



M 2011

Safety at Sea – US Naval Academy 2012
Michael Jacobs, MD

HOW TO DIE UNDERWAY

- ◆ DROWNING/COLD SHOCK RESPONSE
- ◆ HEAD/BRAIN INJURY-
- ◆ SEASICKNESS
- ◆ MAJOR TRAUMATIC INJURY
- ◆ HYPOTHERMIA
- ◆ ANAPHYLAXIS
- ◆ HEART ATTACK/STROKE/AAA

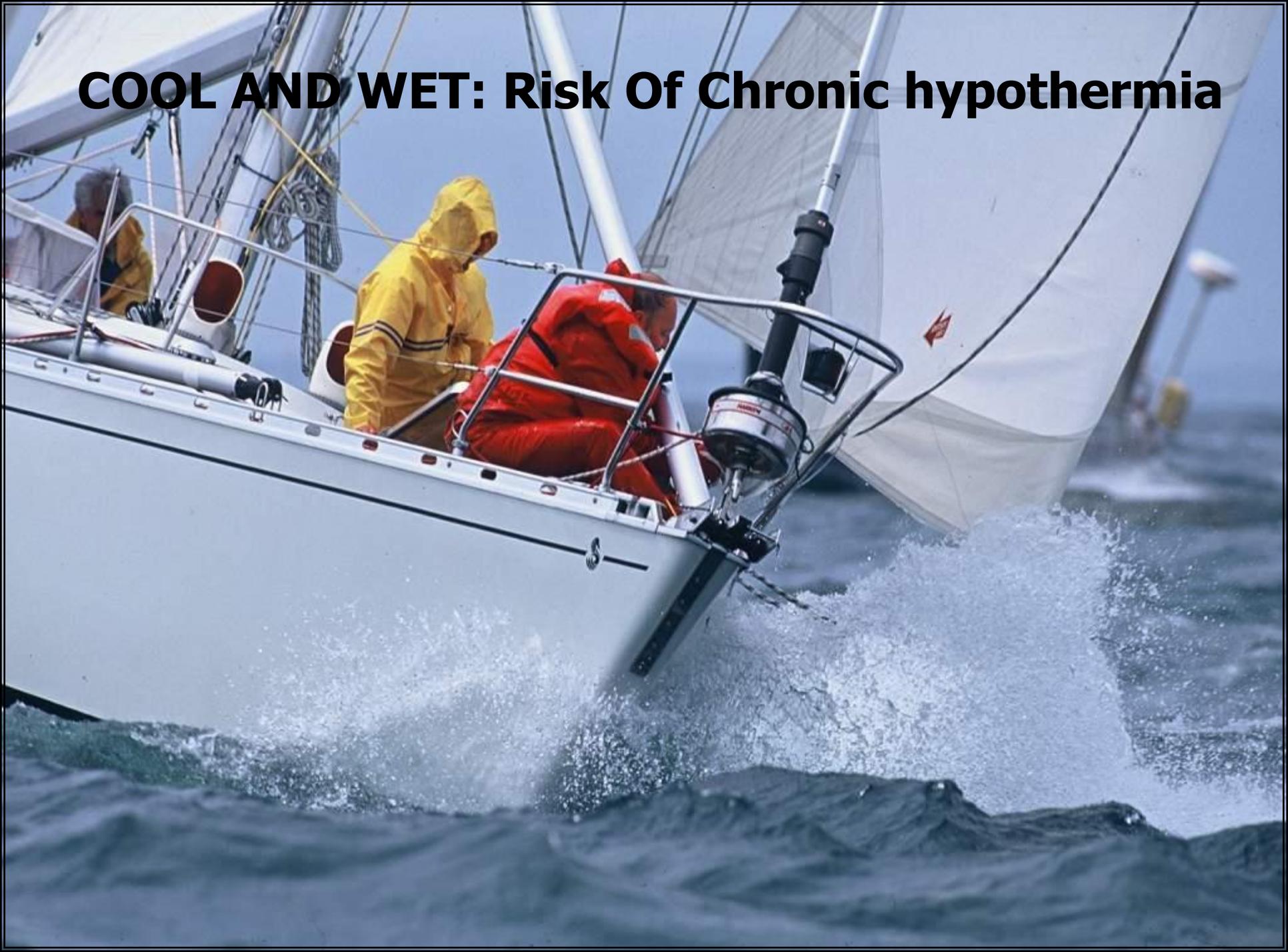
HYPOTHERMIA



Hypothermia

- **CHRONIC:** Slow drop in core temp over hours to days
 - prolonged exposure to elements: wet clothing, cool breeze
- **ACUTE:** Rapid drop in core temp over hours
 - Overboard: Immersion in water $< 25^{\circ}\text{C}$ (77°F)
 - Water conducts heat away from the body up to 25X faster than air at the same temp

COOL AND WET: Risk Of Chronic hypothermia



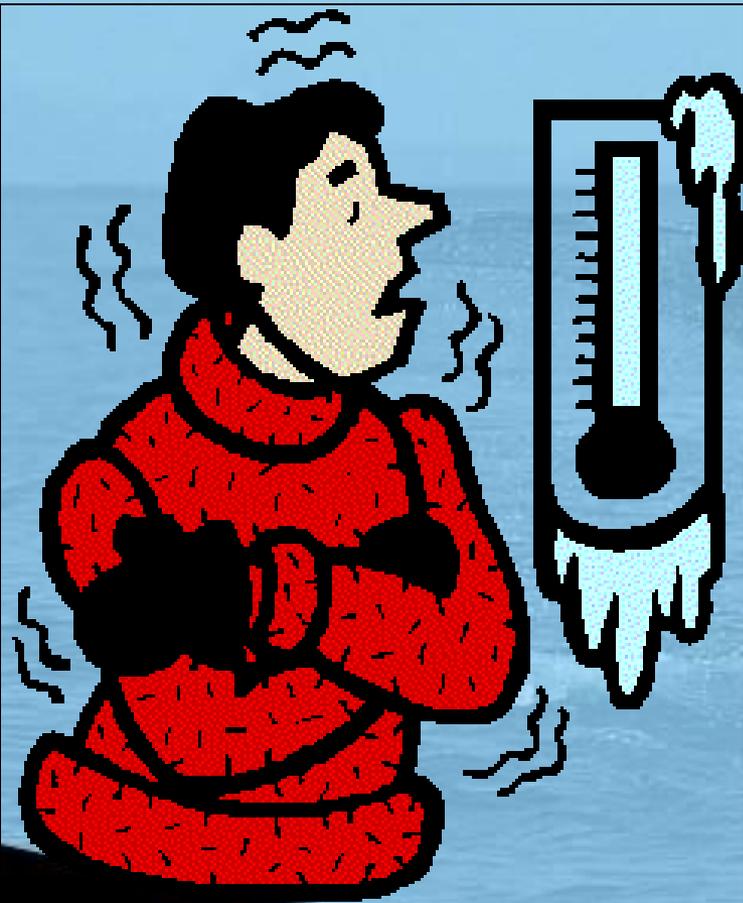
Hypothermia Signs

•Mild

35°C (95°F) **Shivering**

Mental Impairment

Physical Impairment



- Shivering is the the best dx sign
- Starts early, before a drop in core temp.
- Shivering powers metabolic (muscle) heat production
- Once shivering stops, the body has lost the capacity to actively rewarm itself

Hypothermia-Mild (Above 90°F)

- Sustained uncontrolled shivering
- Change in fine motor coordination
- Loss of strength
- Loss of balance-ataxia
- Impaired judgment, confusion
- **FULLY CONSCIOUS**

Rx: Mild Hypothermia

- Get out of the cold
- Shelter, Dry skin
- Dress in layers, Wrap with insulation
- OK to give sweet fluids, snacks (fuel) if victim is alert
- External heat not necessary-NOT helpful
- **Let victim shiver**, limited exercise

Perils of Rewarming

- Active external heating warms skin
- Shivering heat production decreases
- Core temperature is unaffected
- Never substitute a hot shower
- Victim may suffer “circum-rescue collapse”



INJURY

Mechanisms of Injury N = 1,480

Cause of Injury

- Trip/Fall 30%
- Hit by object★ 22%
- Lines /Halyards 22%
- Winch 8%

Contributing Factors

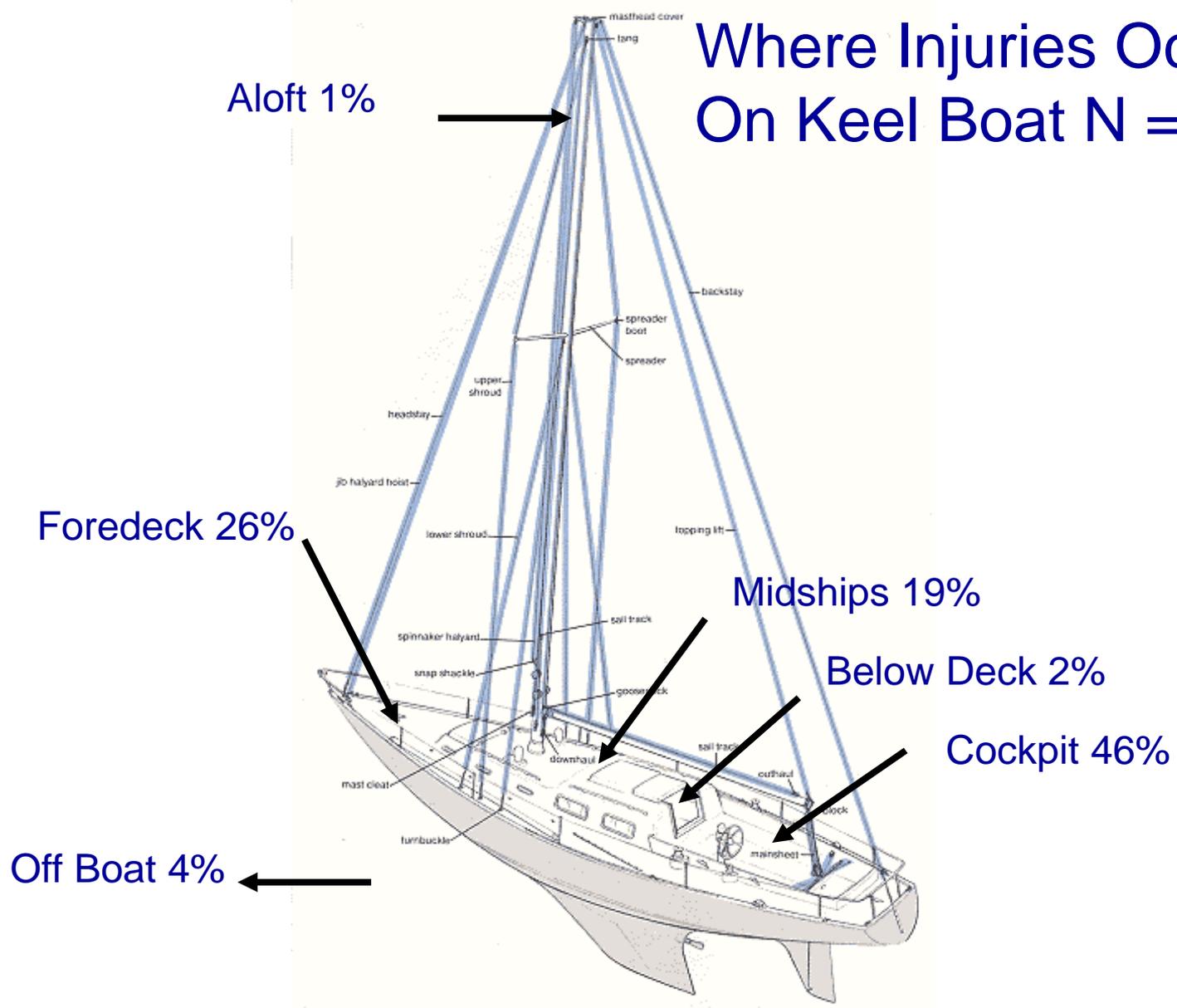
- Heavy Weather 23%
- Tacking* 17%
- Jibing* 13%
- Sail Change 12%
- Repetitive Stress 7%
- Fatigue /Crew Error 5%
- Equipment Failure 4%

★ Boom, spinnaker pole, sail clew, fellow crewmember

* Crew coordinated sailing maneuvers



Where Injuries Occur On Keel Boat N = 1,080





INJURIES

- Soft tissue extremity injuries most common injury among sailors
- 30% caused by trips/falls
- Sailing maneuvers in heavy weather is major contributing factor
- Injuries include contusions, lacerations, sprains, and strains.

Sprains, Strains, & Soft Tissue Injury

- **“Stable injuries”**: No immediate loss of function; progress over first 24 hrs
- **TREATMENT: RICE** for 3-4 days
- **Rest**--splint as needed
- **Ice** -- 15-20 minutes every 4 hours x 72hrs
- **Compression**
- **Elevation** above the heart

HAND INJURIES

- Lacerations and contusions common
- Hand and upper extremity always exposed
- Risk to hands/fingers handling lines
- Winches and cleats are dangerous, especially in heavy weather
- **BOAT IS HIGH THREAT ENVIRONMENT**



Figure 10-3. Improper way to add wraps to a winch.



Avulsion/Amputation Rx

- Sterile Dressing
- Splint entire hand
- If finger completely amputated, place digit in sterile dressing, then sterile bag, then on ice (never directly on ice)



AUS 31

AUS 31



FOSTERS

one Australia



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Head Injury-Fisher's data

- 34 head injuries
- 24 caused by a “flying boom”
- > 50% fatal



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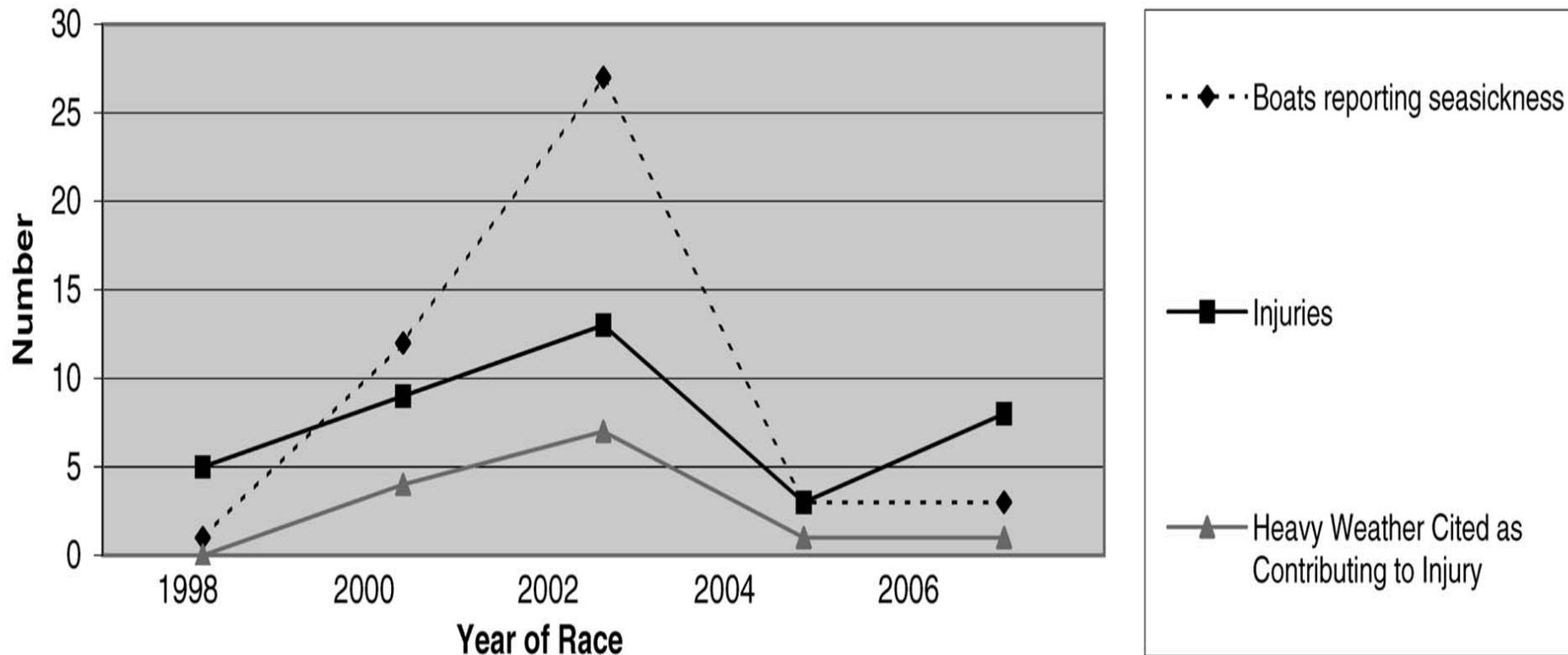
Seasickness



Seasickness

- A common hazard to safety at sea
- Seasickness may be at least annoying or disabling, but may also lead to fatal consequences.
- Nearly everyone will develop seasickness with sufficient stimulus; however, individual susceptibility is enormously variable.

Seasickness, Heavy Weather and Injuries



Seasickness

Every year, many seaworthy yachts are abandoned because their exhausted and despondent crews have lost their collective will to persevere.

“They are wet, seasick, scared, and want to go home,” observed a merchant marine captain.



FACTORS CAUSING IMPAIRED JUDGEMENT

Seasickness impairs memory and cognitive function



Photo: On Edition

- MEDICATIONS FOR SEASICKNESS MAY IMPAIR COGNITIVE FUNCTION
- DEHYDRATION
- SLEEP DEPRIVATION
- FEAR AND PANIC

Seasickness: Mechanism

- The brain's balance center receives sensory data from the eyes, inner ear, and position sensors to estimate motion and spatial orientation of the head and body.
- A sensory conflict is generated when data from these structures arrives in the brain in conflicting combinations.
- Conflict activates the vomiting center in the brain







If your eyes are seeing
what your ears are feeling,
you have a better chance
of having a great day.





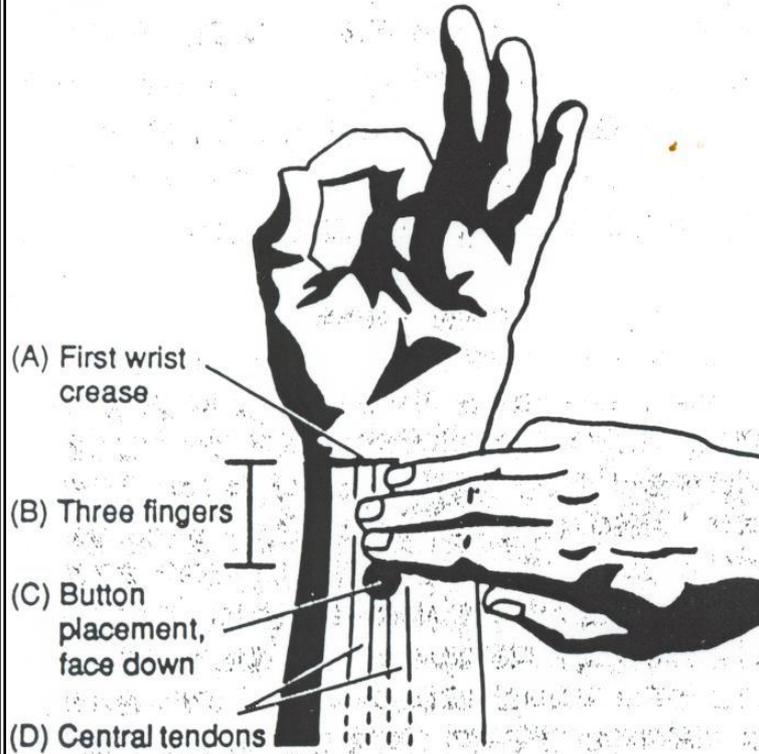
**“INFLATABLE VOMITORIUM”
WHY?**

Seasickness: Prevention

***Medication is more effective in preventing symptoms than in reversing them- start trip on medication!!

MUST BE WORN PROPERLY TO BE EFFECTIVE.

The bands must be worn on both wrists. Position the button as follows (see illustration): Starting at the first wrist crease (A), use your three middle fingers (B) to measure to a point on the underside of each wrist (C). Position the button downward over this point, between the two central (flexor) tendons (D).



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यात्रियों के लिये कला

Queaz-Away™ एक ऐसा के द्वारा आपको पहाड़ी रास्ता, अथवा जहाज तथा बुलती रेल गाड़ी का मिल सकती है। आप इसे दोनों धीमे से दबा कर क्रियाशील बनाया जा बार बार पहन सकते हैं। एक है। इसे आप धी से कर सकते हैं। प्रथम ठिक तरह पहनना आवश्यक है। कलाई को (A), और दूसरी, तीसरी एवं चौथी एक स्थान को हर कलाई के ऊपर करें (C)। इस स्थान पर, दोनों बटन को बिटाएँ (D)।

トラベル用リ

Queaz-Away™は、カーブのつた海上での船旅、悪天候での列車の旅などが引き起こす乗車酔いなどにやわらげる製品です。ツボを押すことにより作用を返し着用のいずれも可。力を発揮するように正しく着用)：両手首に装着のこと。近い線を起点として (A)、(B) 各手首より下側にあるここにバンドのボタンの付いた腕2本の間 (D) にボタン

旅行者

Queaz-Away™系非藥物性自由曲折公路、顛簸海面、見不止の火車旅途所引起使用時將該品輕壓於雙腕效驗。可連續佩戴或反復人可用。不怕洗滌。必須效(如圖)：應佩於雙腕第一處褶皺(A)開始。使用在每一手腕的內側定出一點置於該點之上、兩根中央筋

여행용 손목

Queaz-Away™는 바깥부는 길이에는 비행기, 또는 흔들리는 기차에서 애주는 비순환성 약품입니다. 양쪽 가볍게 눌러 주도록 착용하십시오. 목에서 사용하셔도 됩니다. 크기 조절할 수 있으며, 세탁도 할 수 내기 위해서는 정확하게 사용하십시오. 양쪽 손목에 모두 착용하십시오. 있는 곳부터 시작하십시오(A), 가운대 이용해서(B) 양 손목의 안쪽에 사용(C). 단추가 있는 면을 아래쪽 중앙인대의 사이에 있는 지압점 위



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36 CAPSULES · 250 MG. EACH



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WILDERNESS MEDICAL SOCIETY

Sea Sickness: Prevention

After Departure:

- Stay on deck- amidships
- Avoid areas with fumes & odors
- Avoid close-focused visual tasks- e.g., reading, using binoculars, navigating
- Look at the horizon, take the helm
- Take medication at regular intervals (Use long-acting drugs while offshore)

Seasickness: Early Treatment

- “Fight back and act quickly” Take the helm
- Obtain good broad view of horizon:
 - Use “earth-fixed” reference frame
- Steer boat by reference to oncoming waves, clouds, horizon and distant marks
- Ride the waves with your whole body*
 - Alter boat’s course for comfort & wear a safety harness
- Take additional medication

*Posture yourself to anticipate the boat's motion and "ride the waves."
Keep your head and shoulders balanced over your hips and gain postural control gracefully.

“GIMBLE YOURSELF”



Seasickness- Medication

- Consider: Sudafed (30-120mg pseudoephedrine) to counter drowsiness of medications or caffeine 200mg
- **“BEST BET”**: Bonine (Meclizine)* + Sudafed
- Use Phenergan 25 mg when necessary

*least sedation and cognitive side effects



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MARINE MEDICAL HIT 2000

MARINE MEDICAL HIT 1000

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Medical
Kits

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RX
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25% OFF All Other Name Brand Items In Stock

A large display of prescription medications on shelves. The shelves are organized into several sections, each containing various types of drugs, including bottles, boxes, and blister packs. The display is set against a red background with a white top edge. The floor is made of wood, and the ceiling has recessed lighting.

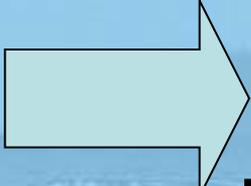
13000 Brand solutions.

A small advertisement for Zovatec, featuring a photograph of two people and the product name.

SELECTION OF MEDICAL SUPPLIES

- Waterproof containers
- Rx Endemic diseases, crew's health
- Rx Hazardous marine life, infections, seasickness, trauma, submersion, sun burn
- Medical expertise aboard
- Drugs not causing photosensitivity
- Access to reliable and comprehensive medical care; HOW FAR, HOW GOOD?

GOALS OF MEDICAL OFFICER

- Increase self-reliance at sea- do the “right thing at the right time”.
- Prevent minor problems  major
- Avoid **high risk** medical evacuation for a **low risk** medical problem
- Promote health and safety of crew

MASH FOLDER FOR CREW

- Medication
- Allergies
- Sat phone medical contact
- History

EMAIL IN ADVANCE TO MEDICAL OFFICER TO FILE



HOW TO BE MISERABLE UNDERWAY

- Pass a kidney stone (or don't pass it)
- Experience alcohol withdrawal
- Inadequate pain medication for a fracture
- Share the head with the crew-all with diarrhea
- Have a severe rash
- Be unable to void (Urinary retention)
- Suffer from a dental infection
- Recurrent chest/abdominal pain

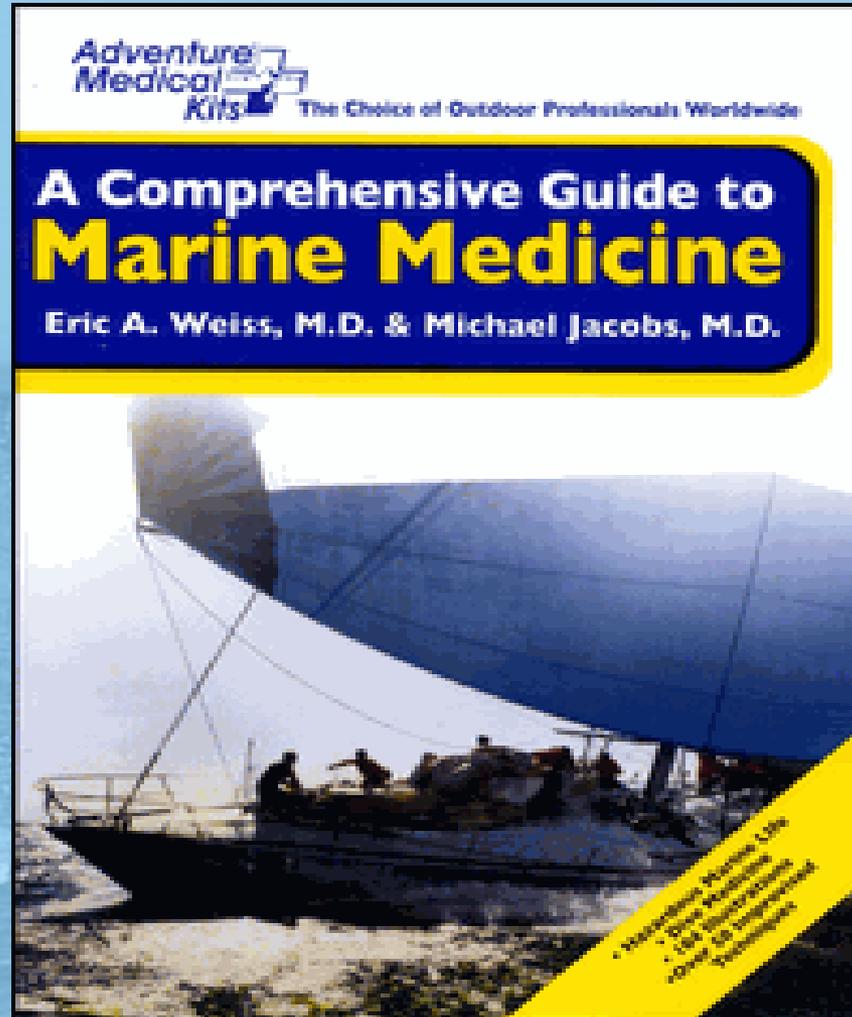
COASTAL MEDICAL KIT: 12-24 hrs



Category 1 races, using the US Sailing prescription definition are *"of long distance, well offshore,... where yachts must be completely **self-sufficient for extended periods of time,prepared to meet serious emergencies without the expectation of outside assistance."***



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Maritime Medical Access (MMA)

George Washington University

- 120 transoceanic commercial and recreational vessels over 4 years (Occupational Medicine 2007)
- 84% of consultations were for medical problems, 14% were for injuries, and 2% were for psychiatric illness.

U.S. Coast Guard Rescue Coordination Centers (RCCs)

24 hour Regional Contacts for Emergencies

<i>RCC</i>	<i>Location</i>	<i>Area of SAR Coordination Responsibility</i>	<i>Phone Number</i>
Atlantic SAR Coordinator RCC COMLANTAREA	Commander U.S. Coast Guard Atlantic Area Portsmouth, Virginia	Overall responsibility for areas covered by RCC Boston, RCC Norfolk, RCC Miami, RSC San Juan, RCC New Orleans and RCC Cleveland plus a portion of the North Atlantic Ocean out to 40 degrees west longitude.	(757)398-6231
RCC Boston	Commander 1st Coast Guard District Boston, Massachusetts	New England down to and including a portion of Northern New Jersey plus U.S. waters of Lake Champlain.	(617)223-8555
RCC Norfolk	Commander 5th Coast Guard District Portsmouth, Virginia	Mid-Atlantic states including the majority of New Jersey down to the North Carolina / South Carolina Border.	(757)398-6231
RCC Miami	Commander 7th Coast Guard District Miami, Florida	Southeast states from the South Carolina / North Carolina border around to the eastern end of the Florida panhandle plus a large portion of the Caribbean Sea.	(305)415-6800
RSC San Juan (Sub-Center of RCC Miami)	Commander Sector San Juan San Juan, Puerto Rico	Southeast portion of the Caribbean Sea	(787)289-2042
RCC New Orleans	Commander 8th Coast Guard District New Orleans, Louisiana	Southern states including the Florida panhandle to the U.S. / Mexico border in Texas plus the inland rivers including the Mississippi, Missouri, Ohio and tributaries.	(504)589-6225
RCC Cleveland	Commander 9th Coast Guard District Cleveland, Ohio	U.S. waters of the Great Lakes, their connecting rivers and tributaries.	(216)902-6117
Pacific SAR Coordinator	Commander U.S. Coast Guard Pacific Area Alameda, California	Overall responsibility for areas covered by RCC Alameda, RCC Seattle, RCC Honolulu and RCC Juneau.	(510)437-3700
RCC Alameda	Commander 11th Coast Guard District Alameda, California	California and Eastern Pacific Ocean waters assigned by international convention off the Coast of Mexico.	(510)437-3700
RCC Seattle	Commander 13th Coast Guard District Seattle, Washington	Oregon and Washington	(206)220-7001
RCC Honolulu (operated as JRCC with DOD)	Commander 14th Coast Guard District Honolulu, Hawaii	Hawaii, U.S. Pacific Islands and waters of Central Pacific Ocean assigned by international convention (extending from as far as 6 degrees south to 40 degrees north latitude and as far as 110 west to 130 east longitude).	(808) 535-3333
Sector Guam (coordinates SAR under RCC Honolulu)	Commander Sector Guam	Guam and other U.S. territories and possessions in the far western Pacific Ocean.	(671)355-4824
RCC Juneau	Commander 17th Coast Guard District Juneau, Alaska	Alaska, U.S. waters in North Pacific Ocean, Bering Sea, and Arctic Ocean	(907)463

Training Resource: The Man

Jeffrey Isaac, PA-C Ltd.
Phone: 1-970-275-4999
www.medicalofficer.net

Wilderness Medical Associates
WFR, WEMT

SOLO



Jeffrey Isaac, PA-C is the curriculum director and a lead instructor for Wilderness Medical Associates, Inc. He is a co-author with Dr. David Johnson of ***Wilderness and Rescue Medicine, A Practical Guide for the Basic and Advanced Practitioner***, used as a textbook in WMA courses worldwide. His teaching reflects the experience of 25 years in emergency medicine, outdoor education, and wilderness rescue.



THE CREW KIT

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- **PREVENTION** BEGINS HERE
- Review contents with crew



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- Apply early ($\frac{1}{2}$ hour before), liberally, & **frequently: Q 2H**
- - Use “very water resistant”
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Caliber™ Povidone-Iodine Prep Pad
 Antiseptic/Germicide, Medium
 For Single Use Only
 Saturated with a 10% povidone-iodine solution equivalent to 1% available iodine
 For external use only

Cat. 40000-040
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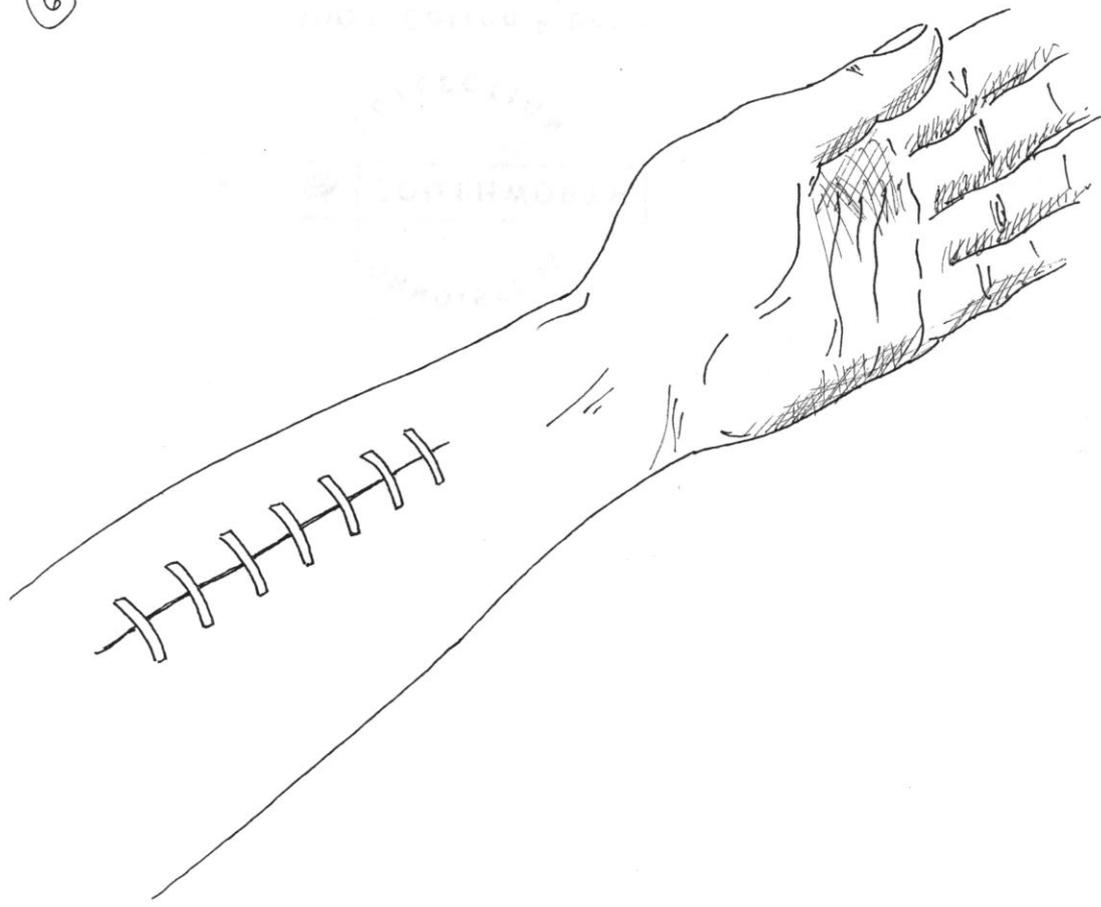
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USUAL DOSAGE: See package insert.

Keep patient under close observation of a physician.

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TAKE WITH FOOD

IT IS VERY IMPORTANT THAT YOU USE THIS EXACTLY AS DIRECTED. DO NOT SKIP DOSES OR DISCONTINUE UNLESS DIRECTED BY YOUR DOCTOR.

OBTAIN MEDICAL ADVICE BEFORE TAKING NON-PRESCRIPTION DRUGS AS SOME MAY AFFECT THE ACTION OF THIS MEDICATION.

CALL YOUR DOCTOR FOR MEDICAL ADVICE ABOUT SIDE EFFECTS YOU MAY REPORT. SIDE EFFECTS TO FDA AT 1-800-FDA-1088.

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