SEASICKNESS

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Seasickness is the most common and significant medical illness for mariners at sea, often generating maritime rescue operations that put crew and rescue personnel at unnecessary risk. During stormy weather, mariners frequently consider seasickness a medical emergency and justification for medical evacuation. Each year, seaworthy yachts are abandoned because their exhausted and despondent crews have lost the collective will to persevere. “They are wet, seasick, scared, and want to go home,” observed a merchant marine captain (personal communication with author).

Epidemiology and risk factors: Nearly everyone will develop seasickness with sufficient stimuli; however, individual susceptibility is enormously variable. Only those without a functioning vestibular system are fully immune. Pregnant women are highly susceptible, especially in the first trimester.

Physiology: One underlying mechanism of seasickness involves a conflict of sensory input processed by the brain to orient the body’s position. Someone positioned in the cabin of a heeling or rolling boat is inviting seasickness. Below decks, the eyes oriented to the cabin sole and ceiling detect no tilt from vertical, while the fluid in the inner ear’s vestibular system (semicircular canals and the otolith organs) constantly shifts, sending neural messages that the head and body in the boat are not vertical. Position sensors (proprioceptors) in the neck, muscles, and joints send additional signals, depending on how a person shifts and secures him or herself from falling. This mix of sensory data
from the eyes, inner ear, and position sensors arrives in complex and conflicting combinations, creating a “sensory conflict” that activates the emetic center in the brainstem. According to Dr. Charles Omen, Director of the Man Vehicle Space Lab at MIT and an authority on motion sickness, the sensory conflict is also a sensory cue “expectancy” conflict. It occurs when signals from the inner ear don’t match expectations based on one’s own commanded self-movement, or concurrent visual or proprioceptive cues. When the motor cortex generates motor signals for movement, it also generates the predicted sensory feedback of our motion. If there is a conflict in the expected sensory input with the actual movement (for example, the effect of a rolling boat on our motion), an “expectancy conflict” develops which activates the autonomic and emetic centers, and symptoms of seasickness develop. If one eliminates these conflicts, one can prevent seasickness; “if your eyes are seeing what your ears are feeling, and what your brain is expecting, you have a good chance of experiencing a great day at sea.”

Clinical Presentation: Seasickness is a complex syndrome with an array of signs and symptoms. It includes much more than nausea and vomiting. One facet of seasickness that is often not recognized is the sopite syndrome. It refers to the profound drowsiness and persistent fatigue following provocative motion stimulation. Yawning has been shown to be a behavioral marker of the sopite syndrome; additional early signs include boredom, sighing, pallor, dry mouth or salivating, headache, dizziness, and lethargy. With sustained exposure to the stimulus, gastric emptying is inhibited. Subsequently, hands and face start to sweat and become cold and clammy and belching, salivation, nausea, dry heaves, and vomiting ensue. Some persons don’t have gastrointestinal complaints but
experience headache, apathy, and depression. Seasickness impairs cognitive function. Sailors often lose the ability to multitask, making it difficult to analyze and integrate complex data, which leads to illogical reasoning, impaired judgment and faulty decisions. Cognitive failure is also expressed as loss of short-term memory. As seasickness becomes more severe, it can lead to rapid mental, emotional, and physical deterioration marked by progressive dehydration, loss of manual dexterity, and ataxia.

**Prevention and early Treatment:** Medication is more effective in preventing symptoms than in reversing them. Therefore, anti-seasickness medication should be administered well in advance, before leaving port, or the night prior to departure. See discussion of medications below.

Begin any trip well hydrated, well rested, and free of the after-effects of alcohol, which impairs vestibular function by sensitizing the vestibular apparatus to motion. Snack on bland foods throughout the day, even if anorectic, to maintain energy levels until meals are regularly tolerated. Cheese and crackers, energy bars, fruit, trail mix (GORP), dry granola, and popcorn work well. Drinking small amounts of fluid frequently is recommended to avoid dehydration. Many sailors believe drinks high in vitamin C prevents seasickness (e.g., "Emergen-C") however, there is no clinical data to support this supplement or ginger, which may be clinically useful in individual cases. Ginger is readily available in 500-mg capsules in health food stores and sold in marine stores as Sailor’s Secret. The suggested dose is 1000 mg every 6 hours. Foods containing lower concentrations of ginger, such as gingersnap cookies, ginger ale or tea, and candied ginger may be helpful. Ginger may cause heartburn and an attack of biliary colic by
stimulating the flow of bile if gallstones are present. Both field and laboratory experiments have documented the efficacy of acupressure in preventing seasickness. However, some experts consider acupressure no better than a placebo. One sea trial showed that acustimulation suppressed the symptoms of motion sickness. Pressure should be applied on the Neiguan P6 point of the forearm over the median nerve. This is found two to three fingerbreadths proximal to the wrist joint between the two prominent finger flexor tendons. There are commercially available elastic wrist straps with plastic studs that create pressure over the P6 point. To reduce sensory conflict, limit the time below decks while underway.

After departure, reduce sensory conflict by limiting the time below decks. Stay on deck amidships (center), or aft (toward the stern), where pitching and rolling are less severe. Obtain a broad view of the horizon using direct and peripheral vision. This provides a stable and level point of reference. Avoid close-focused visual tasks such as prolonged reading and writing. Avoid areas with fumes (especially diesel) and odors that can stimulate nausea. Avoid sleep deprivation, which increases susceptibility to seasickness. Continue medication for preventing seasickness at the suggested intervals; taper the dose after the first or second day.

At the first sign of seasickness, one immediate remedy for many is to take the helm and steer. Stand and feel the waves, and steer the boat by reference to clouds, the horizon, distant marks and oncoming waves, posturing to anticipate the boat’s motion by “riding” the waves. “Wave riding” synchronizes sensory input and expectations of motion. Keep the head, shoulders and upper body balanced over the hips, to stay in balance and gain
postural control gracefully, as though the body was truly “gimbaled” on the deck. Sitting in the cockpit, one can still ride the waves and watch the horizon. “Postural anticipation of the boat’s motion is the natural cure for seasickness,” states Chuck Omen, who developed the concept of wave riding.

Treatment for moderate to severe seasickness: Seasick crew can easily fall or be washed overboard. They should always wear a safety harness on deck and be closely monitored. Have a bucket nearby, and never let them move to the lifelines to vomit overboard. In storm conditions, or if symptoms progress, the safest place to be secured is in the cabin, resting in a well-ventilated bunk, face up with eyes closed and head still, in an attempt to sleep.

Prevention and Treatment with Medications: The antihistamines meclizine (Bonine) and dimenhydrinate (Dramamine) are available over the counter (OTC) without prescription. They are effective for preventing seasickness, as are the other prescription medications listed in Table 70-1. The popular antihistamine cinnarizine (Stugeron) is not sold in the United States, but is available OTC in Europe, Bermuda, Mexico, and Canada. It can be obtained legally from http://www.canadadrugsonline.com. Many sailors favor it because it is less sedating than all the other antihistamines and has fewer reported side effects (described below).

Side effects of over-the-counter antihistamines include drowsiness, dry mouth, blurred vision, irritability, urinary retention, dizziness, and headache. Meclizine (Bonine) is thought to cause less drowsiness and confusion. Antihistamines cause thickened bronchial secretions, and should be used with caution in people with asthma and chronic
obstructive pulmonary disease. An effective nonprescription drug for drowsiness is the decongestant pseudoephedrine, which is available in doses of 30 to 100 mg; caffeine 200 mg is also useful and may potentiate the beneficial effects of promethazine. The newer generation of nonsedating antihistamines are ineffective in preventing seasickness. Parenteral anti-nausea medications include the phenothiazine derivative promethazine hydrochloride (Phenergan). Promethazine is useful for prophylactic and active treatment of seasickness and can be administered as a suppository, by deep IM injection, and orally as a tablet or syrup. Anticholinergic side effects include constipation, xerostomia, blurred vision, and urinary retention. Phenergan should be used with caution in persons with decreased gastrointestinal motility, urinary retention or obstruction, benign prostatic hypertrophy, xerostomia, or visual problems. Rare but serious adverse effects of promethazine include extrapyramidal reactions. The oral disintegrating tablet ondansetron (Zofran) is extremely effective for treating vomiting, however, it does not treat or prevent the other symptoms of seasickness. Transdermal scopolamine hydrobromide (Transderm Scōp® patch) is the most popular anticholinergic agent used for prevention of motion sickness. Scopolamine prevents motion-induced nausea by inhibiting vestibular input to the central nervous system, causing inhibition of the vomiting reflex. It may also act directly on the vomiting center. The drug is delivered via an adhesive patch placed behind the ear at least 4 hours before departure; the patch will last for up to 3 days, often with minimal side effects. The most common adverse effects are dry mouth (66%) and drowsiness (17%). Other undesirable side effects include blurred vision (which may persist for weeks), dry mucous membranes, short-term
memory loss, and problems denoted by the well-known mnemonic “hot as hell, dry as a bone, blind as a bat, mad as a hatter.” Do not disrupt the integrity of the disc by cutting it. Follow the directions carefully, and wash hands thoroughly after application because temporary blurring of vision and dilation of the pupils may occur if the drug is on your hands and comes in contact with the eyes. Apply only one disc at a time. Scopolamine is contraindicated for children, persons with narrow-angle glaucoma (remove the patch immediately if eye pain occurs suddenly), and men with prostatic hypertrophy. Long-term use may produce withdrawal symptoms such as nausea, dizziness, headache, and equilibrium disturbances. Scopolamine in pill form (Scopace) is no longer available in the US or Canada.

All therapies are subject to placebo effect, and there are no well-controlled trials comparing and evaluating different treatments. Many products cite only testimonials. The protection conferred by drugs is a matter of degree; there is no magic bullet to prevent seasickness in everyone. It is not uncommon for one drug in a category (e.g., antihistamine) to be effective and a related drug to provide no benefit; the same is true for side effects. Evaluate medication side effects before boating by trying different drugs while on shore. If all else fails, follow Samuel Johnson’s 18th-century advice: “To cure seasickness, find a good big oak tree and wrap your arms around it.”