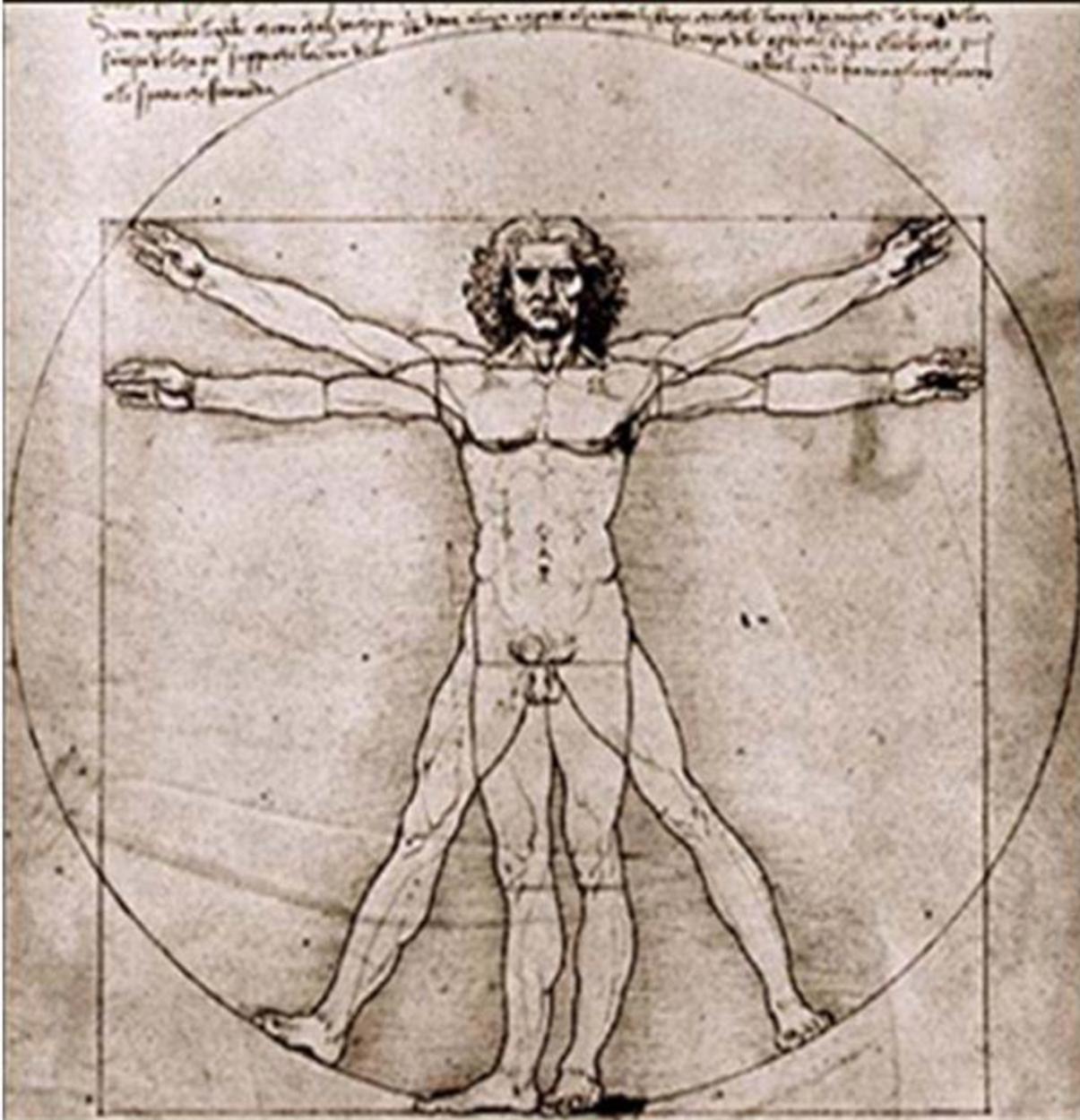


# Offshore Medicine: What You Need to Know (and Nothing More)



Edited by Derek Hillen

This ebook is all about saving someone's life offshore and maybe even your own. Most of us take off in boats knowing far more about the diesel engine than we do about the engine that is our own body. Using my case as an example; I was an Eagle Scout, took first aid courses in the past, did my CPR training etc., and I knew next to nothing. In an effort to eradicate some of my own ignorance on the subject I recently took a three-day wilderness medicine course offered by [Wilderness Medical Associates International](#), which I highly recommend.



The official course title is, “**Offshore Emergency Medicine**” and it is part of the **Ocean Navigator School of Seamanship**. Upon completion, not only do you get “*The Knowledge*” that is truly life-saving but a certificate and a really neat patch too.

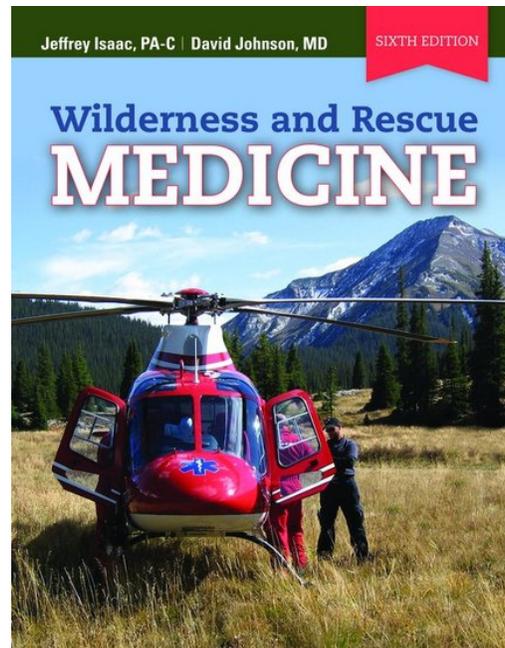
Our instructor was **Jeff Isaac, PA-C**, who was brilliant. He lives in Colorado, runs a clinic and spends a lot of time leading SAR teams (search & rescue) into the Rockies to rescue the injured, the sick and the dead. Jeff is also a sailor and has a Cape Dory 33 which he keeps in Maine. The CD33 is a great boat, I know I had one. She was my first and I still miss her.



The book we read before the course explained everything clearly and in a direct manner. “*Wilderness and Rescue Medicine*” was written by Jeff Isaacs and his business partner, David Johnson, who is the

owner of Wilderness Medical Associates. I recommend you buy it, read it and keep it on board. I have no financial interest in any of this and just want to pass along what I consider valuable information.

What amazed me most about the course was how simple the concepts are and because of that how much I learned. When you talk about a “blank slate,” that pretty much described me. I walked in there being able to put a band-aid on and that was about it. Now, I have “*The Knowledge*,” which I am writing down so I don’t forget. If you find this useful, so much the better, but all credit should go to [Wilderness Medical Associates](#).



**Note:** *I would like to stress: these are my notes from the class. This is what I learned and what I found most applicable to an offshore emergency. **Use them at your own risk.** I also accept no liability for anything written or expressed here. If you are the type of person who loves to sue people, well, then I have no time for you.*

## Salty Language

Another thing I would like to point out about offshore sailing: none of this horrible stuff is likely to happen to you or your crew. My wife and I sailed together on our last boat, *Tehani-li*, a Tayana 52, for three years. We cruised around **South East Asia**, across the **Indian Ocean**, through “**Pirate Alley**,” up the **Red Sea** and across **the Mediterranean**. The only medical issues we had were when I stupidly dropped the heavy wooden access panel to the engine room on my bare toe. Birds squawked, moneys screamed and children cried as salty language echoed across the lagoon. Although I lost the nail temporarily, all I needed was some antibiotic ointment and a bandage and I was good to go.

If you know anything about your diesel engine then you are in luck. Your body isn’t much different. Here are the basics and things you need to know. Everything else follows from that.

## What You Know is Probably *Wrong*

The first thing I learned is the very little I knew walking in there and the very little you learn from **Red Cross** or **YMCA CPR** classes is **ALL WRONG** - for an offshore setting! First aid classes you take ashore are always designed with the urban setting in mind: keep the patient alive until the ambulance arrives. So, like me, you probably thought, *“Yeah, I better take a “wilderness first aid” course. That should do the trick.”* While slightly better, “wilderness medicine” works on similar principles of *“keeping the patient alive for a few hours or a day or two until SAR show up.”* If you are sailing halfway between **Panama** and **the Marquesas** and something goes wrong, that isn't going to be the situation you find yourself in. This course is taught with just that in mind. You are on your own for several weeks with a very sick patient. How do you cope? We had 10 people in our class, all of them long distance sailors and the material and approach was designed with that particular set of circumstances in mind.

On a boat you have some advantages over the home and wilderness emergency scenario: you can carry A LOT MORE EQUIPMENT. Backpacking an AED around (defibrillator) when you camp isn't an option but putting one on the boat is, for example. (And we learned why you don't want to do that anyway. More on that later). The other difference is on a boat you may be days or weeks away from help. The ocean is the world's largest and most untouched wilderness. You need to be able to handle things on your own. Please don't think if you get on the radio or hit the EPIRB and you are 2,000 miles offshore that anyone can help you. Realistically, they can't. You need to help the patient stay alive for days or even a week or more until you can get to port, or at least closer to land where a helicopter rescue *might* be feasible.

All this means “offshore medicine” has a different set of circumstances and consequences than seeing some fat guy choke on an Oreo and collapse at Sears.

## It All Boils Down to This

Is it serious or not serious? For every single accident or injury that you encounter you need to answer this question. From that answer, you will immediately be able to determine a course of action. This mindset I found most interesting. Usually when we see blood, our own or someone else's, it's just time to freak out. You can't do that anymore and if you approach the problem just like you would your engine you will do fine. A guy falls and is bleeding from his head and his hand all over the deck – what do you do? Serious or not serious? Man, this is exciting and now let's dive into what you need to know.

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## Helicopters to the Rescue?



In a first aid situation, your job is always to enhance oxygenation and perfusion. For wound treatment, you need to control pain and prevent infection. Only call for a helicopter for life threatening problems. Remember, helicopter rescue is not a sure thing. You are putting the lives of the helicopter crew and that of your patient at risk. They are very difficult to do safely and can only be done near shore of a first world country. If you are voyaging across oceans you will rarely be in the comfortable situation of having helicopter rescue at hand.

### **Ship to Ship Rescue?**

Transferring a patient to a ship from a sailboat is even riskier. The chances that the sailboat gets crushed or the patient drops into the water and drowns are high. One would only attempt this in an extreme emergency. Surprisingly, most ships will not be as well-equipped as you are and their medical knowledge will be minimal. Pick a cruise ship or military vessel if you can.

The only other reason to affect a ship to ship transfer would be the speed that a bulk carrier or container ship can get a patient to shore or to a place within helicopter range (First World country scenarios only). Again, not a realistic choice. Be self-sufficient.

## Order for Dealing with an Emergency

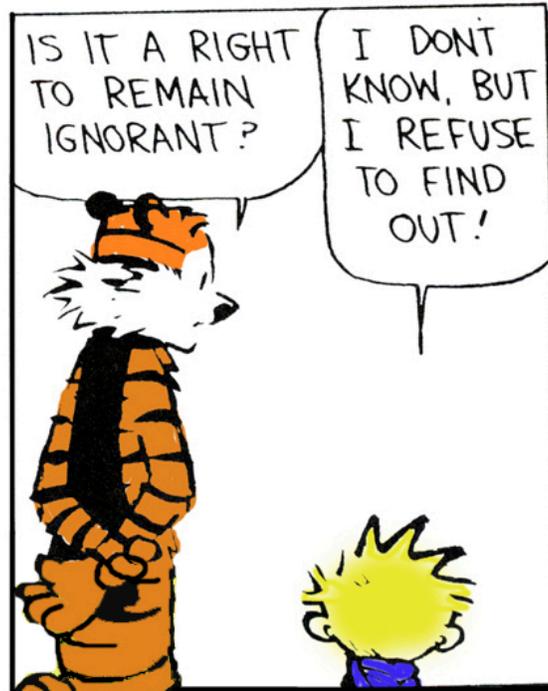
- 1) **Take care of the boat!**
- 2) **Circulatory system**
- 3) **Respiratory system**
- 4) **Nervous system**
- 5) **STOPEATS**

Jumping off the helm to help an injured person may imperil the boat, depending on circumstances, and then you will have a bigger problem. Always Take Care of the Boat First!



Most likely an injury will occur at the worst possible time and usually during rough weather. This is one of those iron-clad rules of cruising. It is imperative you know how to heave to and stop the motion of the vessel to provide a more stable and steady platform to handle the crisis. It is important all the crew know how to heave to as well. Practice this in calm weather before heading offshore.

## The Basics (or 4-3-2-1)



### The “Big Four”

The basic rule of thumb for health on board is the “Big Four.” As long as a person is:

- 1) Eating
- 2) Drinking
- 3) Peeing
- 4) Pooping

they are fine and not in trouble. Keep it in mind at all times. Our bodies are just like the diesel engine and will run without problems for years. A problem that is of concern will manifest itself by interfering with one of the “Big Four.”

### The Three Critical Systems

There are three basic systems that keep us alive and functioning. Anything that impairs one or more of these is serious. That is really all you need to know. The three critical systems are:

- 1) **Circulatory system:** Heart and vascular system

- 2) **Respiratory system:** Lungs
- 3) **Nervous system:** Brain

## Two Functions

There are two functions we need to learn here:

**Oxygenation** – Pretty much what it sounds like; the transfer of oxygen from the blood to the body.

**Perfusion** – The movement of blood through the veins and capillaries



In ALL first aid situations, your job is to enhance oxygenation and perfusion. That is the mantra. Please repeat after me:

*"Enhance oxygenation and perfusion."*

Anything that enhances oxygenation and perfusion is good. Anything that inhibits it is bad and a major problem.

## One Golden Rule

Anticipate. Whatever the situation, you need to have a plan.

*"For every problem there should be a plan. For every anticipated problem, there should also be a plan."*

Much like sailing along on a beam reach on a fine day, and you are at the helm taking in the glory of it all, thinking about how lucky you are and remembering the poor slob at work. You should stop and ask yourself, "*Right, mast falls over, what do I do now?*" or, "*We hit a log and start taking on water, what do I do now?*" This is proper seamanship and probably something you do already. It is the same thing dealing with a patient. What is the problem right now and what can it develop into? What will I need to do if that happens? What should I anticipate?

## The Three Critical Systems Again

Let's look at the three critical systems of the body again and the major potential problem with each that you always need to keep in mind:

<u>System</u>	<u>Problem</u>
<b>Circulatory system:</b>	<i>Shock</i>
<b>Respiratory system:</b>	<i>Respiratory failure</i>
<b>Nervous system:</b>	<i>Brain failure</i>

There are two other terms we need to familiarize ourselves with:

**Ischemia** (isskeemia): Lack of perfusion, or lack of blood flow to a particular area.

**Infarction**: Tissue death due to ischemia.

Blood must continuously flow over all living cells to bring oxygen and to remove metabolic waste. Absence of this regular flow is ischemia and it leads to rapid tissue death, or infarction.

Interestingly, while the tissues and cells in your arm, for example, can go without fresh blood for an hour or more before infarction starts, the cells in your nervous system, your brain, are exquisitely sensitive to lack of blood and will start to die within minutes without it.

The way the brain has evolved is a fascinating subject that science is currently still pretty unsure about. What we do know is the basic automatic functions, such as breathing, heart beating, swallowing, etc. are governed by the "inner brain" which evolved first. Snails and flies have this inner brain too. As we slowly extricated ourselves from the primordial muck and began to climb up the evolutionary ladder (some more quickly than others) our brains began to grow and develop other capabilities. What we have recently learned is the outside of the brain, the last to evolve, governs judgment and behavior. And this outer layer is the first to succumb to ischemia. This is what Jeff Isaacs calls, "*peeling the onion.*" Why is this key? Because if there is any damage to the brain or anything serious happening, behavior is impacted first.



When you walk into the ER or a clinic and complain about an injury the nurse or doctor always asks you a set of questions. What they are doing when you answer is watching to see if you answer the question asked and if your answers make sense. If you have an injury to the brain (you won't know it) your answers will not be completely coherent and the urgency of your case is immediately raised to the highest level. You need to watch for any behavioral changes in your crew as well. Is someone acting out of character after an injury? Did they fall and now don't seem to care about it? Are they normally a jerk but now, after an accident, they are very nice and easy to get along with? You may approve of the change but something is wrong here and deserves further investigation.

This is referred to changes in mental state and to measure consciousness the **AVPU scale** is used.

**A** = Awake

**V** = Verbal stimulus response, responds to voice only

**P** = Pain response, responds to pain only

**U** = Unresponsive

## Shock



[Image credit](#)

We have all heard this term and it does not have anything to do with electricity here. Shock is:

*inadequate perfusion pressure in the circulatory system.*

A lot of things can cause shock but the result is the same. There isn't enough pressure to push the blood around your body to where it is needed. Your brain and your heart suffer and you just die. It can happen quickly or slowly but the result is ALWAYS death. Shock is a MAJOR THREAT and needs to be reversed or death will result every time.

A major threat? That means it impact one of the three critical systems. Which?

This is a circulatory system problem.

There are three types of shock:

- 1) Blood → Volume shock
- 2) Vessels → Vascular shock
- 3) Heart → Cardiogenic shock

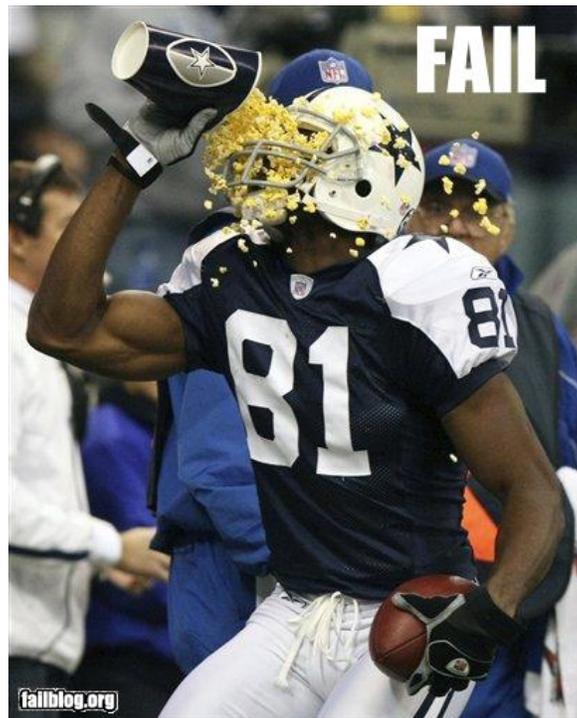
**Volume shock** is by far the most common and we need to get to grips with the signs and how it works.

**Cause:** Volume shock on a boat is most often caused by **dehydration:** not drinking enough. The problem is exacerbated by sea sickness. This can creep up on you or your crew. When you are dehydrated, your body suffers from a lack of water. To compensate for this it draws the water out of your blood, thus reducing the *volume* of blood in your circulatory system. Remember the definition of shock: inadequate

perfusion pressure. Sort of like running the faucet on board until the water tank begins to run dry.

Now this happens all the time without us going into shock right away and that is because the body, smart as it is, “compensates” for the lack of blood volume. The signs that demonstrate “compensated volume shock” are:

- Faster pulse rate (less blood so it needs to be pumped more quickly to do the same work)
- Respiratory rate up (breathing faster to compensate for less blood)
- Urine output down (obvious, lack of water in your kidneys)
- Skin perfusion down (blood is diverted away from the skin to the core organs)



[image credit](#)

Volume shock is always indicated by an elevated pulse rate – that is the First Clue.

Somebody with compensated volume shock, therefore, will have a higher pulse, faster breathing; they won't have urinated in hours and will look and feel pale and dry to the touch.

The body can maintain this condition for a while, but eventually blood pressure will drop and the condition moves from “*compensated volume shock*” to “*decompensated volume shock.*” That means death is right around the corner.

**Note:** *Those with children, such as me, should be aware that children can compensate for a long time but then all of a sudden crash and die. Adults, on the other hand, deteriorate sooner and more gradually.*

**Treatment:** Aggressive rehydration and calories while maintaining core body temperature.



[image credit](#)

A person in compensated volume shock will be very susceptible to hypothermia. Most people who dehydrate on a boat are doing so because of seasickness and may not be able to hold anything down. They must. Water may not be enough. A good idea is to carry an electrolyte powder, such as **GU**, that can be mixed with water to help replace critical lost salts and minerals. I know from personal experience as a (pretty lame) long distance runner that this stuff is “better than water” for rehydration.

The body can absorb up to one liter of fluid an hour. Mix a liter (quart) and have the patient sip it. Watch them and make sure it is gone in an hour. If they are too incapacitated to drink and hold liquids down then fluids must be given via a needle (we’ll get to that later) or rectally, via an enema. The body can absorb water rectally quite well. Just waving around the funnel, a tube and some Vaseline should motivate the patient into strenuous efforts at drinking...

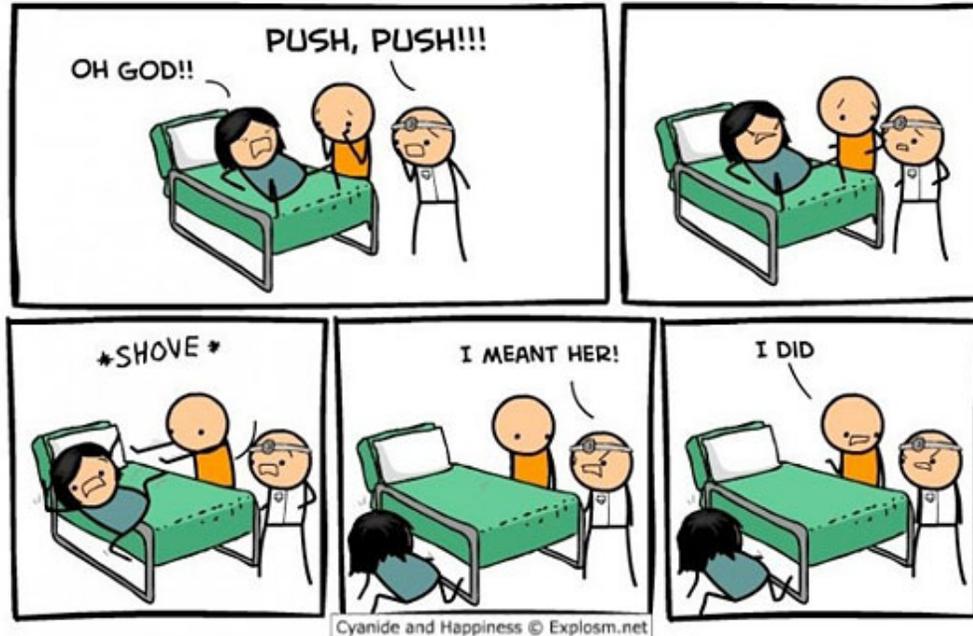


## Vascular Shock

Vascular shock is when the vascular system (veins and such) relax and dilate completely. Pressure drops immediately.

**Cause:** Anaphylaxis. A bad thing that is easy to fix (which we get to later). It can also be caused by sepsis, or blood poisoning caused by systemic infection. A severe spinal cord injury (thankfully rare) can also cause vascular shock. The cause of death in Toxic Shock Syndrome is vascular shock. The arteries and veins go slack with the result of a lethal drop in blood pressure.

**Treatment:** It is most important to keep the patient horizontal. Treat the cause, if possible.



more awesome pictures at [THEMETAPICTURE.COM](http://THEMETAPICTURE.COM)

## Cardiogenic Shock

**Cause:** Cardiogenic Shock can be caused by heart attack, chest trauma, or chronic heart disease. It is lack of perfusion pressure due to poor pump (the heart) function.

**Symptoms:** Most likely the patient will experience chest pain or chest pressure and there may be signs of shock. It will resemble volume shock in appearance EXCEPT the heart rate may be variable. Anticipate cardiogenic shock if you suspect a heart attack on board.

**Treatment:** Treatment on a boat is difficult. The patient needs to get to a hospital. Use oxygen, if you have it, and aspirin. Rehydrate and rest. Get them to help quickly.

## Acute Stress Syndrome (ASR)



[image credit](#)

This is what happens when you freak out. A person suffering from ASR will have all the symptoms of shock but they won't actually be in shock. If you suddenly encounter a person bleeding all over your deck and screaming at the same time, well, you might go into ASR as well. The good news is this is purely an emotional response and passes in a few minutes. Another term for this can be "panic attack." Calm the patient down and try and get them to relax.

### **Benzodiazepines**

Here is a useful set of drugs I had never heard of. They don't do anything except reduce patient anxiety. Formerly, I was a member of the **General Patton** school of dealing with anxiety. If someone is having a panic attack, smack them across the chops and order them back to work. However, correct usage of Benzodiazepines might be more effective. Used in a combination with pain relievers, for example, the patient will need less pain reliever and that is a good thing. **Alprazolam** is a good example of a useful benzodiazepine.

## Traumatic Brain Injury (TBI)



[image credit](#)

We used to call this condition a “*concussion*.” Traumatic Brain Injury happens when there is an injury to the brain that can be serious.

**Cause:** Usually a fall, or the boom hitting the head.

**Symptoms:** Loss of consciousness and/or memory loss.

Example: A crew member falls down the companion way and hits his or her head. They stand up and shout, “*Fuck! That hurt!*” They do not have TBI.

The next day another crewman falls down the companion way (you need to put some non-skid on those steps). They lie on the floor and have lost consciousness. A minute, or even a few seconds later they wake up. They have no memory of the accident. You now have a TBI on your hands.

The BIG worry with traumatic brain injury is “**elevated intra-cranial pressure**,” or brain swelling. This is called **ICP**. The brain is an organ tightly packed into an enclosed space, your head. When bruised it can swell, just like any other tissue. The problem is the swelling has nowhere to go. The result is the increased pressure begins to inhibit perfusion. What do you get with that? Right, ischemia. What does that lead to if uncorrected? Right, infarction, or permanent brain damage. This can lead to brain failure so now you have a **Major Threat** on your hands.

**Treatment:** The brain, or nervous system, is one of the three critical systems in the body. Anything that threatens the proper function of these systems is life-threatening. The bad news is there is there is nothing that can be done for ICP on a boat. Hospital care is required. (You cannot give ibuprofen as an anti-inflammatory because it will inhibit clotting and may result in more bleeding. You can give acetaminophen, or Tylenol, for the pain but it won't help the swelling).

If necessary, after a CT scan has identified the exact location of the swelling, doctors may drill a hole in the skull to relieve the pressure. (Don't try this with your 18V DeWalt. I asked that question and it is a no-no because without a CAT scan you cannot identify exactly where the swelling is). The only thing that can be done for the patient is **Basic Life Support**, or BLS. This is what BLS is all about:

### Basic Life Support

**Oxygenation**

**Perfusion**

**Calories**

**Fluids**

**Maintain body core temperature**

In any first aid or emergency setting, BLS is critical to ensure patient survival. Something useful to remember that we learned is, no matter how serious an injury may appear, people often survive. They survive as long as you maintain BLS. A mnemonic to remember this is: **Only People Can Fool Me**. Oxygenation, Perfusion, Calories, Fluids, Maintain temperature.

If your crew didn't lose consciousness and has no memory loss then there is no TBI and you shouldn't have to worry about ICP. But remember, any blow to the brain may cause TBI and then you must watch for ICP. Not only that, but ICP can result from any brain injury, not just physical blows to the skull, such as:

Stroke  
Hypoxia (oxygen deprivation due to drowning)  
Hyperthermia (heat stroke)

**Note:** *I noticed there are a lot of "hypos" and "hypers" in medicine. It is pretty important to know the difference. They come from Greek. "Hypo" means "under." An example is "hypothermia," or*

*“under temperature;” you are cold. “Hyperthermia,” on the other hand means, “over temperature,” you are too hot.*

**Post Concussive Syndrome:** this may develop after a knock to the head that does not result in a TBI. Post concussive syndrome can develop more than 24 hours after the injury and the symptoms are:

Sensitivity to light  
Loss of appetite  
Dizziness/nausea

The bad news is, it can last for days or weeks. The good news is, unless it worsens it is not serious.



**“What fits your busy schedule better,  
exercising one hour a day or being  
dead 24 hours a day?”**

## STOPEATS

This is a handy mnemonic used by EMTs to quickly examine a patient and determine what is wrong with them. Here is the diagnostic tool explained.

- S**     **Sugar?** (When did they last eat or drink?)
- T**     **Temperature?** (Hypothermia or hyperthermia?)
- O**     **Oxygen?** (Are they getting enough, did they get enough?)
- P**     **Pressure?** (Decreased perfusion? ICP?)
- E**     **Electricity?** (Lightning or man-made ?)
- A**     **Altitude?** (Usually not a concern on a boat....)
- T**     **Toxins?** (Did they eat, drink or were exposed to any in the environment?)
- S**     **Salts?** (Electrolyte deficiency?)

This is useful if there is no clear evidence of what is wrong. When somebody is hurt or sick we always need to look for an **MOI – mechanism of injury**. If a crew member suffers third-degree burns because they spilled boiling water on them in the galley – you know the MOI. You don't need STOPEATS. On a small boat STOPEATS may not be useful. It is generally applicable for SAR situations when you encounter someone you don't know who is sick or injured.

## Abdominal Pain

This is a tricky area as there are many causes. Most causes of abdominal pain are just gas.

Three parts to the abdomen:

- 1) Peritoneal lining
- 2) Intestines/guts
- 3) Solid organs

**Gut pain** is the stretching of a hollow organ, usually caused by a gas bubble. This type of pain is usually intermittent with a generic, unspecific location. It can be a crampy pain that moves around and is NOT serious.

**Peritoneal irritation** is the cause of other abdominal pain. The other organs in your abdomen do not have much enervation and pain is not felt there. The peritoneal lining is what holds everything inside the abdomen in a bag. This type of pain is very location specific. It does not move around much and is VERY serious.

**Appendicitis:** an inflammation of the appendix in the large intestine caused by infection. The infection is usually the result of a blockage of some sort. In the early stages of appendicitis the appendix swells and the pain feels like gas. It comes and goes. Once it moves to irritate the peritoneal lining the pain becomes sharp and location specific and is on the RIGHT SIDE. Jeff Isaacs said you can always tell an appendicitis case when the patient walks into the clinic because (this part is cool) *the patient winces in pain every time their right foot touches the ground when walking.*

**Note:** *Internal bleeding can feel the same way. But the pain will spread as it irritates the peritoneal lining.*

Pain associated with a specific spot in the abdomen is a red flag.

**Treatment:** This is an infection and you need to start the “big gun” antibiotics immediately. Hydration and caloric intake need to be maintained. EVACUATE if possible as surgery will be needed.

Another good thing to have in the medical kit is a stethoscope. You can buy a good enough one for \$20-\$30. Use it to listen to lungs as patient breathes. Also, good for listening to the heart and bowels. Quiet bowels are a bad sign. This means blockage. Blockage of any hollow organ means infection. Bowels shut down due to peritoneal irritation. Aggressive antibiotics are needed.

Healthy bowels are noisy all the time. Only the stethoscope will tell you this.

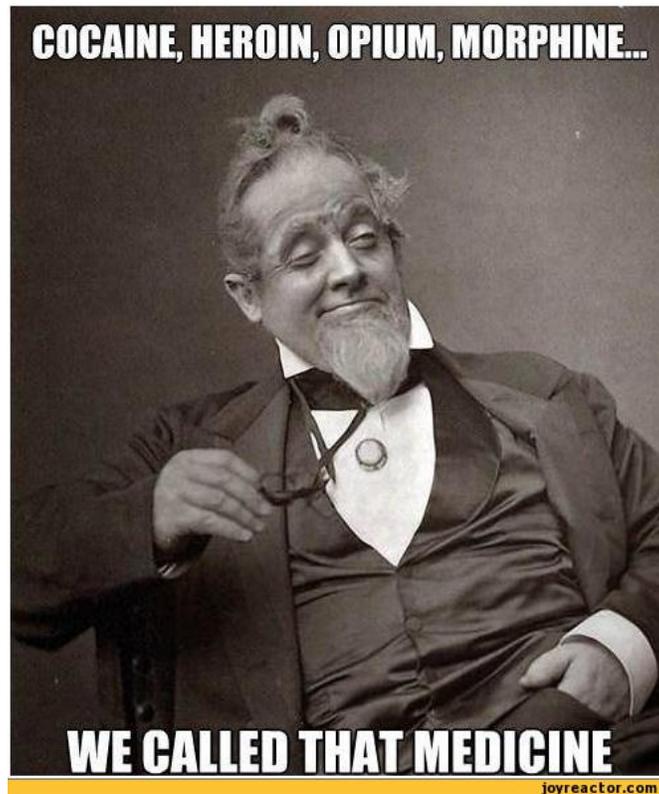
## Anaphylaxis

This is really bad and can happen to anyone – even people with no known allergies.

Anaphylaxis is a severe allergic reaction which causes your immune system (white blood cells) to release too much histamine into your body. This immediately causes the following:

- Blood vessels dilate → Hives
- Swelling in bronchial tubes → Respiratory distress
- Leaking of capillaries → Volume shock

Hives can be a precursor to anaphylaxis. If you see hives, *anticipate* anaphylaxis. This idea of always anticipating the worst case scenario may make you sound like a pessimist but all good sailors are pessimists. You knew that, didn't you?

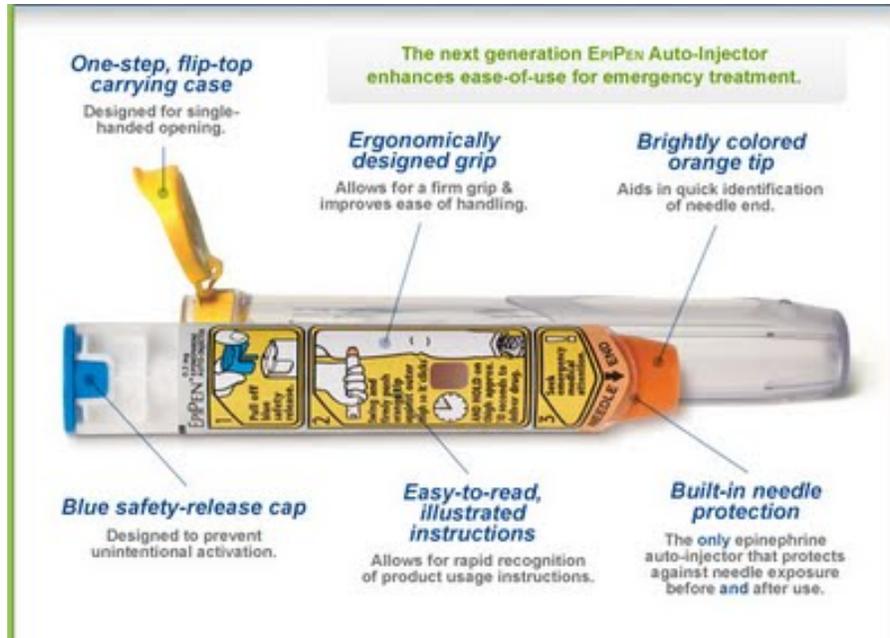


### Signs of anaphylaxis:

- Scratchy throat
- Swelling lips/throat
- Altered mental state
- Respiratory distress

- Vascular and volume shock
- Hives, itching and swelling of skin

**Treatment:** The good news is today anaphylaxis is easy to treat. One injection of epinephrine (adrenaline) will stop the histamine reaction in its tracks. Epinephrine (ep-i-NE-frin) constricts the blood vessels. This can be given instantly with an **EpiPen**, which is a preloaded syringe-gun type of thing anyone can use. Jam it into the patient's thigh or shoulder and it will take effect within 90 seconds. You just saved a life.



One of the great risks with anaphylaxis is swelling of the throat, or trachea, which will make it impossible to breathe. If you suspect anaphylaxis, break out the EpiPen and give him a jab. Even if you are wrong, the epinephrine injection will not harm the patient. You should have several EpiPens in your medkit. They last three years and turn brown when they go bad. Cost: \$60; cheap for a life saver. People who are allergic to bee stings also need to carry these.

However, 15% of anaphylaxis cases come back even as soon as twenty minutes after the first epinephrine shot. Be ready with another EpiPen. Reoccurring cases then require an evacuation as the situation is more serious. If you are comfortable loading your own syringes, get a vial of epinephrine and some syringes. A good idea would be to pre-load the syringes and store them carefully. You don't want to be searching around for the right dosage and trying to load a syringe with your patient clutching his throat and expiring at your feet in a pile of hives, welts and gasps.

**Full Treatment:** **Epinephrine** first, then **diphenhydramine** (antihistamine), then **prednisone** (steroid).

**Prednisone** is a very useful steroid that also treats jellyfish stings, bee stings and poison ivy. It takes several hours to work, however, which is why you use this AFTER the epinephrine. Take for 5 days and no more.

## Respiratory Distress

This condition, if untreated, will develop into respiratory failure and is one of the scariest things in emergency medicine. Since we are talking about one of the three main systems, the respiratory system, it is a MAJOR THREAT. Whether the patient is suffering from anaphylaxis, pneumonia, lightning strike or a heart attack, you may need to help them breathe. The process is called PPV, or **Positive Pressure Ventilation**. In the old days, we called it mouth-to-mouth resuscitation. For hygienic reasons, that is no longer encouraged. PPV masks are a good addition to the medical kit.



The lower part fits over the patient's mouth, much like a snorkel and you breathe into the other end. They come in different sizes. It is a good idea to get a large one and a small one for children. The longer the hose the easier it will be for you to help the person breathe over a longer period of time and allow you to do other things, like steer the boat.

## Dental

See your dentist before you head offshore. If anything is about to fall out or go bad he should be able to spot it first. Dental work in other countries, particularly the third world, is surprisingly good and cheap. Most dentists in developing countries have trained in the US, UK or Australia. I don't put dental issues on my top list of concerns.



**Cavit** is a product made by 3M that is recommended as temporary dental filling material. This is good if a cavity pops out.

**Note:** *If you lose a tooth in an accident, and I mean a complete tooth with the root, you can put it right back into the space it belongs and will "take root" again in your mouth. This works if it is done right away.*

Tooth abscess: **Amoxicillin** is good for dental infection. This won't cure the problem but will keep it at bay until you see a dentist.

## Diving Injuries



Other than cuts and lacerations, which we have covered elsewhere, the two types of serious medical issues that are particular to diving arise (no pun intended) from rapid ascent.

**Pulmonary Overpressure Syndrome:** caused by uncontrolled rapid ascent from depth. This can cause the formation of an arterial gas embolus which is often fatal. A hyperbaric chamber is needed.

**Decompression Sickness:** known as “**the Bends,**” this is an ischemia to infarction problem all over the body. Bubbles lodge in veins and deprive body of circulation. They can lodge in heart and brain, etc. Signs of the bends are:

- Itching, tingling and joint pain
- AVPU changes (mental state), ataxia (impaired physical coordination)
- Respiratory distress and shock in severe cases

**Treatment:** For both Pulmonary Overpressure Syndrome and Decompression Sickness, BLS (Basic Life Support) and high pressure oxygen are needed as patient is evacuated to the nearest hyperbaric chamber.

**Note:** *If you spend enough time underwater you can “get bent” even at only 10 feet of depth. **Hookahs** are dangerous because of this – especially for children. The issue is ALWAYS the breathing in of compressed air while under the surface. If diving with a Hookah, always use a dive computer. Don’t let children play with it.*

## Submersion Injury

This is where the patient inhales water but does not die. We used to call this “*near drowning*.” The person has to be unconscious under water to meet this definition.

### Problems:

Cardiac arrest. Give CPR a try, but don’t get your hopes up\*

Pulmonary edema and for the longer term infection are problems to deal with.

Hypoxic brain injury which can lead to ICP due to lack of oxygen supplied to the brain.

\*CPR, like a defibrillator, is better than nothing but it is NOT the miracle life saver we have been taught to believe. CPR is designed to force already oxygenated blood around the circulatory system of an unresponsive patient who has just collapsed. This preserves the sensitive tissue in the nervous system (brain) for a couple of minutes until the ambulance arrives. If the person has had a heart attack and has been lying there for several minutes, CPR isn’t going to do much. First, their blood is de-oxygenated and forcing it through the vascular system will have minimal impact. Second, damage to the brain has already occurred. Third, even if CPR starts the heart beating again – and the same thing applies to an AED, or defibrillator – the heart is most likely to stop beating right away. This is because you have not been able to address the CAUSE of the heart attack, which is most likely a blockage somewhere. This can only be done in a hospital.

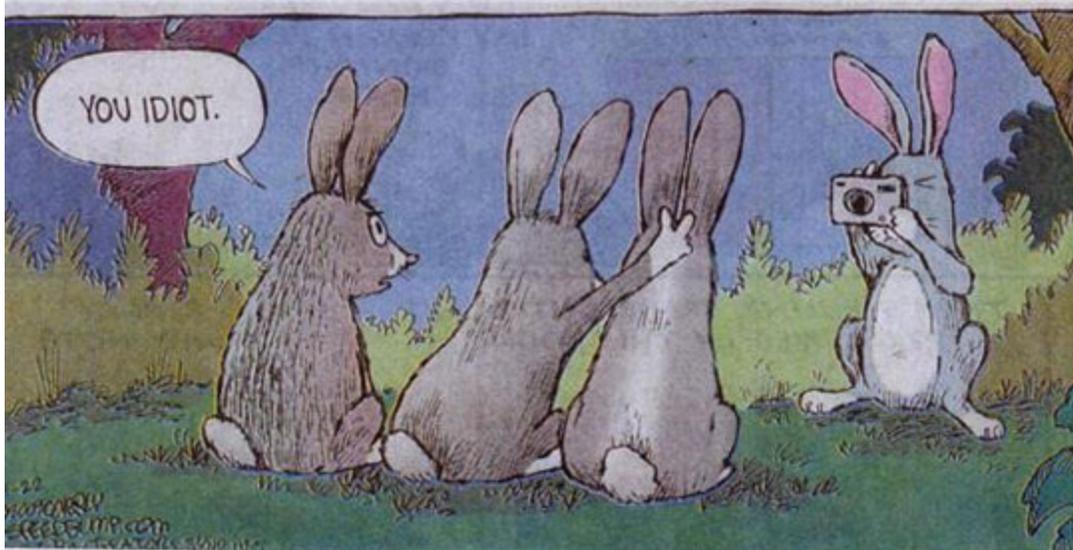
**Conclusion:** CPR is better than nothing but its usefulness is greatest where a hospital is just minutes away. Maintain CPR for several minutes and if the patient does not respond, sadly, there is nothing more to be done. Carrying an expensive AED around on a boat is also of minimal usefulness unless you are anchored right next to a hospital and have a 50 hp outboard on your dinghy.

There is a hilarious [video](#) by the *British Heart Foundation* starring thug **Vinnie Jones** on how to do CPR. Note the ending where they say, “*Keep this up till the ambulance arrives.*” That tells you all you need to know – for our purposes CPR will not help much.

## Middle Ear Barotrauma

This is a ruptured ear drum and is quite common. The typical cause is snorkeling too deep. The patient will hear and feel a “pop” and then the ear feels cold as water rushes in.

**Treatment:** Don’t do anything, it will heal by itself. At least one month no swimming.



more awesome pictures at [THEMETAPICTURE.COM](http://THEMETAPICTURE.COM)

“Swimmer’s Ear” can lead to cellulitis (skin infection) which can lead to sepsis, in worst case scenarios. It starts with an infection of the interstitial space and spreads, so you need to jump on it. If you suspect cellulitis use a topical or oral antibiotics. After swimming the skin is “*macerated*,” or soft due to water immersion and it is then much easier for invading bacteria to attack.

An **Otoscope** is good for the medical kit. You can look into ears with the light and it has a magnifying glass inside. There are many uses on a boat for this instrument. Cost: \$30-\$60 for a good enough model. Check out [www.otoscope4u.com](http://www.otoscope4u.com)



A good prophylaxis to prevent infection occurring in the ear is to use “Swim Ear” drops after swimming. Many cruisers, including ourselves, make our own using these ratios:

- 1/3 alcohol
- 1/3 vinegar
- 1/3 water

## Musculoskeletal System

“Broken bones are just carpentry.” - Jeff Isaacs

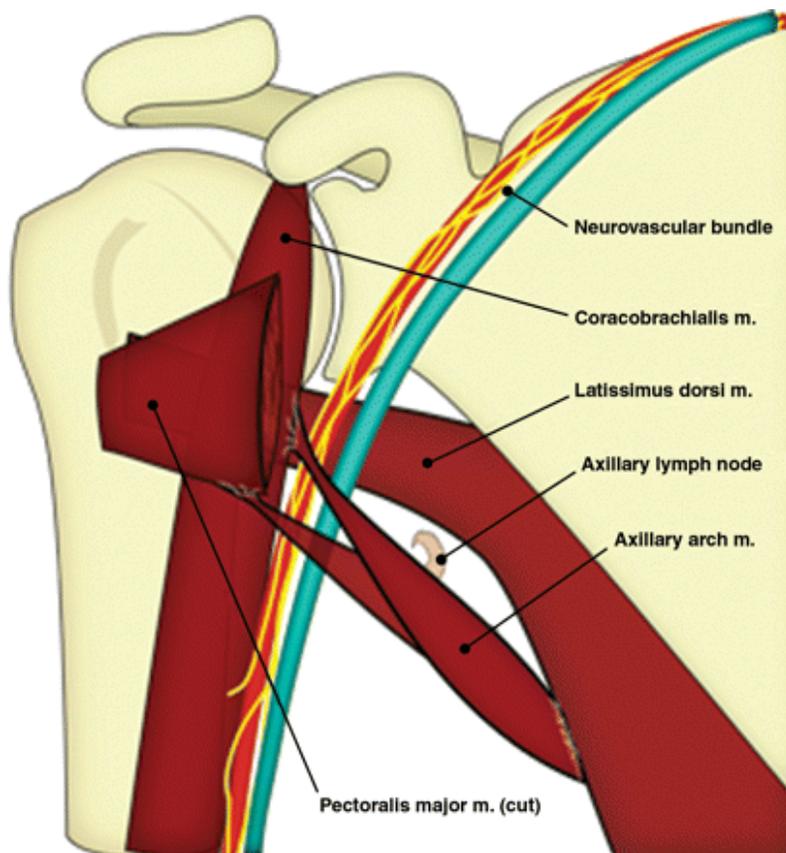
With broken, or fractured bones, you need to assess: stable or unstable?

An unstable injury is one the patient cannot use or move and that has persistently impaired CSM.

What’s that?

**CSM:** Circulation, Sensation and Movement.

Along the limbs and through the pelvis runs the **Neurovascular Bundle**. This is a bunch of arteries, veins and nerves that are bundled together throughout the body. Any damage to this bundle is bad because it can lead to permanent nerve damage, or in the case of an artery, life-threatening bleeding. You must check the condition of the neurovascular bundle by checking **Distal CSM**.



**Distal CSM** is just making sure there *is* circulation, sensation and movement at the end of the extremity. The worry here is, again, ischemia leading to infarction. Tingling or numbness is a sign of nerve damage. Impaired CSM is usually a problem with an artery – especially with dislocated fingers.

Pain is not a good indicator of severity unless it is out of proportion to the injury. In that case, the pain is usually caused by ischemia.

**Unstable joint:** Leave it alone unless it is causing a distal CSM problem. Splint it up and go see a surgeon. If you see blue and there is tingling (fingers) – then fix it. This is not an emergency.

**For long bones:** Set back into position to restore circulation. Then splint. Make the smallest splint that makes the patient feel better. Swelling will occur and that means you will have to adjust the splint every few hours for a few days. When splinting: include the joint above and below the fracture.

**Compartment Syndrome:** Common in lower leg and forearm trauma. It is similar to ICP in that you are dealing with swelling in a constricted area. Raise limb and apply ice. NSAIDS are not helpful here. Evacuate because surgery is needed to correct. With Compartment Syndrome pain is out of proportion to injury. IT HURTS like hell.

**For a broken collar bone:** Roll up a towel, place it between the shoulder blades and have patient lie on their back for 45 minutes to allow it to set back into place naturally. Treat for pain and anxiety.

**Remember:** For broken bones you just need to get things in line and splint. The surgeon will correct it with surgery – even weeks later. Musculoskeletal injuries are not a big problem unless they interfere with the Three Critical Systems: Circulatory, Respiratory and Nervous.

Set bones slowly and gently with the patient's cooperation. The last part is the most important. You do NOT force a setting. It is a slow, graceful, yoga/Zen type thing.

Sam Splints are easy, light and flexible and are the best for making splints.



After making the splint, wrap with vet wrap in two to three places. Better to first put the arm in a sock with the toes-end cut off for fingers, then place in splint and wrap. Remember to adjust regularly for swelling. Remove watches and rings or other jewelry before splinting.

**For injured joints:** splint in position found unless CSM is impaired. Let the surgeon deal with it.

**Dislocation** is an ischemia to infarction problem and is time sensitive. It must be fixed soon. A dislocation completely disables the patient. Dislocations are a mechanical problem and are easy to “reduce,” or fix (except for elbows). Most common is a shoulder dislocation. Here is how you fix it:

- 1) Have patient sit up
- 2) Stand behind or in front of patient
- 3) With one hand gently press elbow to patient’s side
- 4) With other hand gently hold extended forearm level
- 5) Move forearm toward patient’s chest and it should pop back in
- 6) Massage of scapula may be necessary while doing this

There are plenty of different techniques, including some classic what-not-to-do videos are available on **YouTube**. It is worth watching a few to get the general idea.

Post joint reduction the patient should seek medical care because there will have been some damage done to cause a dislocation. This is NOT an emergency unless there is a distal CSM problem.



[image credit](#)

**Patella (knee) dislocation:** more common in women. Have patient sit or lie down. Slowly straighten leg. See an orthopedist afterward.

**Note:** *Most dislocations WANT to go back into place and only need gently guiding to do so.*

**Dislocated elbow:** very difficult and painful to fix and you need drugs to do so. Inject lidocaine into either side of joint. Give patient a fentanyl pop. (**Note:** *Use liquid lidocaine, not the viscous kind for injections*).

What is the difference between dislocations and fractures?

→The patient can't move a dislocation. They can move a fracture.

## Pain Management

The most important thing in pain management is:

Treat the Cause by listening to the patient

Steps to keep in mind:

- + Reduce swelling
- + Realign fractures and dislocations
- + Adjust splints

There are three types of pain medications: analgesics (**Tylenol, Advil**), anesthetics (numbing agents like **Lidocaine**) and opioids (hydrocodone; **Vicodin**).

### **NSAIDs: Non-Steroidal Anti-Inflammatory Drugs**

These analgesics are miracle drugs with a ton of uses that you can buy without a prescription and are safe to use. They do not cross the blood/brain barrier and so do not affect the brain.

**Ibuprofen** (Advil): It works at the site of injury by inhibiting chemicals that transmit pain. It is non-systemic. Ibuprofen has Three Miracle Abilities:

- 1) Relieves pain at site
- 2) Reduces fever (a must have for children)
- 3) Reduces swelling

The only issue with Ibuprofen is that, like aspirin, it can inhibit clotting (and may irritate the stomach). This is no big deal for scrapes, cuts and bruises but for serious injuries where there is a risk of severe bleeding DO NOT GIVE IBUPROFEN. In these cases, such as for ICP (Intra-cranial bleeding) you can give **paracetamol/acetaminophen** (Tylenol) for the pain. Tylenol is a good pain reliever and anti-pyretic, or fever reducer. However, it DOES NOT REDUCE SWELLING. So with ICP, in a way you are damned if you do and damned if you don't. You want to reduce swelling AND pain so you may think, right, ibuprofen. But NO, that would cause MORE bleeding and MORE swelling. So you give Acetaminophen, which helps pain management but does nothing for the main cause of it – swelling caused by bleeding!

Some people prefer paracetamol over ibuprofen. You should experiment between them and also try **Naproxen Sodium** (Alleve) to see which works best for you. I experimented after this course a bit (hangovers) and found ibuprofen works wonders for me while naproxen sodium is a waste of time.

## Leapfrogging



A good treatment program for severe pain or severe fever, and one used by pediatricians around the world is “*Leapfrogging*” ibuprofen and acetaminophen. Each work for about 6 hours. First give ibuprofen. In 3 hours then give acetaminophen. In another 3 hours, follow up with a second dose of ibuprofen, etc.

Aspirin cannot compete with NSAIDS and not only causes bleeding but also irritates the stomach. It is really only good for heart attacks. So keep some on board if you have any old farts around.

## The Opioids

This is the heavy artillery of the pain management world and includes drugs such as **hydrocodone** and **Vicodin**. Opioids (or “opiates”) are strictly controlled Type 2 narcotics and work by suppressing the brain’s ability to receive pain but they also have some severe side effects, such as

- Slower reaction time
- Affecting ability to walk and poop
- Interfering with thermoregulation (temperature regulation)
- Depressing respiratory drive

Opioids are useful for the early management of severe pain to straighten a fracture (ouch!) or clean a bad wound (we get to that later – ouch!). This usage is referred to as, “*procedural sedation*.” They do not reduce swelling (bad) but they also do not inhibit clotting (good). Once the procedure is finished, get the patient off opioids and on NSAIDs as soon as possible.

**Morphine** is probably the most well-known opioid but it is used less nowadays. There are better things out there, such as **Fentanyl**, which is 100 times stronger than morphine. The neat thing about fentanyl is it comes in a lollipop form, called a “**Fentanyl Pop.**” Fentanyl pops are used by the military in Iraq and Afghanistan. In fact, the last 10 years of boots on the ground combat in those places has yielded new ideas and treatment in the area of first aid. The good thing about fentanyl pops is you can regulate the dose. Stick one in the patient’s mouth between the gums and the cheek. (This is a conscious patient, of course. If they are unconscious then you don’t need sedation). The mucous mucosa in the mouth is very effective at absorbing things. Once the patient starts to look or talk goofy, take the pop out. When he starts complaining about pain, stick it back in. Pretty cool, eh? They also come in children’s sizes.

### Looking Goofy Already



Because opioids are controlled substances, it is a very good idea to record when you use them and how much you used in the ship’s log. It is also good to record in the log when and what kinds of these substances you are bringing on board. Remember, the ship’s log is a legal document and you, as captain, are legally required keep it up to date.

## Wonder of wonders, miracle of miracles: Viscous Lidocaine



Viscous lidocaine is a topical anesthetic and a MUST HAVE on board. It is clear with a honey-like consistency and deadens pain on contact. The uses for this stuff are unlimited. Burn injuries would benefit as would any injury that requires cleaning. Pour some viscous lidocaine on the wound, wait ten minutes or so and the patient will not feel anything, allowing you to inspect and do a proper cleaning.

**Note:** *Viscous lidocaine is especially useful with children, like mine, who will not let you near them if they get a cut, abrasion, splinter, etc.*

We even learned how to insert catheters up a penis to relieve a blocked urethra. There were no volunteers in class for this procedure. Using a syringe – with no needle, please– first inject 10cc of viscous lidocaine up the penis. Then wait. Then you can insert the catheter with no pain. Useful stuff, although I hope I never have to handle another man’s penis.

## Skin Rash

Skin infections if they are “angry” and hot are caused by bacteria and they progress rapidly.

Fungal infections develop more slowly.

If you see a serious rash, look for a systemic cause.

Antihistamines are good for itching. Get a topical antihistamine ointment.

If you use a steroid on bacterial infection it will make the patient feel better BUT it suppresses the immune system so the person might get worse...

With a rash, you generally don't know what kind of rash it is unless you are a dermatologist. Therefore treat for bacteria first (Bacitracin again). Bacterial infections are the most serious so being the pessimists we are, we treat for this. If you see pain, swelling and redness it is usually bacteria.

For fungal rashes, jock itch, crotch rot and the like, **Lamisil** is the recommended over the counter topical ointment. It works better than the others.

### **There's an App for That**

Apparently, there is an app called “PhotoClinic” for your iPad or iPhone that has countless pictures of rashes you can use for identification. I haven't used it yet but it sounds interesting and it could be fun at boring dinner parties.

Drugs and medications can cause “drug eruptions” after several days of exposure. This is true with antibiotics and the result looks like an allergic skin reaction – hives. One of the questions you need an answer to is, “*Are you taking any new medications or antibiotics?*” If a person has a reaction to one type of antibiotic then switching to another usually SOLVES the problem.

To get most of the drugs you need for your medical kit you need to see a physician and have a consultation. He can and usually will prescribe what you need once you explain why you are asking for this stuff. If your MD cannot, he is useless. Go and find another one. Also, I have not specified exact dosages with any of the medication mentioned above. This and details of proper usage needs to come from your doctor.

## Thermoregulation and Hypothermia

When putting an injured crew on medication, remember that any drug which is a **Vasoconstrictor** (pronounced “vayzo-constrictor”) interferes with your body’s ability to control temperature. **Vasodilator** drugs (“vayzo-dilator”) also interfere with thermoregulation; your body loses heat faster.

For our purposes, there are two stages of hypothermia we need to recognize:

### Mildly hypothermic:

- Person is still awake
- Can take food and fluids
- Can rewarm themselves

### Severely hypothermic:

- Cannot take food or fluids
- Cannot help themselves or rewarm themselves



There are two types of hypothermia:

**Acute hypothermia:** caused by a sudden immersion in cold water. Body still has glycogen stores.

**Sub-acute hypothermia:** takes place slowly over hours. Body has depleted glycogen stores. Volume shock results.

Hypothermic people have altered mental states. They become quiet and they can’t follow directions.

**Note:** due to smaller body size and reserves, children are especially sensitive to hypothermia. They will play in cold water until they crash.

**Treatment:** For a severely hypothermic person:

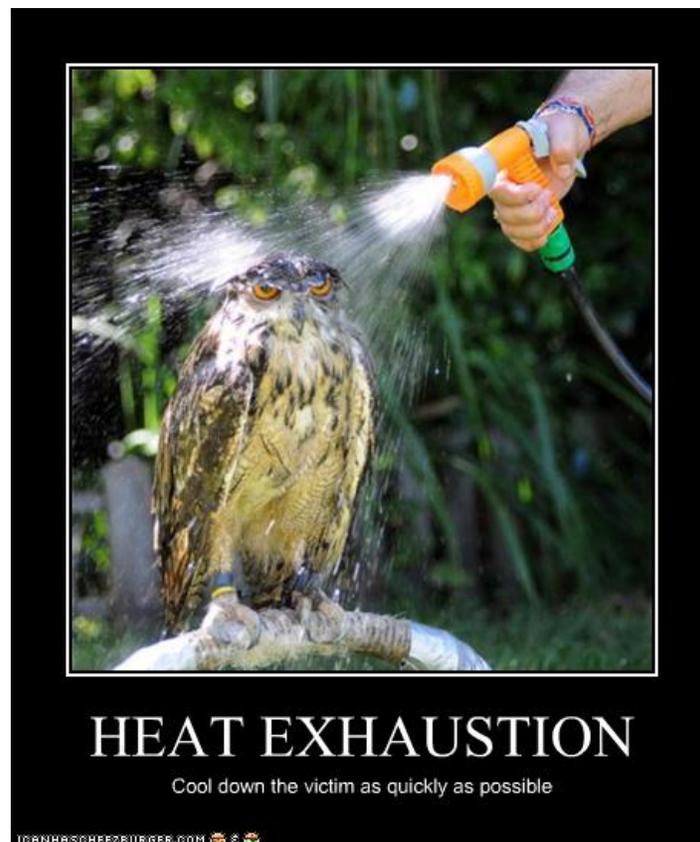
- 1) KEEP THEM HORIZONTAL
- 2) Don't let them sit up
- 3) Warm up their torso

**Note:** EXERCISING A SEVERELY HYPOTHERMIC PERSON CAN KILL THEM.

Shivering is a very efficient way of rewarming. Do not exercise them because their body has likely depleted all its energy (glycogen) stores. Skin to skin warming is NOT EFFECTIVE. This is again, old school discredited BS. All you end up with is TWO cold people. A warm water bottle on the torso is best. Put one in the medical kit.

Ever notice nowadays the **Coast Guard** rescue helicopters bring up people from the sea horizontally in baskets? Because of the VOLUME SHOCK that comes with severe hypothermia, lifting a person vertically can kill them. Keep the patient horizontal.

Warm tea won't do much. Add A LOT of SUGAR or HONEY. Even a warm Coca-Cola is good. They NEED SUGAR. Mix up a batch of WARM GU BREW.



**Heat Exhaustion:** Dehydration causing compensated volume shock. This is primarily a volume problem. A person who is suffering from heat exhaustion will have normal mental status.

**Heat Stroke:** Body core temperature is dangerously elevated. Altered mental status is obvious. So if you see a hot person with altered mental status you are looking at heat stroke. Turn on the hose.

**Treatment:** Cool them down any way you can. Water immersion is effective as it sucks the heat out of the body 25 times faster than air. Proceed with aggressive hydration.

Heat stroke can cause brain injury (TBI). This can lead to the dreaded ICP. Heat stroke can also cause kidney failure and the urine becomes red or brown. People suffering from heat stroke need aggressive hydration immediately.

If a person is dehydrated and cannot hold down fluids (sea sickness) or collapses due to heat stroke, other than the dreaded enema there are other ways to rehydrate them. **Hypodermoclysis** is rehydration under the skin via a saline bag. It is good to carry 4 saline bags in the medical kit. Get 4 administration sets from **Norfolk Medical**:



With this tool you just slap it on a fatty part of the body and tape it there. Stick in a tube from an elevated saline bag and you are rehydrating. You can do up to 3 saline bags in one day this way. Intravenous rehydration is more dangerous and requires regular training. The rehydration system above is idiot-proof and is safe.

Remember, with dehydration you want to anticipate urinary tract infection (UTI), especially in women. This is very rare in men.

## Toxins

For toxin ingestion and overdoses, **activated charcoal** may help. It will not hurt and therefore, following the first rule of medicine, “*Do No Harm*,” you should carry some on board in the medical kit. You should also know what the overdose symptoms – and treatment – are for every medicine you are carrying. Be prepared, as the Boy Scouts say.

There are two types of toxins:

**Neurotoxins:** attack the nervous system (friendly cobras). Anticipate respiratory failure.

**Tissue toxins:** attack tissue (friendly rattlesnakes). Anticipate ischemia and infection as well as vascular and/or volume shock.

Hot water destroys most marine toxins. The bigger problem is often infection. Use antibiotics.

**Spiny injury (urchins, etc.):** use hot water to treat and destroy toxins

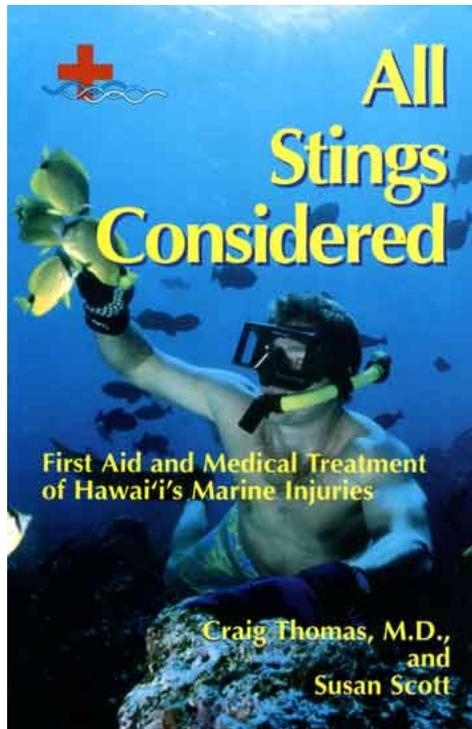
**Stingray sting:** Hot water immersion

**Nematocyst injury (jellyfish):**

**Treatment:** Get it off you – that is the most important thing. Scrape nematocysts off with a credit card and rinse with salt water. Vinegar may be effective – it depends on the species. The literature is NOT clear here. Hot water or alcohol may be effective.

For Portuguese man-of-war stings, the most recent research is to rinse the sting thoroughly with salt or fresh water and apply ice for pain control. Vinegar is no longer recommended, nor is heat, alcohol or urine. So, the old story of whipping it out and pissing on the victim is also discredited. An Australian study showed that application of alcohol and urine caused even more nematocysts to discharge in the box jelly fish, or sea wasp.

There is a book that details different types of tropical marine stings and their treatment. It was recommended in the course and I been reading it. This is a good reference to keep on board:



Scorpions in North America hurt but are not dangerous. Same with black widow spiders, their bite is not fatal. However, often the patient will experience allergic reaction to the envenomation.

## Vaginitis

This is when the yeast/bacteria balance in the vagina gets out of balance. Often this is a result of taking antibiotics which kills bacteria and then allows the yeast to take over. There will be discharge with vaginitis:

Brown and smells bad = bacterial infection

White and cheesy = yeast infection

Bacterial vaginitis is unusual. A “lost” tampon is often the cause.

Get treatment for both conditions for the medical kit if you have women on board. Douching with 1% PI solution for three days works. A 60 cc syringe (without the needle) is required here. Get several for the medical kit as they have many other medical and nonmedical uses.



## Vomiting and Nausea

We often see this on boats due to sea sickness. In fact, the word “nausea,” comes from the Greek word for boat, “naus”! The only cure for sea sickness, and it works every time, is sitting under a tree. Failing that, try and slow the boat down and get the affected person up on deck doing something. A slower boat will often have an easier motion.



**Benadryl** is a good antiemetic (a drug that is effecting against vomiting and nausea). Aside from a liquid or pills, which may be hard to hold down if someone is vomiting, it comes in strips that melt on the tongue.

**Zofran** is also good for sea sickness and is non-drowsy.

We use **Stugeron** (Cinnarizine) for my wife as she usually feels queasy the first 3 days out. After that, she gets her sea legs and is fine. Stugeron works and is available all around the world, except for the US, for some unknown reason. Buy some in Mexico or Canada and use a tiny dose. It is quite powerful, especially the stuff they sell in Mexico. The active ingredient, cinnarizine, is an antihistamine. This could make you drowsy and is not for children under the age of 5. It works by interrupting the blocking receptors in the “vomiting center” of the brain. Cinnarizine prevents this part of the brain from receiving disturbing signals from the middle ear which normally would cause nausea, vertigo and vomiting.

## Wounds and Burns

Again, break out the viscous lidocaine and spread it over the wound. Cover and wait 20 minutes. Then clean wound with a soft bristle toothbrush and irrigate with clean fresh water. RO water is sterile and good for use in wound care but any clean water will do. Be careful to clean thoroughly and get all the dirt and debris out. Take your time. It may take 30 minutes or more.

After cleaning treat with **Bacitracin** ointment (antibiotic).

Start with antibiotic course (internally) to ensure no infection takes root.

**Note:** *You must give antibiotics WITHIN 3 HOURS of injury to prevent infection.*

**Cephalexin** (Keflex) is a good, all round antibiotic to carry.

Make sure your crew and you all have had a tetanus booster within the last 5 years.

**Simple wounds:** these don't penetrate the fascia and are unlikely to get infected.

**Fascia:** this is a layer of fibrous tissue that holds us together. It contains "*closely packed bundles of collagen fibers oriented in a wavy pattern parallel to the direction of pull,*" according to Wikipedia. They hold our organs in place and allow muscles, guts and the like to slide around freely. Penetration of the fascia in the abdomen, for example, is a LIFE THREATENING injury.

**High Risk Wounds:** these penetrate fascia to expose bone, tendon or muscle. They can become infected right away. IMMEDIATE antibiotics are required and then proceed to clean wound.

Impaled objects should be removed.

### Treatment of Wounds

- 1) Oral dose of prophylactic antibiotics if wound is high risk
- 2) Swab Betadine around healthy skin outside of wound with a cotton ball
- 3) Apply viscous lidocaine and wait 20 minutes
- 4) Clean well with soft bristle toothbrush
- 5) Cut away (debriding, pronounced "debreeding") dead tissue

In our class, we experimented by cleaning wounds in store-bought pigs feet that had been lacerated and filled with potting soil. It was useful to see how it works and how difficult removing all the debris can be. One thing was stressed for wound cleaning and that was: **Careful Wound Exploration**.

There may be a straight laceration but unless you take your time and look inside the wound you won't know if actual penetration of the fascia occurred, or is there also a puncture wound on the side under that flap of skin? You need tools to do this. Here they are:



The ones on the left look like forceps but are called “**Kelly clamps**,” They have grooves in the jaws and when you close them they “lock” like vise grips do. They come in all sizes. Get several of different size. The tweezers on the right also have small teeth that make it easy to grip slippery skin. Remember, the patient will be sucking on a fentanyl pop or you will have poured lidocaine on the wound – or both. They won't feel much and you need to explore the wound to properly assess treatment.



**Betadine:** a topical antiseptic formally known as **Povidone Iodine**. Get some.

For bandaging a wound, after you clean it the first covering should be a piece of sterile gauze soaked with Betadine (1-2% PI solution). Put several more dry gauze sheets over it and tape it on. You will need

to change this dressing at least once a day for 3-4 days. Make sure the wound is draining and healing. After that 3-4 day period put on a **hydrocolloid dressing** and leave it for 3-4 days.

Do NOT use hydrogen peroxide. All medical kits you buy at K-Mart and the like carry this. You probably have some on the boat: THROW IT OUT. This is old school stuff my granny used to use and it has been discredited. Hydrogen peroxide kills everything it touches, including the tissue you are trying to save. Just use clean fresh water to irrigate the wound when cleaning.

You do not need sterile gloves. Gloves out of the box are fine. Dishwashing gloves (new ones) should be a part of the medical kit. Buy several and roll them up as they are better than the throw away kind for wound cleaning and care.

Cleaning a wound carefully is the most important step in preventing an infection. This stage of the program is even more effective than antibiotics and must be done immediately. Do not wait to clean the wound – unless it is for the lidocaine to take effect.

You can cover burns with Saran wrap (clear food wrapping) which is sterile as it comes off the roll. Don't take it from somebody's sandwich and then apply it to a wound. Change the wrap every half hour.



For small burn wounds use “Xeroform,” a petroleum impregnated gauze which is antiseptic for 3-4 days. Every medical kit should have some. In combat in Iraq and Afghanistan the military uses this for large gaping wounds as well. They bunch some Xeroform into a ball and stuff it into the wound, tape it over and call in the helicopters.

Here is something else I learned and did not know:

**Stitching is for quilters.** Only. You DO NOT NEED TO KNOW suturing or to close wounds. Newer thinking on this subject is that stitching a wound closed just increases the chance for infection. Wounds need to breathe and exude foreign material. In other words, wounds must drain. This is

your lymphatic system at work flushing the wound out from the inside. In a hospital setting suturing may be used to close wounds that are a nuisance and bleed a lot, for example, facial and scalp lacerations bleed profusely.

Because of such high blood flow, a wound to the scalp can look very scary. Unless you can see a cracked skull underneath – it is not serious. Also, this copious blood flow to the head means facial and scalp wounds almost never get infected. I also found that interesting.

**Scalp Lacerations** can be relatively common on a small boat with a boom and tall crew. Again, unless there is loss of consciousness and memory issues (**TBI, ICP**) they are not serious and infection is rarely a worry. The best cure is let it bleed, inspect and clean the wound. Then cover with a feminine napkin and a hat.

**Facial Lacerations** are similar to scalp wounds. You can close the wound over a bit with **Steri-Strips** to make it easier for the patient to move around. The wound should still be able to drain. Steri-Strips can be difficult to stick to skin so use **Tincture of Benzoin** around wound. This makes the skin sticky and greatly enhances the ability of bandages to remain in place. Useful on a boat where perfect hygiene is impossible and skin, as a result, is slippery with salt, sweat and maybe tears.



**Steri-Strips**



**Tincture of Benzoin**

Suturing performed by medical professionals can help with minimizing scarring that a wound may cause. However, you need to be pretty skilled for the cosmetic impact of this to have impact. This is an area that requires practice and since I have trouble sewing a button on a shirt I don't think I qualify. The higher risk of infection with suturing is why it is discouraged in an offshore context.



**Hydrocolloid Dressings** – these are the new way to prevent infection and encourage healing. Hydrocolloid dressings absorb moisture and keep the wound moist which enhances the healing process. They are waterproof too. **Band-Aids** now make these and they are a good addition to any medical kit. Hydrocolloid dressings are expensive, however, \$5-\$6 a pop. So don't use them for fresh wounds that need dressing changes frequently.



Another recommended multi-use product is "**Vet Wrap**." This is most frequently used on horses and is a self-amalgamating wrap useful for splints, bandage covering etc. It is also cheap compared to similar stuff sold just for humans. Vet wrap can be found in your garden-variety feed store.

Another good product used in animal husbandry that reportedly works well on humans is **Nitrofurantoin**. This is particularly good for burns and topical anti-septic use. It is sold for veterinary use in a yellow/green tub.

So let's look at a **case scenario**. Your idiot crew screams. You come up topside and see they have a mangled their hand after getting it caught in the windlass. They are freaking out. You, because you have read this ebook, are not.



You ask yourself, serious or not serious?

*Answer:* does it affect any of the three critical systems? No. It is not serious.

Here in proper order is what you need to do:

- 1) Take care of the boat!
- 2) Give patient antibiotics
- 3) Give patient fentanyl pop (if needed)
- 4) Pour viscous lidocaine on wound (if needed)
- 5) Swab around wound with Betadine
- 6) Clean wound, debride and irrigate – explore wound carefully
- 7) Dress wound
- 8) Start leapfrogging Ibuprofen and Acetaminophen for pain
- 9) Splint fingers (if needed)
- 10) Get new crew

**Day 2:** Remove the dressing and irrigate the wound. Dress the wound with a fresh dressing.

**Day 3:** Same routine.

**Day 4:** Clean and dress with **Xeroform** or a **hydrocolloid dressing**.

**Puncture wounds:** these are the worst wounds because you cannot clean them. DO NOT use a syringe and high pressure to try and force the dirt and material out of the wound. You will only push it into the body further. For puncture wounds assume infection and begin antibiotics immediately.

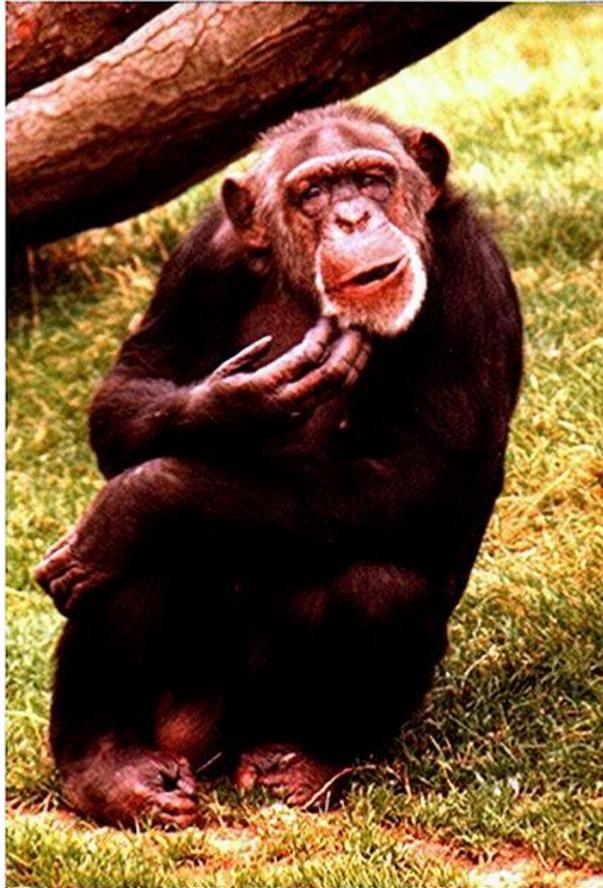
### South Beach Penetration

*Here is a good place to stress the difference between offshore and onshore treatment. If you had a puncture wound, say walking on South Beach in Miami. You would go home, rinse it out, maybe put on some Neosporin, a band-aid and go hit the bars. If you did develop an infection you could always go see your doctor who would prescribe a course of antibiotics which would fix you up.*

*In the offshore setting you do not want to wait until you have an infection. Infections are scary things which can go wild and get into the blood causing lymphangitis, or sepsis (blood poisoning) and then you croak. That is why when presented with an injury offshore you always anticipate the worst case scenario. Anticipate and prepare for the worst and are allowed to hope for the best.*



I may have mentioned Neosporin above because that is what I grew up with but there is something better out in the market: **Bacitracin**. We just threw our Neosporin out and replaced it with Bacitracin. The big difference between them is Bacitracin has a broader usage as it can be used on mucous membranes – such as your eyes. If you get **conjunctivitis** on board, a little Bacitracin in the impacted eye will cure it in a day or two. It says on the tube, “Do not put in eyes.” This is because the FDA has not approved it for such use. However, it works and can be used in the eyes, I am told.



### Is it a Bacteria or is it a Virus? How do you tell the difference?

**Bacteria** tends to produce one symptom accompanied with constant fever and thick pus.

**Viruses** produce many symptoms accompanied by spiking fevers, erratic temperatures and thinner pus.

**Note:** *If you treat infection with antibiotics and it doesn't get better, you are probably dealing with a virus. A cold is caused by a virus, for example. There are many symptoms and a runny nose, not thick snot. The stuffiness in a cold is actually caused by histamine so taking an antihistamine or Sudafed can help.*

## Bugs and Other Things

There are only two insect repellents that really work:

**DEET:** Not toxic in concentrations up to 30%, despite what women's magazines may say. Also, it is no more effective at 100% than 30% concentrations.

**Picardin:** As effective as DEET in same concentration.

Recommended "*Ultrathon*," by 3M, which is DEET at 30% strength. It can be found at REI.

**Permethrin:** Often used on clothing. It is picardin and an insecticide. Clothing impregnated with this is safe and can be washed 50 times before the stuff wears off.

**Nix** shampoo is for lice. Get some for medical kit.

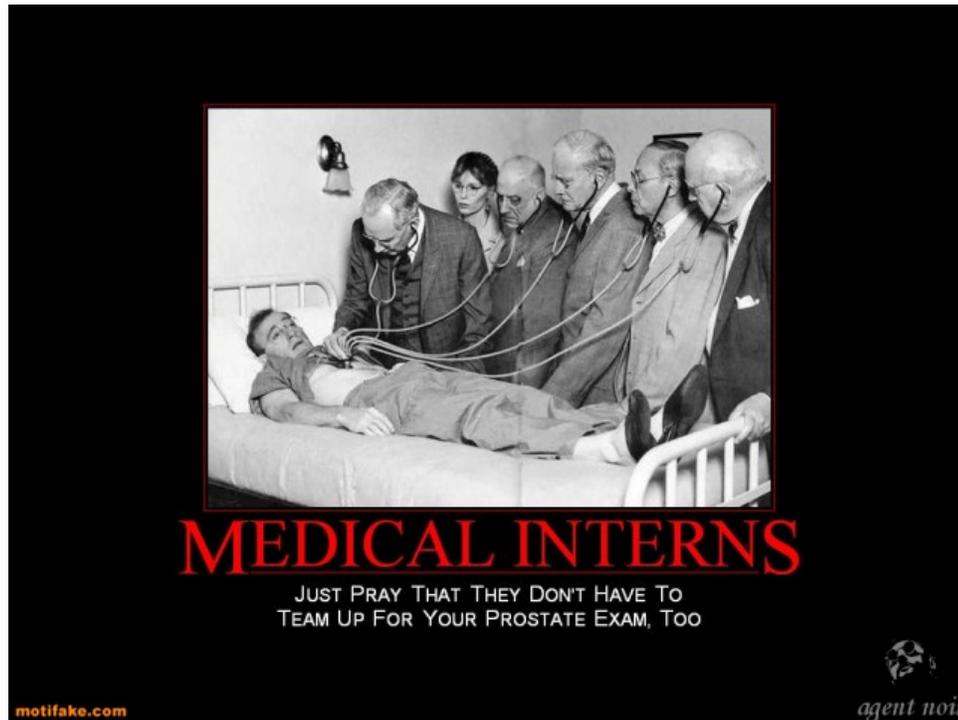
**Doxycycline** is a good malaria prophylaxis. It treats tick-borne disease too.

**Rabies** is a virus that has almost 100% fatality rate in humans. There is an expensive 3 shot series vaccine. The incubation period can be months. More information can be found under "travel medicine" on the internet. Check it out.

### Sunburn



**Treatment:** Aloe Vera Gel. It acts as an anti-septic and anti-inflammatory agent. Combine with Ibuprofen for pain and swelling management.



Carry a copy of your EKG with you in the medical kit. This is very valuable for comparison purposes in case you experience a heart attack.

## Diarrhea

**Diarrhea** is not an emergency unless:

- It causes volume shock
- There is fever
- It is bloody

Bloody diarrhea or diarrhea with pus in it and a fever mean, again, infection. Treat with antibiotics. DO NOT GIVE IMMIDIUM here because you want the person to pass all the bad bacteria out of his/her system. Make sure they rehydrate.

## Eyes

Get lubricating eye drops. “**Natural Tears,**” is recommended.

Bacitracin ointment is also a good lubricator (even though, as we mentioned earlier, it says “Not for use in eyes” on the label). Bacitracin, three times a day for two days will also cure conjunctivitis.

Ibuprofen is particularly good for eye pain.

**Ciprofloxacin** eye drops are needed for serious eye infection, such as one where there is a lot of pus.

**Afrin** is a vasoconstrictor and good for persistent nose bleed. (Cutting your fingernails will also help...)

**Constipation?** This is usually caused by dehydration. Time to rehydrate. Use stool softeners as a last resort and only then try a laxative if really necessary. Strong coffee and booze works well, too.



Alcohol is a good cough suppressant – hey, THAT I did not know! Tea with honey is also good. (I'm going with the alcohol cure next time).

The End.

Edited by: Derek Hillen

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