

SAEMS Nausea-Vomiting-Diarrhea Standing Order

TRAINING MODULE FOR

NAUSEA-VOMITING-DIARRHEA

Jackie Lewis, EMT
Portal Rescue
Dawn Daniels, RN
TMC Base Hospital Manager

Objectives

- Identify causes of nausea, vomiting and diarrhea
- Identify possible causes of vomiting/diarrhea in the pediatric population
- Identify at least four serious conditions causing nausea, vomiting and diarrhea
- Identify pathophysiology of nausea and vomiting
- Describe how to assess a patient with complaints of nausea, vomiting and/or diarrhea
- Describe the initial management of the high risk causes of vomiting

Case review.....

“

You are called for a 13-year-old boy who suddenly developed nausea and vomiting after school. He feels better after vomiting, has normal vital signs, and his parents tell you they think it's just the stomach flu like his mom had a few weeks ago. You have the parents sign a refusal form and suggest if he's not better in a day to seek medical treatment at his physician's office. Your next shift, you learn the child had surgery to remove a testicle after it infarcted

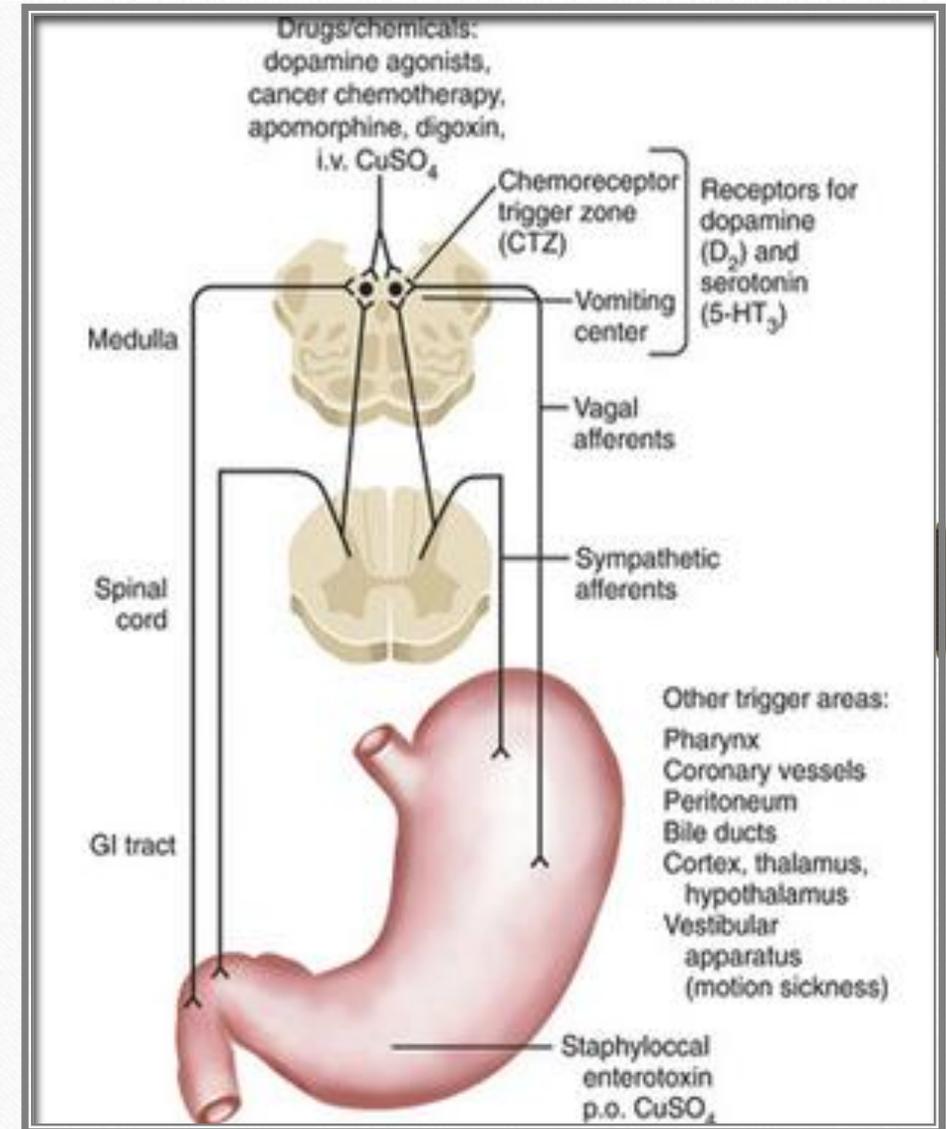
”

There are many causes for nausea and vomiting, some of which are benign and some deadly. EMS providers and patients often think of it as the "flu." While this is a possibility, it is your job to sort out the benign from the deadly and make sound management choices

Pathophysiology...

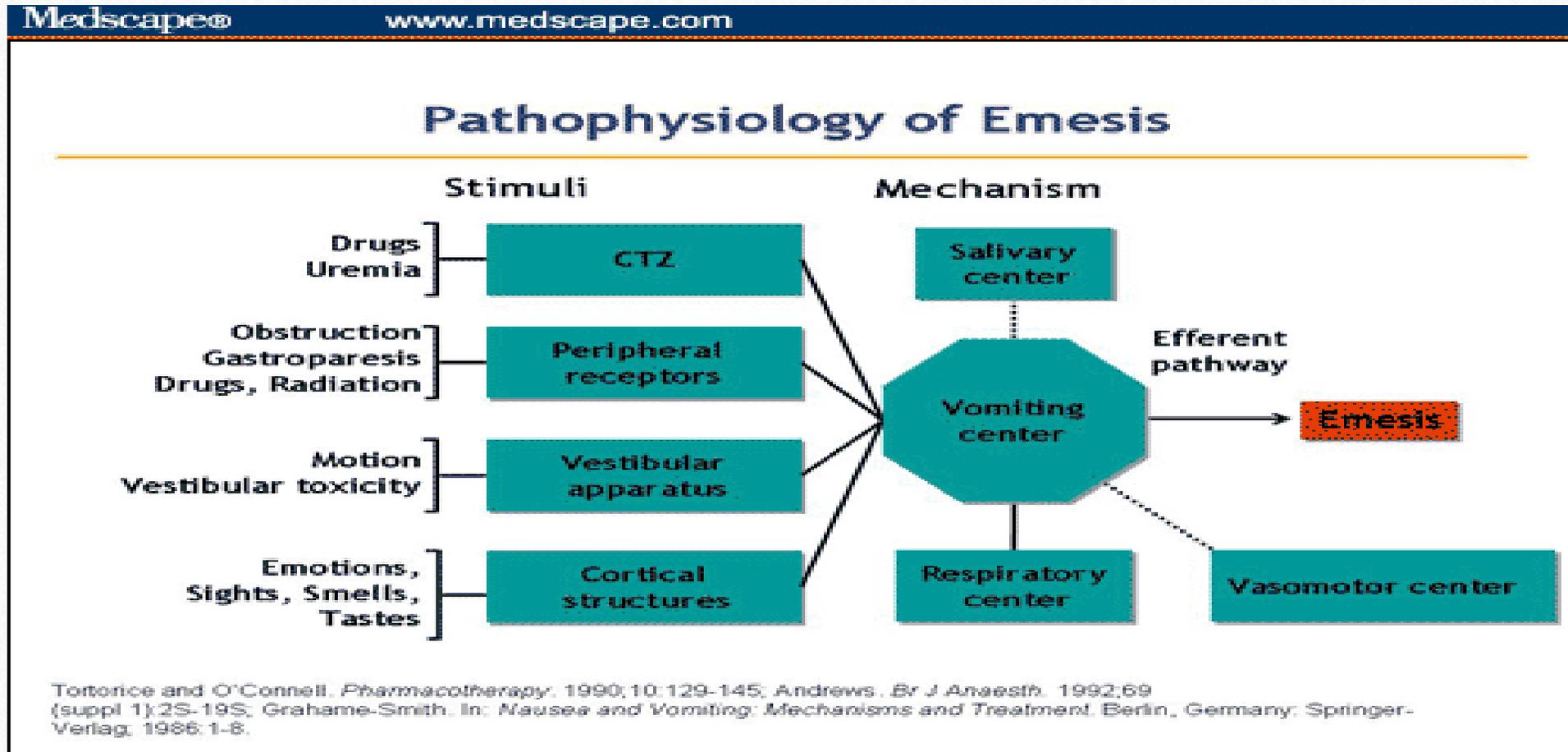
Few things in medicine elicit a visceral response as powerful as vomiting.....

- Nausea or vomiting (N/V) can occur by three mechanisms
 - First- the brain stem activating the brain's chemoreceptor trigger zone
 - This region contains serotonin (5HT₃), muscarinic cholinergic (M1), dopamine type 2 (D₂), neurokinin type 1 (NK1), histamine (H1) and mu-opioid receptors
 - Second- Stimulation of the chemoreceptor trigger zone can occur from irritation of the ear labyrinth
 - Third- stimulation of the gastrointestinal vagus nerve can activate the D₂, NK1 or 5-Ht₃ receptor
- Stimulation of any receptor can result in activation of the zone causing N/V



<https://www.youtube.com/watch?v=LTjbp5xdwf4>

*****great short video.....making sense of it.....



Common Causes of Nausea & Vomiting

INTERNAL CAUSES

Headaches



Viral Infections



Heart Attack



Severe Pain
From any source



Abdominal Sources

Appendicitis, hepatitis, kidney, or gallbladder issues.



Pregnancy



EXTERNAL CAUSES



Motion Sickness



Alcohol Poisoning



Food Poisoning



Medicines



FASTMED
URGENT CARE

Medications that can cause nausea/vomiting

- **Opiates:** morphine, hydromorphone, fentanyl and codeine
- **NSAIDs:** ibuprofen, naproxen and ketorolac
- **Chemotherapeutic agents:** cyclophosphamide, methotrexate and mercaptopurine
- **Bisphosphonates:** alendronate (Fosamax), ibandronate (Boniva) and risedronate (Actonel)
- **Anesthetic agents:** nitrous oxide, sevoflurane, ketamine
- **Others:** Antibiotics, oral contraceptives, antiretroviral/anti-seizure prophylaxis, digoxin, metformin and lithium

Medication causes with case review.....

“ You are dispatched for a 68-year-old female whose chief complaint is N&V. She has crampy, diffuse abdominal pain and thinks it's the casino food she ate last night. She denies chest pain, dyspnea, fever or headache. She was recently started on Bactrim for a bladder infection. Her other medications include cardizem, digoxin, simvastatin, calcium and synthroid.

The ED staff informs you later her digoxin level was elevated from an interaction with the Bactrim, and that's what triggered her vomiting

”

It is important to review the patient's medications, especially any new ones or changes in dosing....

Abdominal Causes case review

“ A 32-year-old female calls 911 because of vomiting. It started yesterday, and now she has a fever and chills. As you start your "PQRST," she admits to having some colicky right upper quadrant pain and had a similar episode last year that she was not evaluated for. She has orthostatic dizziness without syncope. She denies any past medical problems, alcohol use, chest pain, dyspnea or diarrhea. Her heart rate is 104, blood pressure 116/78, respiratory rate 28 and temperature 101°F. You start an IV, administer 50 micrograms of fentanyl and 4 milligrams of ondansetron (Zofran) and give her a liter of normal saline. ”

The emergency department physician thanks you for your care and drawing blood, and invites you to watch as she performs a bedside ultrasound, which shows gallbladder distention and wall thickening with stones. This is typical for acute cholecystitis. It is removed laparoscopically the next day.....

Other abdomen causes.....

“

Pancreatitis- most often from alcohol, gallstones or, rarely, certain drugs, is another entity that can cause N&V. Patients will often complain of a constant epigastric pain that radiates to the back. Do not be fooled by the patient's numerical rating of the pain, as their perceived severity does not correlate with severity of the disease. These patients are sicker than they look, and mortality rates can be as high as 5%-10%. Death is caused by hypovolemic shock from bleeding and third-spacing, and from renal and pulmonary complications.

”

These patients are sicker than they look, and mortality rates can be as high as 5%-10%. Death is caused by hypovolemic shock from bleeding and third-spacing, and from renal and pulmonary complications.

Other abdomen causes.....

“ -Patients with prior abdominal surgeries can develop adhesions that predispose them to *obstructions*. -Small bowel obstruction presents with intermittent, colicky abdominal pain, N&V, lack of bowel movements, and typically a history of prior abdominal surgeries

-The less than 2 year old age group is TOUGH

Pyloric stenosis

Intussusception→

Malrotation with volvulus

Inguinal hernia

Necrotizing enterocolitis



”

Bowel obstruction-While some EMS consider it an unglamorous nursing home call, patients may die from incarceration and subsequent strangulation of the bowel, causing ischemia and perforation.

Other abdomen causes continued.....

“

- "Classic" appendicitis presents with periumbilical abdominal pain that migrates to the right lower quadrant, anorexia (lack of hunger), fever and N&V.

”

-

Appendicitis is difficult to detect in the early stages, but never assume someone with vague abdominal pain, N&V and abdominal tenderness (especially in the right lower quadrant) is just suffering from the "stomach flu."

Case Study:

- 5 y/o M with vomiting since this a.m.
- Tactile fevers at home, +diarrhea, +abdominal pain
- Temp 39.2°C, diffusely guards abdomen

APPENDICITIS

The most common abdominal surgery in children

- Diagnosed in 1-8% of children with abdominal pain in the ED
- Perforation the most common complication:
 - 70-90% in age 1-4
 - 10-20% in adolescence



Appendicitis

■ Symptoms

- Abdominal pain
- Vomiting
- **Fever**
- Anorexia
- Migration of pain

■ Signs

- McBurney's point tenderness

https://www.youtube.com/watch?v=kjo5KBql_fo

- **Fever**
- **Rebound tenderness**
- **Involuntary guarding**

Endocrine causes with case reviews.....

“ A 52-year-old female's chief complaint is N&V. She reports mild, diffuse abdominal pain only with emesis. She also has a productive cough, dyspnea and fever. She denies headache, diarrhea or difficulty urinating. The past medical history includes insulin-dependent diabetes, kidney stones and fibromyalgia. On exam, she looks ill: Her vital signs are heart rate 124, blood pressure 116/78, respiratory rate 36, temperature 101.5°F and pulse oximetry of 88% on room air. She has crackles in her right lung base. Her belly is soft, but mildly tender in all quadrants. Your impression-given her fever, cough and dyspnea, she may well have pneumonia, and you know infections are a common trigger for diabetic ketoacidosis (DKA). Her FSBG reads “high”. ”

DKA is commonly triggered by infectious diseases such as pneumonia, kidney infections, intra-abdominal infections and meningitis. These same infections can present with N&V.

Diabetics may also have acute coronary syndromes or a lack of insulin as triggers for DKA.

Endocrine causes with case reviews peds.....

“ “ Your called for a 7 y/o Female patient with history of vomiting for 5 days. She can't keep up with fluids and her breath smells funny.... your FSBG reads “hi”

DKA

Develops over time

Dehydration

Loss of K⁺, Phos⁺

Ketone production

Glucose build up

”

Insulin melts ketones in the flames of carbohydrates. . . eventually . . . These kids die from Cerebral Edema.....



Dysrhythmias...



Infection causes

“

Pneumonia classically presents with fever, cough and dyspnea with or without N&V.

Meningitis is caused by a variety of pathogens and presents with varying amounts of headache, neck pain, altered mental status, fever, rash and N&V.

>95% of patients with meningitis had *2 or more* of the following:

Fever

Neck stiffness

Mental status changes

”

Infectious-EMS providers are most likely to see outbreaks among people living in close quarters, such as military personnel, college students and some immigrant populations.

Infection causes continued.....

“

Bladder/Kidneys: UTI & Pyelonephritis

Pyelonephritis (kidney infection) presents with constant flank pain, fevers and N&V

UTI-Consider in a child <2 years with vomiting and:

Fever >39°C

Fever > 48 hours without a source

New fever in a diapered infant with diarrhea



”

URINARY TRACT INFECTION (UTI)

RISK FACTORS

Male < 12 months

- Fever >39.0°C
- Fever >48 hours
- Non-black race
- No other source

Female <12 months old

- Fever >39.0°C
- Fever > 48 hours
- White
- No other source

Central Nervous System Causes with case review

“ A 78-year-old male says he started vomiting about 2 hours ago and complains of everything spinning (vertigo). On further questioning, he complains of an occipital headache and has trouble walking. His blood pressure is elevated, but the rest of his vitals are normal. Past medical history includes hypertension, smoking and high cholesterol. Your impression is the patient probably has an inner ear problem. Your partner tells you that he's seen this before and thinks it is a cerebellar infarct. You give silent thanks for an experienced partner, and together you quickly load the patient and notify the ED of your suspicions. ”

The CNS is responsible for many causes of N/V. Cerebellar infarcts are rare, but half of them include N&V.

You are actually more likely to see N/V with hemorrhagic stroke than with the most common form of ischemic stroke.

Central Nervous System Causes continued....

““ *Migraines*-patients who suffer from migraine headaches frequently have N/V; although the exact number who call 9-1-1 is likely low.

Head trauma- patients may have N/V, although this is usually not the chief complaint and can be caused from the circumstances surrounding the call, e.g., a patient in a rollover motor vehicle crash.

Alcoholics with possibility of occult trauma- are a high-risk group for subdural hematomas from repetitive falls – could present with headache with or without N/V. ””

Occult trauma-The combination of clotting problems and repetitive falls and concussions predisposes them to subdural bleeding with or without N/V.

Environmental and Toxicological causes with case review....

“ A husband and wife both began vomiting about 2 hours after preparing dinner with mushrooms they had gathered in the woods. Your impression is simple food poisoning.

You bring the mushrooms to the ED for identification. And you later learn the mushrooms you brought in were identified as *Chlorophyllum molybdites*, the most commonly ingested toxic mushroom in the U.S. The patients were luckily these were not the hepatotoxic variety of *Amanita* your partner thought they were. ”

Amanita is found in the United States and is responsible for 90% of deaths from mushroom poisoning via liver toxins and liver failure.

Common toxicological & environmental etiologies of N/V include acetaminophen, alcohol, salicylates, carbon monoxide poisoning acute mountain sickness, theophylline, organophosphates/pesticides and toxic mushrooms.

Alcohol-related....

“ Alcohol-related problems are such a common EMS call that they deserve special mention. Its abuse can predispose to CNS hemorrhage, as discussed. Acute intoxication itself produces N/V. If N/V is coupled with epigastric abdominal pain, think of pancreatitis, which can lead to irritation of the gastric lining, producing N/V and serious gastrointestinal bleeding. The most feared complication is portal hypertension with accompanying esophageal varices.

”

Ischemia....

““ *Ischemia*- Acute coronary syndrome (ACS) is often accompanied by N/V. Unexplained N/V in patients at risk for acute coronary syndrome is cause for worry about ACS.

Mesenteric ischemia- another underappreciated cause of N/V which involves reduced blood flow to the gut. These are typically older patients with longstanding hypertension, atrial fibrillation, diabetes and/or smoking, who present with diffuse, colicky, abdominal N/V, diarrhea and pain "out of proportion" to the exam. ””

Recent large international review of 1,763 patients with proven myocardial infarction without chest pain found 24% presented with N/V.

These are exactly the kind of patient you do not want to assume has the "flu." Next-day follow-up with their doctor or taking a wait-and-see approach is inappropriate and dangerous.

GASTROENTERITIS

“ Gastro ”

Latin root
meaning
“stomach”

Enter

Latin root
meaning
“intestine”

Itis ”

Latin root
meaning
“inflammation”

You can't have GASTRO-ENTER-ITIS without
VOMITING and DIARRHEA

GASTROENTERITIS case study.....

6 y/o male with vomiting x 2 days

Watery diarrhea, felt warm, everyone else
vomiting too

Temp 37.8°C, looks tired

**Sometimes it really is just a virus but patients are still prone
to:**

Dehydration, hypoglycemia and starvation ketosis

Warning Signs for the peds summary.....

- Young age
- > 2 weeks
- Morning emesis
- Fever >2 days, >39°C
- or lack of fever
- Bilious emesis
- Lethargy
- Heavy breathing
- Neck stiffness
- Tender or distended abdomen
- Persistent vomiting

ASSESSMENT

Thorough patient history and perform a complete detailed assessment

Assessment

History

- Age
- Time of last meal
- Last bowel movement/emesis
- Improvement or worsening with food or activity
- Duration of problem
- Other sick contacts
- Past medical history
- Past surgical history
- Medications
- Menstrual history (pregnancy)
- Travel history
- Bloody emesis/diarrhea

Signs and Symptoms

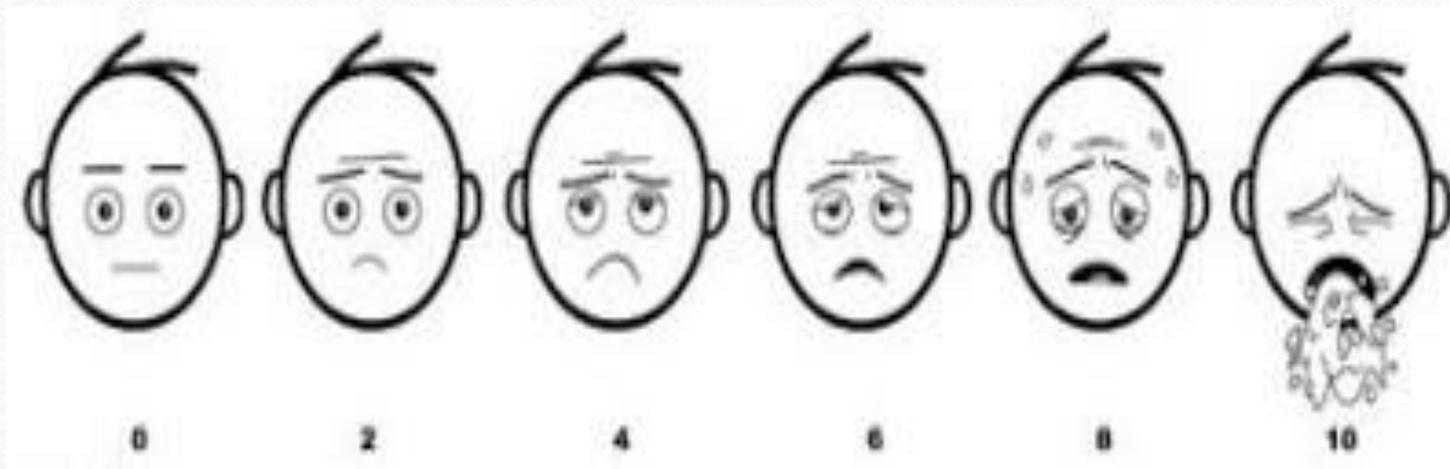
- Pain
- Character of pain (constant, intermittent, sharp, dull, etc.)
- Distention
- Constipation
- Diarrhea
- Anorexia
- Radiation
- Associated symptoms: (Helpful to localize source)*
- Fever, headache, blurred vision, weakness, malaise, myalgias, cough, dysuria, mental status changes, rash

Differential

- CNS (increased pressure, headache, stroke, CNS lesions, trauma or hemorrhage, vestibular)
- Myocardial infarction
- Drugs (NSAID's, antibiotics, narcotic, chemotherapy)
- GI or Renal disorders
- Diabetic ketoacidosis
- Gynecologic disease (ovarian cyst, PID)
- Infections (pneumonia, influenza)
- Electrolyte abnormalities
- Food or toxin induce
- Medication or Substance abuse
- Pregnancy

Severity of Nausea & Vomiting

- In the last 24 hours, for how long have has patient been nauseated?
- In the last 24 hours, have you vomited?
- In the last 24 hours, how many times has patient been retching or dry heaves without bringing anything up?



Complications of Severe Nausea, Vomiting & Diarrhea

Severe vomiting can lead to symptomatic dehydration and electrolyte abnormalities (typically a metabolic alkalosis with hypokalemia) or rarely to an esophageal tear, either partial (Mallory-Weiss) or complete (Boerhaave syndrome). Chronic vomiting can result in undernutrition, weight loss, and metabolic abnormalities

<http://www.merckmanuals.com/professional/gastrointestinal-disorders/symptoms-of-gi-disorders/nausea-and-vomiting>

Management....

Today fast symptomatic relief of N/V is relatively quick and simple. It not only makes the patient more comfortable, but makes the assessment and further treatment of the patient who was retching in your ambulance much easier.

Patients also do not have to wait in a busy ED to be evaluated before they receive relief from their N/V. There is no disease process that will be missed because the ED providers did not actually witness an episode of vomiting.

An article in *EMS Magazine* provides an in-depth discussion on antiemetic's.

<http://www.researchgate.net/publication/5804299> [Prehospital pharmacology anti-emetics](#)

Having a good working knowledge of the medications in your formulary is important

Conclusion

The causes of N/V can be medications; abdominal, infectious, endocrine and CNS illnesses, environmental & toxicological conditions and ischemia. There are several interventions that EMS providers can use to minimize patient's N/V, including oxygen and medication with Ondansetron (Zofran) if a paramedic. Most important, remember that there are many other potentially deadly causes of N/V apart from the flu. It is important to gather a thorough patient history and perform a complete detailed assessment to insure that the EMT or Paramedic is able to give the best patient care.

References

- www.Mayoclinic.org
- www.Medicinenet.com
- www.Medscape.com
- www.Merckmanuals.com
- www.My.Cleveland.org
- www.WebMD.com
- Megener K, Baillic J. Fortnightly review: Acute pancreatitis. *BMJ* 316:44, 1998
- Malagelada JR, Malagelada C. Nausea and vomiting. In: Sleisenger & Fordtran's *Gastrointestinal and Liver Disease: Pathophysiology, Diagnosis, Management*, 8th ed. Saunders Elsevier: Philadelphia, PA, 2006
- Edlow JA, Newman-Toker DE, Savitz SI. Diagnosis and initial management of cerebellar infarction. *Lancet Neurology* 10:951, 2008
- intinally JE, Kelen, GD, Stapczynski JS. *Emergency Medicine: A Comprehensive Study Guide*, 6th edition. McGraw-Hill Inc., 2004
- Schneider SM, Donnelly MW. Toxic mushroom ingestions. In PA Auerbach (ed), *Wilderness Medicine*. Mosby Elsevier, Philadelphia, PA, 2007
- Budaj A, White K, Montalescot G, et al. Acute coronary syndromes without chest pain, an underdiagnosed and undertreated high-risk group: Insights form the global registry of acute coronary events. *Chest* 126:461, 2004.