Nausea is described as the recognition of the urge to vomit, whereas vomiting (A – 1) is the forceful expulsion of gastric contents. For many years, it was thought that chemotherapy-induced nausea and vomiting (CINV) is initiated by an activation of the chemoreceptor trigger zone (CTZ) in the medulla (area postrema). However, more recent evidence showed that the primary mechanism for the emetic response (A – 2) is an abdominally activated 5-HT3 receptor–mediated pathway. In addition, a neurochemical mediator (neurokinin, NK-1) is involved.

There are 4 subcategories of CINV.

- Acute emesis, which occurs up to 24 hours after chemotherapy
- Delayed emesis, which occurs 24 hours to 7 days after chemotherapy
- Chronic nausea and vomiting, which is not related to chemotherapy but to other causes such as pain medications, metastasis (especially to the brain and colon) and signs and symptoms of advanced cancer such as constipation, stomach ulcers and metabolic abnormalities
- Anticipatory emesis, which is a conditioned response that occurs at any time in response to thoughts of chemotherapy and is linked to psychological, neurological and physical symptoms.

Uncontrolled nausea and vomiting can lead to severe dehydration, electrolyte imbalance, malnutrition, aspiration pneumonia and emotional distress. All of these conditions can substantially affect the patient’s quality of life, survival and health care costs.
Effects on the Gastrointestinal System:
Nausea and Vomiting

Assessment

Nausea and vomiting are the most common and most distressful side effects of cancer therapy. Almost all chemotherapeutic agents can cause nausea and vomiting; however, the emetogenic potential of different agents varies. Nausea and vomiting can occur in patients who receive total body irradiation and irradiation of the head and abdomen. These side effects can occur in response to the cerebral edema that can develop after irradiation of the head and in response to the release of serotonin by the irradiated tissues in the abdomen.

Other factors that could bring about nausea and vomiting include increased intracranial pressure secondary to brain tumors and oncologic emergencies such as superior vena cava syndrome and tumor lysis syndrome.

Radiation-induced nausea and vomiting are often related to the site being irradiated. Nausea and vomiting are more likely to occur when radiation is directed to the brain, skull, upper abdomen, stomach, bowel or liver. The risk of emesis increases as the dose of radiation increases, the duration of therapy increases and the width of the treatment field becomes larger.

When assessing the patient with nausea and vomiting, the nurse should consider administering supportive medications (e.g., opioids for pain relief) prescribed for the patient. The possibility that metastatic lesions are obstructing the bowel should also be considered.

Studies have indicated that the following factors are predictive of CINV in all patients:
- younger age
- female gender
- previous occurrence/experience of CINV.

For adults, the use of alcohol and susceptibility to motion sickness are added risk factors.

In cases of anticipatory CINV, factors that can increase the risk of its occurrence include inadequate control of previous treatment-related nausea and vomiting, pre-existing anxiety and/or depression. Adolescents and young adults are more prone to anticipatory CINV than younger children and older adults. Triggering factors may include the sight and smell of the hospital or clinic and the presence of health care workers.

Other assessment data that the nurse needs to collect include characteristics of emesis (volume, color, presence or absence of blood), signs and symptoms of fluid and electrolyte imbalance and triggering and alleviating factors, which may include the use of complementary/alternative therapies. The nurse must also assess the patient’s response to antiemetic therapy and the impact of the symptom on the patient’s daily activities, nutritional intake and overall quality of life.
Planning

Once established, the cycle of nausea and vomiting is difficult to reverse. Therefore, the nurse should be proactive in developing a plan of care that would result in the following.

- minimal nausea and vomiting related to chemotherapy.
- appropriate use of antiemetic therapy by the patient and family to prevent and/or minimize the intensity of CINV.
- knowledge about the appropriate situations in which to seek medical attention to prevent consequences of CINV.

Implementation

The best management approach for CINV is prevention. Medical management includes the use of antiemetic medications (A – 5), which are often given prophylactically (30-60 minutes before therapy begins). If the patient receives chemotherapy in an outpatient clinic, the patient should take the antiemetic medications before he or she arrives. If an acute onset is expected, the nurse should administer the prescribed antiemetic agent immediately after the administration of chemotherapy is complete. In this situation, the antiemetic agent should be given even if the patient is not experiencing CINV at the time. Also, the nurse should teach the patient to take the antiemetic medication before nausea occurs.

Most patients experiencing CINV are afraid to eat because they fear that the presence of food may trigger vomiting. The nurse should encourage each patient to eat generally well-tolerated foods such as cold, bland foods and clear fluids. Often, patients tolerate frequent small meals better than three regular meals each day. Patients are also encouraged to suck on ice chips and Popsicles® (the low temperature is soothing, and the ice is a source of fluid).

The nurse needs to monitor the patient’s fluid and electrolyte balance. The patient’s fluid intake and output and the patient’s weight should be carefully measured on a regular basis, especially if the patient has uncontrolled vomiting. Hypokalemia (A – 6) may result from excessive vomiting, and the nurse should assess the patient for signs and symptoms suggestive of the imbalance.

Because anticipatory nausea and vomiting do not respond very well to standard antiemetic therapy, the patient may be given an oral dose of a sedative (lorazepam, Ativan) the night before chemotherapy and the morning that chemotherapy begins. Other management options for anticipatory nausea and vomiting are complementary therapies such as distraction, music and self-hypnosis.

Evaluation

The desired outcomes for the patient and family include a decreased incidence of and/or minimal distress from therapy-related nausea and vomiting and the absence of physiological and psychosocial complications such as dehydration, esophageal tears, hypokalemia, isolation and abandonment of treatment.
**Patient and Family Education**

Effective self-management of anorexia, nausea and vomiting will help the patient and family to feel in control of the patient’s symptoms. In addition, antiemetic agents should be taken before treatments and on a regular basis after therapy. A major component of self-care is knowing which foods to choose and to avoid in order to manage nausea and vomiting.
Helpful Web Links

The University of Virginia Health System
Nausea and Vomiting
http://www.healthsystem.virginia.edu/UVAHealth/hub_cancer/nasvomcm.cfm

Pathways to Prevention
http://www.pathwaysstoprevention.com/

National Comprehensive Cancer Network (NCCN)
Nausea and Vomiting
Treatment Guidelines for Patients with Cancer,
Version IV, June 2007

CancerCare Nova Scotia, Halifax, Nova Scotia, Canada
A monograph on managing cancer treatment–related nausea and vomiting

The National Comprehensive Cancer Network/American Cancer Society
Guidelines in the Management of Chemotherapy-Induced Nausea and Vomiting
APPENDIX

A – 1 Vomiting

ChennaiOnline.com, T.Nagar, Chennai

Vomiting is often a frightening and exhausting condition in young children.

Although chemotherapy affects everyone differently, the risk factors include the following.

- Age – Children are more likely to develop nausea and vomiting than adults.
- Sex – Female patients are more likely to experience nausea and vomiting.
- A history of nausea and vomiting (especially from previous cancer therapy)
- A history of motion sickness
- The type and amount of chemotherapy - Certain types of chemotherapy or combinations are more likely to cause nausea and vomiting than others.
A – 2 Pathogenesis of Nausea and Vomiting

How different antiemetic agents work
### A – 3 Emetogenicity of Chemotherapeutic Agents

<table>
<thead>
<tr>
<th>Category</th>
<th>Highly Emetogenic</th>
<th>Moderately Emetogenic</th>
<th>Mildly Emetogenic</th>
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<td>Cyclophosphamide (&gt;1 g/m²)</td>
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<td>Cytarabine (&gt;1 g/m²)</td>
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<td>Mercaptopurine (IV)</td>
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<td>Methotrexate IV (&gt;1 g/m²)</td>
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<td><strong>Delayed Emesis</strong></td>
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[Go Back]
Effects on the Gastrointestinal System:
Nausea and Vomiting

A – 5 Antiemetic Agents Used in Children

Serotonin receptor antagonists
Granisetron (Kytril), ondansetron (Zofran)

Highly selective antagonists of serotonin receptors, these agents have no effect on dopamine receptors. Their main site of action is the vagal afferents of the small intestines. Their main side effects are headache and a transient increase in the liver enzyme levels.

Dopamine antagonists
Phenothiazines
Chlorpromazine (Thorazine), prochlorperazine (Compazine)

These agents alter the central nervous system (CNS) effects of dopamine and block dopamine receptors in chemoreceptor trigger zone (CTZ). Their main side effects are extrapyramidal symptoms (EPS), athetosis, sedation, hypotension, arrhythmias, constipation and dry mouth.

Glucocorticoids
Dexamethasone (Decadron), prednisolone (Pediapred/Hydeltra-TBA)

These agents interfere with permeability of the blood-brain barrier and thus allow antiemetic agents to act on the CTZ. The main side effects of glucocorticoids are depression, euphoria, hypertension, acne and a cushingoid appearance.

Supplemental Agents
Diphenhydramine (Benadryl), lorazepam (Ativan)

A – 6 Signs and Symptoms of Hypokalemia

Weakness that begins in the lower extremities and moves to the upper extremities
Fatigue
Abdominal distention
Paralytic ileus – decreased responsiveness of the gastrointestinal tract and decreased bowel sounds
Nausea and vomiting
Constipation
Polyuria and polydipsia
Dysrhythmias
A – 4 Complementary and Alternative Therapies Used to Treat Nausea and Vomiting

Complementary Therapies

Relaxation can be helpful in coping with nausea. Using relaxation tapes or taking part in activities that the patient finds relaxing may be useful in relieving nausea and vomiting.

Distraction can reduce or relieve nausea and vomiting. For children, play is a very good method of distraction. A favorite toy or game can distract a child; also engaging them in activities such as drawing, reading or playing video games can be a distraction.

Self-hypnosis may be effective for adolescents.

Acupuncture is the placing of thin, sterile needles into the skin to affect energy points. It is part of traditional Chinese medicine. Seabands (acubands) use the principle of acupressure, which is similar to acupuncture. These bands apply pressure to specific points on the body, usually the wrist, to control nausea. Some people find that acubands reduce nausea. They are available from pharmacies and health food shops.

Alternative Therapies

Ginger, especially ginger that has been made into a tea, is a popular alternative therapy for the treatment of nausea and vomiting.

Ice chips, Popsicles® and soft drinks are also used in treating these side effects.

A – 7 Tips for the Patient and Family about Nutritional Management of Nausea, Vomiting and Anorexia

Nutritional Management -- Anorexia:

Eat small meals. Eating small meals often and slowly can be helpful in managing nausea and vomiting.

Eat foods that have enough calories and protein and that are appealing.

Eat in a place that is comfortable. Avoid eating in stuffy places that are too warm or have cooking odors. Eat in a play area if necessary.

Drink something before or after meals but not with your meals.

Drink slowly or sip liquids throughout the day. Use a straw if necessary. Funny straws may be appealing to the child.

Eat food that is at room temperature or cooler.
Do not force yourself to eat foods that you normally like; if you do, this experience may cause you to dislike them later when you feel better.

Rest after eating.

**Nutritional Management -- Nausea and Vomiting**

If nausea occurs in the morning, eat crackers or toast before getting up.

Wear loose-fitting clothes.

If nausea occurs during treatment, wait a couple of hours before eating.

Older children can be encouraged to keep a diary of their nausea. Answers to the following questions can provide helpful information that can be recorded and reported to the health care provider.

- How long did the bout of nausea last?
- What did you eat before the bout occurred?
- Where were you when the nausea occurred?

If you vomit, do not eat or drink anything more until the vomiting is under control. Once it is controlled, you can then drink small amounts of clear liquid according to the following guidelines.

- Drink 1 teaspoonful every 10 minutes.
- Gradually increase the amount to 1 tablespoon every 20 minutes.
- Then try 2 tablespoons every 30 minutes.
- Continue by switching to full liquid or soft foods such as fruit juices and nectars, milk, cream, margarine, pudding, plain gelatin, potatoes pureed in soup, cooked cereal, ice cream, custard, strained or pureed soup and vegetable juice.

Tell the physician, nurse or registered dietitian if you have nausea or vomiting. If your nutritional status is at risk, the health care provider may recommend supplemental foods such as Ensure.
Choose foods that are easy to chew, swallow and digest, such as the following.

- toast, crackers and pretzels
- yogurt
- sherbet
- angel food cake
- cream of wheat, rice, oatmeal or grits
- boiled potatoes, rice, or noodles
- skinned chicken that is baked or broiled (not fried)
- canned peaches or other soft, bland fruits and vegetables
- clear liquids, such as bouillon, clear carbonated beverages, apple/cranberry/grape juice,
- plain gelatin, Popsicles®, tea and water
- ice chips
- carbonated drinks

Try to avoid the following:

- fatty, greasy or fried foods,
- very sweet foods, such as candy or cookies or cake with icing,
- spicy hot foods,
- foods with a strong odor.
Acknowledgments

Authors: Ayda G. Nambayan, DSN, RN, St. Jude Children’s Research Hospital
       Erin Gafford, Pediatric Oncology Education Student, St. Jude Children's Research Hospital; Nursing Student, School of Nursing, Union University
Content Reviewed by: Kelley Windsor, RN, BSN, CPON, St. Jude Children's Research Hospital
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International Outreach Program
St. Jude Children's Research Hospital
332 N. Lauderdale St.
Memphis, TN 38105-2794

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