The Ups and Downs of Motion Sickness

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Abstract:

Overview: Nearly everyone will experience motion sickness at some point. It's thought to be caused by confusion among the vestibular, visual, and proprioceptive systems; the associated nausea is thought to involve neurons in the hypothalamus and a portion of the cerebral cortex. Although many remedies are available, none has been proven to be effective for everyone. Pharma cologic treatments include antihistamines, scopolamine, and gingerroot. Nonpharmacologic treatments include efforts to control gastric motility, such as wearing a wristband that stimulates the P6 acupressure point, and efforts to affect the vestibular, visual, and proprioceptive systems, such as facing forward, riding at the front of a boat, and looking toward the horizon, among others. Nurses can help patients find the remedy that works best for them.

Article:

The sun is brilliant yellow, the sky is crystal blue, the water is sparkling turquoise, and you're slowly turning a bilious green. Many vacations involving travel, especially by boat but also by airplane or car, are spoiled by motion sickness. What causes this distressing malady, and what can be done to prevent or alleviate it? Although motion sickness has long plagued humankind, surprisingly little of its etiology and treatment has been discovered.

There are many motion sickness remedies available, but no one remedy works for everybody; to find that perfect remedy, the one that works for everyone in every condition (and has few adverse effects), more must be learned about the causes of motion sickness. Engineering advancements have been made to alleviate motion sickness on modern boats, trains, buses, and

airplanes, which has made a big difference in the comfort of many travelers. Still, before setting off on the cruise of a lifetime, those who are vulnerable to motion sickness must try to find the interventions that work best for them.

PREVALENCE

Motion sickness is a phenomenon that affects almost everyone at some time. The prevalence of motion sickness on very rough seas approaches 100%.1 Car sickness is familiar to almost everyone with young children. Seventy-three percent of crew members on their first space shuttle flight experience motion sickness during the first two to three days of the mission, and some experience it later on, particularly upon reentry and when flights are longer.2 Quite a bit of research on the best way to treat motion sickness has therefore been funded by the National Aeronautics and Space Administration (NASA) and by navies around the world, yet no one method has been proven to be more effective than all others; studies have yielded conflicting support for the various treatments, and none is effective in every study. Nevertheless, there are interventions nurses can recommend to help ease their patients' symptoms.

THE ETIOLOGY OF MOTION SICKNESS

The causes of motion sickness appear to involve confusion between the vestibular, visual, and proprioceptive systems. Vestibular receptors are found in the middle ear in the ampulla of the semicircular canals; they carry sensations to the eighth cranial nerve, also known as the vestibulocochlear nerve, which is responsible for our sense of balance and spatial orientation. Visual input is conveyed to the brain by the second cranial nerve (the optic nerve). Proprioceptors are sensory receptors on nerve endings (found in various parts of the body) that relay to our brains information about our body positions and movements in space. When these impulses conflict, homeostasis is upset, and the body reacts as it would to the ingestion of toxins, with nausea and vomiting. The exact cause of the nausea is unknown, but it's thought to involve neurons in the hypothalamus and a portion of the cerebral cortex.3 Recently, Eisenman has proposed that acetylcholine brings about the symptoms of motion sickness.4

PHARMACOLOGIC TREATMENTS

The agents used most often to combat motion sickness are antihistamines, scopolamine, and gingerroot.

Antihistamines decrease symptoms by reducing sensitivity in the vestibular apparatus and blocking emetic histamine H1 receptors in the emetic center of the brainstem. In addition to

drowsiness, possible adverse effects of antihistamines are confusion and nervousness, hypotension, gastrointestinal distress, and thickening of bronchial secretions.

Antihistamines shown to help control symptoms of motion sickness include the following:

* dimenhydrinate (Dramamine, TripTone)5

* meclizine (Bonine and others); it's sometimes used with caffeine 6

* diphenhydramine (Benadryl and others)7

* promethazine (Phenergan and others); it's sometimes used with caffeine 8

* chlorpheniramine (Chlor-Trimeton and others)9

Scopolamine, also known as hyoscine and levo-duboisine, is a competitive muscarinic acetylcholine receptor antagonist and disrupts the parasympathetic nervous system. It's available by prescription in transdermal patches that are usually worn on the mastoid process. They're thought to be effective for three days. Before the use of promethazine became popular in the U.S. space program, scopolamine was used by NASA to ease motion sickness in space. An extensive literature review undertaken for the Cochrane Collaboration concluded that although some studies have shown scopolamine to be effective in comparison with placebos, no conclusions could be drawn about its superiority to other drug treatments.10 Scopolamine patches cause dry mouth in 50% to 60% of subjects, drowsiness in as many as 20%, and allergic contact dermatitis in approximately 10%. Transient impairment of ocular accommodation (the eye's ability to focus) has also been observed.11,12 The patches shouldn't be worn by children or cut in half. The drug can cause serious central nervous system reactions in older patients.

Gingerroot. The mechanism by which gingerroot functions is unknown. In an early study on its effect on motion sickness, gingerroot in 940-mg capsules was found to be more effective than dimenhydrinate in reducing motion sickness caused by a rotating drum.13 In the last three decades, other studies have supported the use of ginger to relieve nausea; one systematic review of randomized, controlled trials found the effect of ginger on nausea to be significantly superior to controls or other treatments in five of the six studies reviewed.14 Many people believe that gingerroot increases clotting time and shouldn't be used in doses above 1 g or for extended periods by women who are pregnant or by patients taking antiplatelet drugs. However, studies on ginger's anticlotting effect have used small samples and have yielded varying conclusions. Recently, in a study using 12 healthy male subjects, Jiang and colleagues confirmed that ginger had no anticlotting effect even when given with warfarin.15

NONPHARMACOLOGIC TREATMENTS

Nonpharmacologic interventions for motion sickness symptoms include those aimed at affecting gastric motility and at controlling the confusion of signals coming from the visual, vestibular, and proprioceptive systems.

Controlling gastric motility. Gastric hypermotility and other gastric arrhythmias can be controlled to some extent, and motion sickness–induced nausea and vomiting can be decreased, by the use of slow, deep breathing.16 Textbooks discussing the control of nausea in pregnancy recommend the presence of a bolus of nonirritating food in the stomach such as oatmeal, bagels, bread, or crackers. Protein-predominant meals have also been found to decrease gastric hypermotility and motion sickness symptoms.17

Stimulation of nerves at acupressure points. Electrical stimulation of the P6 acupressure point (located on the anterior surface of the forearm, two inches proximal to the distal wrist crease and between the middle two tendons of the inside of the forearm) has been found to be effective in enhancing the regularity of gastric myoelectric activity and, therefore, decreasing nausea. This stimulation can be accomplished by using a wristband with a battery to send electronic signals that stimulate points in the wrist. Wristbands that don't use electric stimulation are also available; stimulation is created by a small plastic ball that's held in place by the wristband and presses on the P6 acupressure point. A double-blind study involving 200 subjects showed the use of these bands to be effective in controlling postoperative nausea.18

Affecting the visual, vestibular, and proprioceptive systems. Controlling the conflicting input received by the visual system has been found to decrease motion sickness. Facing forward, riding in the front seat of a car or the front of a boat, and looking toward the more stationary far horizon, rather than performing tasks at close range, have all been found to help. In a side effect of a study of children with vision problems who were fitted with prism glasses that directed their vision onto the printed page, it was found that 70% of children who were prone to car sickness experienced no motion sickness while wearing the glasses when they rode in a car. The authors surmised that this was because the prisms blocked side and top visual stimuli.19

Several interventions are aimed at decreasing vestibular and proprioceptive inputs. Sitting near the center of gyration on a boat or plane has been recommended so that the up-and-down motions are less pronounced. However, one study of 260 cruise ship passengers found that cabin location wasn't related to the likelihood of seasickness.20 That study, however, did reinforce the benefits of lying in the supine position in order to alleviate symptoms. Not only does the supine position eliminate some visual input, it also minimizes the back-and-forth motion, so that mostly lateral motion is experienced. A study of 72 subjects found that restraining the upper body with a high backrest in order to limit the fore-and-aft motions helped to reduce motion sickness symptoms.21 In that study, controlling upper body motion was more effective than changing visual conditions (such as closing the eyes or performing a "visual search task").

Some psychological interventions have been found to be therapeutic. Cognitive–behavioral therapy has been found to be somewhat effective in controlling motion sickness symptoms. In one study, autogenic-feedback training, a combination of "biofeedback and autogenic therapy" that "involves training subjects to voluntarily control several physiological responses," was found to be the only effective therapy when it was compared with intramuscular injections of promethazine (25 mg or 50 mg), an injection of normal saline, and a control condition.22

In addition, many anecdotal reports on the Internet and from motion sickness–prone people support the effectiveness of distraction, relaxation, imagery, and self-hypnosis in reducing symptoms. Many recommend simply going to bed and sleeping through the first day at sea whenever possible.22

SO WHAT'S A NURSE TO DO?

Clearly, there's no one remedy that's been disproved by one or several studies and no intervention that's obviously better than the rest. A nurse's best approach is to tell patients who suffer from motion sickness to try several methods at different times until they find the one that seems most effective for them—and to do it, if they can, before they start off on that longed-for cruise or transcontinental flight.

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