from gasp reflex (older people ventricular fibrillation)

2. Cold water incapacitation – 5-15 min
   not be able to stay afloat, can’t self-rescue

3. Core body hypothermia - 1-2 hours
   ventricular fibrillation

4. Rescue collapse – death during rescue. Cause?
COLD WATER RESCUE

- HORIZONTAL AND GENTLE = GOOD!

- VERTICAL AND ROUGH = BAD

Life Jacket
FRACTURES AND DISLOCATIONS
FRACTURES

An educated guess unless:

• Deformity
• Crepitus (grating sensation)

Persisting point tenderness, rapid swelling, back and blue
FRACTURE TREATMENT

BASICS FOR ALL FRACTURES:

• Place the part at rest by splinting and immobilizing as best can be accomplished.

Pain Control
Fractures

If no deformity, ask the victim to move the extremity. If the range of motion is full there is probably no fracture and definitely no dislocation.
Eastern Mountain Sports
or On-Line
Splinting a thigh fracture

Cut the t-shirt in a circular fashion.
If circulation is impaired, the hand or foot will last about 3-4 hours before permanent damage sets in leading to amputation.
Fractures with deformity and impaired circulation
If the bone is protruding through the skin:

- Saturate the tissue and bone with Hydrogen Peroxide
- Then with antibacterial solution
- Cover with sterile dressing
- Then reduce and splint

Call for Rescue
All Fractures of Extremities

RICE

- REST
- ICE
- COMPRESSION
- ELEVATION
In the absence of a fracture the victim will automatically begin to use the extremity after a short period of time, perhaps several hours. No harm will be done even if a fracture does exist.
CARBON MONOXIDE POISONING

Most Common Cause of Death Due to Poisoning in the United States.
CO Poisoning
Symptoms
(do not arouse from sleep)

- Not unlike seasickness or flu
- Headache
- Nausea
- Dizzy feeling
- Vomiting
- Drowsiness
- Cherry red color to skin (not always)
- Coma
Carbon Monoxide

• Colorless, Odorless, Tasteless
• Slightly lighter than air, diffuses rapidly into entire space
• Combines with blood rendering it useless in carrying oxygen
• Harm related to dose and duration
CO Sensors

Kidde
(battery operated)

First Alert
(battery operated)

Fireboy
12 v only
Fireboy- XINTEX

- Marine store or online
- $85-$110
- Claims to be for marine environment
- 12v only
- Biomimetric sensor
- Remote units all alarm at once
- Auto shutdown of genset
- Lasts 5 years
CO poisoning
Treatment

• Fresh air
• Oxygen if available
• CPR (30/2) if no pulse and no breathing

Half-life of COHb is about 5 hours
False and Nuisance Alarms
EYE emergencies
UVB damage to eye
UV blindness

- Photokeratitis
- Prevented by glasses or sunglasses
SALT WATER CONJUNCTIVITIS

Vibrio Vulnificus
EYE TREATMENT KIT

Prescription item
Penetrating Eye Injuries

• Leave object in eye and cover with a cardboard or styrofoam cup tapped to the face as best you can
Antibiotic Eye Drops

Spontaneous conjunctivitis

Traumatic conjunctivitis
Anaphylactic Shock
Allergy/Anaphylactic Shock

- Bee stings, Hazardous marine life stings, Food allergies, Unknown allergens
- Most people with allergic histories have a routine for avoidance and have appropriate medications
Severe Allergic Reaction
Anaphylactic Shock

swollen lips and tongue, wheezing, severe asthma, obstructed breathing, choking loss of blood pressure (shock)
Anaphylactic Shock

- First treat the shock- have victim lie on back an raise feet and legs up at least 12 inches.
- Give epinephrine (adrenalin) injection ASAP
- Benedryl 50 mg
- May need 2nd inj.

Prescription item:
2 pack
HEAD INJURY
Head Injury

Frequently associated with a neck injury
C-spine Immobilization
Rest and Pain Control
Head Injury Treatment

- No treatment for brain-it will recover or not depending on the magnitude of injury.
- Skull fracture – not serious in itself since not a vital structure and requires no treatment unless depressed which usually can wait.
- Concentrate on ABCs and neck immobilization if victim is unconscious, rest for 24 hours.
- Most, 90%, recover and are fully active in 24 hours and can return to crew duties.
Head Injury
when to worry

- Prolonged unconsciousness or prolonged periods of bewilderment or poor performance. Others have to make this call.
- Open skull fracture with brain tissue exposed. Cover with a dressing and wrap head.

Call for rescue
HEAD INJURY

Victims that talk than die

After being alert, deteriorates with headache, vomiting, coma and brain death within 12-24 hours

EPIDURAL HEMATOMA
Ciprofloxacin 750 mg (Cipro)
1 daily for 5 days
Fell while skiing on a beginners slope. Thereafter alert, joking. Several hours later back at the hotel complained of severe headache. Lethargy, coma followed. Brain dead the next morning.

What could have saved her life?

Natasha Richardson, age 45
March 2009
PRURITIS ANI

Itchy anus

Wash clean, dry and apply, “Ah”
Off-Shore Medical Kit

Dry Supplies:
- Bandaids - assorted
- 4x4 gauze dressings
- Gauze roll
- Eye patches - gauze
- Adhesive tape
- Latex or plastic gloves - one box
- Rusch QuickTrach
- Celox or HemCom gauze
- Ace elastic bandages - 4” and 6”
Off-Shore Medical Kit

Dry Supplies (continued)

• SAM splint
• Thermometer that reads below 90 degrees
• C-A-T Tourniquet
• Triangular bandage-for sling
• Sail ties – for fixing splints to leg and body
• Telescoping Paddle or Oar- for long leg splint
• Wooden applicator sticks w/ cotton tip – to turn eye lid and remove foreign bodies
• Tongue blade - for finger splints
Off-Shore Medical Kit

Wet Supplies
- Soft Soap-antibacterial
- Solarcaine or Burnjel Plus
- Betadine (10% Povidone-iodine) soln
- Hydrogen Peroxide
- Tincture of Benzoine
- Alcohol swabs
- Eye kit with sterile saline wash and eye cup
Off-Shore Medical Kit

Medications: non-prescription:
- ASA 325 mg
- Headache remedy: Tylenol, Advil
- Antiinflammatory: Advil, Aleve
- Dramamine 50 mg (Dimenhydrinate)
- Dramamine 25 mg “less drowsy” (meclizine) also known as Bonine
- Ginger Tablets – for sea sickness prevention and treatment
- Caffaine 200 mg – to counteract drowsiness from sea sickness and Dramamine
- Benadryl 25 mg, Zyrtec 10 mg for allergies
- Imodium (lopareamide) 2 mg -for diarrhea
- Nupercainal Ointment – for pruritis ani
- Antacid w/ Pepcid (Famotidine 10 mg) for acid reflux heartburn.
Off-Shore Medical Kit

Medications: Prescription
• Vicodan or Lortab 5/325 x 30 generic brand- for strong pain
• Ativan 1 mg x 30 generic brand – for anxiety/convulsive seizures
• Phenergan 12.5 mg for sea sickness
• Albuterol Inhaler – for asthma attacks
• Compazine 10 mg injectable for severe sea sickness, last resort
• EpiPen (epinephrine 0.3 mg injectable) x2 for anaphylactic shock
• Eye drops: Tobradex (Tobramycin/steroid) for inflammation/
  Sulfacetamide (non-steroid ) post-traumatic inflammation
• Ear drops: Neomycin/Polymyxin/Hydrocortisone for external ear infections
• Silvadene 1% - for 3rd degree burns
• Z-Pack (azithromax 250 mg)- antibiotic for respiratory infections
• Cipro 750 mg x 20 for infections other than respiratory
Off-Shore Medical Kit

Other Supplies borrowed from galley and tool box:

• Vinegar- white, for ear drop solution.
• Ginger Snaps for sea sickness prevention
• Ginger Ale for sea sickness prevention
• Duct tape for stronger dressings
• Drill and large drill bit – for cranial trephine
Off-Shore Medical Kit

• **Resource:** MARINE MEDICINE: Comprehensive Pocket Guide by Eric Weiss, MD and Michael Jacob, MD  2nd edition, 2012

• **Communication:** While not part of the first kit, some dependable form of communication is important in the overall medical management plan