Clinical Case Study
Duodenal Cancer and Complications
Winthrop University Hospital
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April 12\textsuperscript{th}, 2012
What is Duodenal Cancer?

Duodenal Cancer is a cancer in the beginning section of the small intestine. It is relatively rare compared to gastric cancer and colorectal cancer. Its histology is usually adenocarcinoma. The duodenum is the first part of the small intestine. It is located between the stomach and the jejunum. After foods combine with stomach acid, they descend into the duodenum where they mix with bile from the gall bladder and digestive juices from the pancreas. There are 4 major types of small intestinal cancer. Carcinoid tumors, gastrointestinal stromal tumors, adenocarcinoma, and lymphomas make up about 60% to 70% of small intestine cancer (Escott-Stump, 2012). Along with being diagnosed with duodenal cancer, the complications involved with duodenal cancer/treatment are an obstacle.

Prevalence

Cancers of the small intestine are rare. Small intestine tumors account for 1-5% of GI tumors (Beers & Porter 2006, p. 172). Small intestinal cancer occurs slightly more often in men than in women. Small intestinal cancer becomes more common as people get older. The average age at diagnosis is about 60. The American Cancer Society estimates for these cancers in the United States are for 2012: About 8,700 people in the United States will be diagnosed with small intestine cancer (in about 2,500 of these the small intestine cancer will be adenocarcinoma). About 1,150 people will die of small intestine cancer with roughly 370 of these deaths from small intestine adenocarcinoma. (www.cancer.org)

Signs/Symptoms

Each victim of duodenal cancer may experience different signs and symptoms of the disease and different levels of severity. The symptoms of small bowel tumors are often
unclear. It could take more than 6 months from the time of the first symptom until the
diagnosis was made. The most common symptoms are: Pain in the abdomen, weight loss,
weakness and fatigue. Often, the first symptom is pain in the stomach area.

This pain may start or get worse after eating. As the tumor gets larger, it can start to
block the passage of digested food. This can lead to increased pain, and it may be more
intense and last longer. The tumor can cause an obstruction. This leads to pain with severe
nausea and vomiting. Rarely, a cancer will cause a hole in the wall of the intestine, letting the
contents of the intestine spill into the abdominal cavity. This condition is known as
perforation. Symptoms of perforation include sudden severe pain, nausea, and vomiting.

Sometimes a tumor will start bleeding into the intestine. If the bleeding is slow, it
may lead to anemia (a low red blood cell count). Symptoms of anemia include weakness and
fatigue. If the bleeding is rapid, the stool can become black and tarry from digested blood
and the patient may feel lightheaded or even pass out. Also, weight loss, poor appetite, acid
reflux, malnutrition, and GI dysfunctions are common signs of duodenal cancer. Each case is
individualized and patients may experience similar or different symptoms.

(Escott-Stump, 2012) (www.cancer.org)

Pathophysiology

According to the American Cancer Society, very little is known about the causes of
small intestine duodenal cancer. There are many possible risk factors, but more research is
being done. Many experts wonder why it is so rare because the small intestine is the longest
structure in the gastrointestinal tract, yet it has only 2% or less of the small intestinal
cancers. As with other cancers, scientists have recognized some changes in the DNA of small
intestine adenocarcinoma cells that are probably responsible for their increased growth and abnormal spread. Many of these tumors show specific genetic abnormalities. But the causes of these changes are not yet known. One cause of these cancers is thought to be problems with the repair of DNA, the large molecule that contains our genetic material. Certain genes control substances called enzymes that are responsible for repairing DNA when it makes mistakes in reproducing itself. Some have compared this to a spell checker on a computer. Without these spell checker enzymes, mistakes are not corrected and genetic mutations or changes are allowed to persist. These may cause the production of abnormal substances that lead to cancer formation. A second theory is that mutations take place naturally with aging and that some of these will also lead to substances that lead to cancer formation.

(www.cancer.org)

Risk Factors

A risk factor is anything that changes your chance of getting a disease such as cancer. Different cancers have different risk factors. Someone without any risk factors can develop cancer, and having a risk factor, or even several, does not mean that the disease will be prevented. The American Cancer Society indicates the many risk factors that may or may not lead to small intestinal cancer. Because small intestine cancer is so uncommon, risk factors for this disease have been difficult to study. Some of the known risk factors include:

• Age: Small intestinal cancer becomes more common as people get older. The average age at diagnosis is about 60.
• Smoking and alcohol use/abuse: Some, but not all, studies have found an increased risk with either smoking or alcohol use.
• Helicobacter pylori infection (H. Pylori): Is a bacterial Infection and the most common predisposing factor cause of peptic ulcers. It thrives in an acidic environment and commonly live and multiply within the mucous layer that covers and protects tissues that line the stomach & small intestine. It is unclear how H. pylori spreads, but it can be treated with antibiotics H. pylori infection is present in about half the people in the world. Most people don't realize they have H. pylori infection, because they never get sick from it.

• Diet: A recent study has shown that a diet high in fiber may help lower the risk of small intestine cancer. (Schatzkin & Park, 2008).

• Other diseases and cancers:
  o Celiac disease: People with celiac disease have an increased risk of small intestine cancers, including lymphoma and adenocarcinoma. Staying on a gluten-free diet seems to lower the risk of cancer in someone with this disease.
  o Colon cancer: Survivors of colon cancer have an increased risk of getting cancer of the small intestine. This may be due to shared risk factors.
  o Crohns disease: Crohns disease is a condition in which the immune system attacks the gastrointestinal (GI) tract. This disease can affect any part of the GI tract, but it most often affects the lower part of the small intestine. People with this problem have a risk of small bowel adenocarcinoma that is about 28 times higher than normal.
• Inherited causes: People with certain inherited conditions have a higher risk of small intestine cancer.
  
  o Familial adenomatous polyposis (FAP): In this condition, many (even hundreds) of polyps develop in the colon and rectum. If the colon isn't removed, one or more of these polyps will become cancerous. Polyps in the stomach and the small intestine are also part of this syndrome, and they can lead to cancers in these areas. In FAP, most small intestine cancers are found in the duodenum. This condition is caused by an abnormal copy (mutation) of the gene APC.

  o Hereditary nonpolyposis colorectal cancer (HNPCC): Another name for HNPCC is Lynch syndrome. In most cases, this disorder is caused by a defect in either the gene MLH1 or the gene MSH2, but at least 5 other genes can cause HNPCC. An abnormal copy of any one of these genes reduces the body's ability to repair damage to its DNA. This results in an increased risk of cancer of the colon and small intestine, as well as a high risk of endometrial and ovarian cancer. People with this syndrome have up to a 4% chance of developing small intestine cancer.

  o Peutz-Jeghers syndrome (PJS): People with this condition develop polyps in the stomach and intestines, as well as in other areas including the nose, the airways of the lungs, and the bladder. The polyps in the stomach and intestines are a special type called hamartomas. They can cause problems like bleeding or blockage of the intestines. PJS can also cause dark freckle-like
spots on the lips, inner cheeks and other areas. People with PJS have an increased risk of many types of cancer, including small intestine adenocarcinoma. This syndrome is caused by mutations in the gene STK1.

- MUTYH-associated polyposis: People with this syndrome develop colon polyps which will become cancerous if the colon is not removed. They also can get polyps in the small intestine and have increased risk of small intestine cancer. Other cancers that can occur in people with this syndrome include cancers of the skin, ovary, and bladder. This syndrome is caused by mutations in the gene MUTYH.

- Cystic fibrosis (CF): This condition causes severe lung problems. Often, in someone with CF, the pancreas cannot make the enzymes that break food down so that it can be absorbed. People with CF have an increased risk of adenocarcinoma of the ileum. The gene that causes CF is called CFTR. A child must have 2 abnormal copies of this gene (one from each parent) to get this disease.

  (www.cancer.org) (Beyer, 2008)

**Diagnostic Criteria**

A review of the medical history and a physical examination will be the first step of diagnosing the cancer. Then, a biopsy of a tumor in the small intestine through an endoscopy procedure will be performed. If cancerous, a CT scan will express the spread of the cancer along with blood tests and liver function tests. A second opinion may be preferred. (www.cancer.org)
Treatment

Treatment depends on the staging and lymph node metastasis. Many times surgery is the main option and only option. A resection of the cancer portion of the small intestine may be performed. At a higher risk case, a Whipple procedure may be performed:

Removing duodenum, part of the pancreas, nearby lymph nodes and part of the stomach are also removed. The gallbladder and part of the common bile duct are removed and the remaining bile duct is attached to the small intestine so that bile from the liver can continue to enter the small intestine.

Chemotherapy and/or radiation are treatment options. Each case is different depending on the stage, condition of the patient, and lymph node metastasis (Escott-Stump, 2012) (www.cancer.org).

Nutrition Implications

The patient may suffer from nutrition complications, especially if an obstruction occurs. Clinical and experimental data suggest that certain dietary regimens, particularly increased fiber and vitamins, might improve the outcome of decreasing duodenal cancer complications. (Schatzkin & Park, 2008). Fiber keeps the GI tract moving which helps to get rid of the acid build up. Along with eating healthy, eating smaller meals more frequently will help to increase po intake and fulfill nutrient needs. (Litchford, 2008) It is recommended that a patient with GI cancer drink fluids and supplements in between meals. Since small intestinal cancer involves many nutrition complications, tube feedings, TPN, or PPN may be needed depending on nutrient status.
Patient background information

Patient, J.S., is a 76 y/o female who was admitted to Winthrop University Hospital on March 5th, 2012. She was admitted with abdominal pain and unable to tolerate solid foods for three weeks possibly secondary to complications from previous diagnosis of duodenal cancer in May 2011. JS reports nausea, vomiting, unintentional weight loss, and unable to tolerate solid foods the past three weeks. JS could only tolerate liquids in small amounts. JS also reports 7 months ago had a good appetite and good po intake. JS was diagnosed with small bowel obstruction.

Psychosocial history

J.S. is a single, Caucasian, middle-class female. She is a retired teacher. She lives with her sister in Mineola, NY, and her other sister from Florida moved in during the summer. J.S. has a history of smoking. She smoked one pack/day for 40 years. She quit smoking about 15 years ago. She has no history of alcohol abuse. J.S. has a family history of GI cancers. Her mother died at 83 y/o of colorectal cancer, her father died in his 70s of GI cancer, and her other sister died in her 70s from gastric cancer. J.S. has a great attitude and is staying positive despite her medical conditions. Since the 66 pound weight loss about 7 months ago, J.S. is no longer taking Diabetes medication, HTN medication, and is at her “lifetime goal weight of 144 pounds”. She also is thankful to have her sisters all living together. J.S. has a great support system from her two sisters. They have been by her
bedside for most of her stay at Winthrop. Therefore, J.S. took this unpleasant situation and turned it into a more optimistic situation by looking at the positive outcomes.

**Medical History**

J.S., with a recent diagnosis of duodenal cancer in May 2011, was brought to Winthrop University Hospital on March 5th, 2012, with severe abdominal pain and unable to tolerate solid foods for three weeks. J.S. suffers from complications of duodenal cancer (diagnosed May 2011). She received Chemo RT August 2011 s/p attempted Whipple @ North Shore Hospital (January 2012). She was found to have nonresectable disease, and therefore discharged from North Shore Hospital to a rehabilitation center for 2 weeks to regain strength since she has lost a significant amount muscle mass and strength to perform ADLs. J.S. has a past medical history of breast cancer s/p chemo RT and left breast lumpectomy 6 years ago (2006). She also has a history of HTN, HLD, Type 2 Diabetes, NASH (Nonalcoholic Steatohepatitis), and subclavian DVT associated with gastric outlet obstruction and Mediport. The Mediport in right internal jugular vein used for Chemo RT was removed in June 2011 and a new one placed in left chest.

J.S.’s current home medications include: Warfarin for an anticoagulant and Zocor to lower LDL levels. She went off of Metformin (Diabetes medication to lower blood glucose) and Metoprolol (antihypertensive medication) secondary to 66 pound weight loss, hypoglycemia, and lower blood pressure. J.S.’s current medications while in the hospital include: Lovenox, Novolog correction PRN, Zofran, and DSW-1/2 NS.
Treatment

After admission late on March 5th, 2012, J.S. received medication to resolve N/V and was ordered NPO. An ultrasound expressed her fluid filled abdomen. A NG tube was placed for suctioning of her fluid-filled abdomen to further perform tests and procedures. A CT scan showed a vascular mass in 3rd portion of duodenum, causing biliary dilation, a gastric obstruction, multiple stones (cholelithiasis), but no evidence of metastatic cancer. An EUS and ERCP biliary and duodenal metal stent placement was scheduled for early morning on March 8th, 2012.

Initial Nutrition Assessment/Intervention (3/7/12)

A RD and dietetic intern met with the patient on March 7th, 2012 for a dietary referral for N/V, unintended weight loss, and unable to tolerate solid foods for the past 3 weeks. Nutrition assessed patient and her needs. Since the diet order is NPO, nutrition recommended a pre-albumin lab value and wrote a diet order for when diet advances: Clear liquids → full liquids → low-fiber diet. Nutrition will follow-up after stent placement with po intake and supplement/Pro-Stat PRN.

March 8th, 2012

A pre-procedure diagnosis is Cholelithiasis, Biliary Obstruction, duodenal obstruction, and a duodenal mass. The patient returned from the GI lab with nausea, and a metal stent placement s/p CBD and duodenal. Later in the day, the NGT was removed, but J.S. still c/o abdominal pain and N/V. J.S. is still NPO.
**Nutrition Follow-Up #1 (3/9/12)**

J.S. has been NPO for four days with N/V. Nutrition recommended that TPN/PPN to be considered until po tolerated. Patient currently diagnosed with acute pancreatitis likely from procedure. Nutrition also recommended a pre-albumin lab value and a new diet order secondary to acute pancreatitis dx for when diet advances if patient able to tolerate food:

Clear liquids → Low-fat full liquids → Low-fiber, Low fat diet.

**March 10th, 2012**

J.S. reports that N/V is resolved, and that she is feeling better. J.S. is able to tolerate clear liquids.

**March 11th, 2012**

J.S. was bloated after clear liquid dinner last night, so she is continuing clears and will advance to low-fat full liquid diet for dinner tonight. Nutrition added 6oz Enlive 2x/day to diet.

**Discharge Day/Nutrition Follow-up #2 (3/12/12)**

J.S. is tolerating low-fat full liquids well and is advanced to low-fat low-fiber mechanical soft diet. Nutrition met with patient before discharged. Nutrition witnessed 75% po intake at breakfast. Nutrition recommended new diet order: Low-fat, Low-fiber mechanical soft diet with no green leafy vegetables. Nutrition also added a 6oz Enlive 3x/day. Nutrition recommended a pre-albumin lab value (since did not receive request from
the first two times asked) and a MVI 1x/day. Enlive was chosen because of the low-fat/low-fiber restriction. Enlive is the only low-residue supplement.

**Nutrition Care Process**

J.S. provided all nutrition-related information. She is very much alert and oriented.

**Present Diet Order**

NPO with N/V resolving from medications.

**Diet History**

J.S. reports 7 months ago had a good appetite and good po intake prior to complications from Chemo RT. Patient would “watch sugar intake” secondary to type 2 diabetes. Once the Chemo RT complications began, her appetite and po intake declined, but she was still able to tolerate foods. Weight loss became apparent at this time. When abdominal pain increased, J.S. attempted a Whipple resection, but J.S. was found to have nonresectable disease. As the abdominal pain increased in February 2012, J.S. was unable to tolerate any solid foods. She could only tolerate liquids and Ensure in small amounts. Therefore the gastric outlet obstruction resulted in a fluid filled abdomen and N/V.

**Dietary Analysis of intake during hospitalization**

- 1-5 days: NPO
  - 0% energy needs
  - Experiencing N/V
• 5-6 days: Clear Liquids
  o 1155kcal/day & 26gms. Protein/day
  o 5th Day: 50% po intake (~578kcal & 13gms. Protein/day) - Not meeting nutritional needs
  o 6th Day: 75% po intake (~866kcal & 20gms. Protein/day) - Not meeting nutritional needs
  o Provide 6oz. Enlive 2x/day which provides an additional 200kcal & 7gms. Protein x2/day (In addition to diet, Enlive 2x/day provides an additional total of 400kcal & 14gms. Protein/day)-start in the evening of day 6
  o Tolerating well, but bloated after dinner on day 5

• 6-7 days: Low-Fat Full Liquids
  o 1030kcal and 34gms. Protein/day
  o 75% po intake and 100% of supplement (Enlive) (~1173kcal & 40gms. Protein/day) - Not meeting nutritional needs
  o Tolerating well

• 7th day: Low-fat, Low-fiber, mechanical soft diet
  o 1600kcal & 75gms. Protein/day
  o 75% po intake and 100% intake of supplement (Enlive) (~1600kcal & 70gms. Protein/day) - Not meeting energy needs, but meeting protein needs
  o Tolerating well
  o Provide 6oz. Enlive 3x/day which provides an additional 200kcal & 7gms. Protein x3/day (In addition to diet, Enlive 3x/day provides an additional total of 600kcal & 21gms. Protein) to meet energy requirements
o Recommend MVI

**Nutrient Analysis**

- 1600kcal & 70gms. Protein/day (75% po intake and 100% supplement intake)
  - Prior to increasing Enlive to 3x/day

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<th>Protein</th>
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<td>Total Grams</td>
<td>238</td>
<td>70</td>
<td>38</td>
<td>346</td>
</tr>
<tr>
<td>Total Kcals</td>
<td>960</td>
<td>280</td>
<td>342</td>
<td>1582</td>
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<tr>
<td>Total Percent</td>
<td>68.7%</td>
<td>20.2%</td>
<td>11%</td>
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**Current nutritional problems**

J.S. has unintended weight loss, N/V, weakness, and poor po intake.

**Anthropometrics**

J.S. is 5’3” tall and weighs 144#. Her IBW is 115# ± 10% and she is at 114% of her IBW. Her BMI is 25.2 which is considered WNL for her age. J.S.’s UBW is 210#s and she is at 69% of her UBW. She has a 31.4% weight loss in the past 7 months.

**Laboratory Values (Admission day & Discharged day)**

J.S. overall lab values are within normal limits (WNL), despite her medical conditions and unable to tolerate solid foods the past 3 weeks. A pre-albumin lab level has been requested to further assess protein stores and malnutrition.
- Hgb (11.6-16.3g/dL)
  - WNL\( \rightarrow \downarrow \)
  - Dietary deficiency, cancer

- Hct (36-48%)
  - WNL \( \rightarrow \downarrow \)
  - Dietary deficiency, cancer

- MCV (80-99fl)
  - WNL

- Glucose (73-107mg/dL)
  - WNL

- Sodium (138-145MEQ/L)
  - WNL

- Potassium (3.7-5.2MEQ/L)
  - WNL

- BUN (8-21mg/dL)
  - WNL

- Creatinine (0.4-1.0mg/dL)
  - WNL

- Calcium (9.1-10.4 mg/dL)
  - \( \downarrow \)
  - Dietary deficiency, bound to albumin, Ca+ can be falsely lower if albumin is low. Adjusted Ca+ is a more accurate test in this case, may need a calcium supplement between meals and/or an active vitamin D
• Adjusted Calcium
  o WNL $\rightarrow$ ↓
  o Dietary deficiency

• Albumin (3.5-4.8gm/dL)
  o WNL $\rightarrow$ ↓
  o Moderate depletion of protein stores: stress, low protein intake, poor po intake, cancer

• Hgb A1C (4.2-5.9%)
  o 4.6%
  o WNL

• Cholesterol (130-200mg/dL)
  o ↓ 127mg/dL
  o Poor po intake

• Amylase (37-121Units)
  o 14↓ $\rightarrow$ 433↑ $\rightarrow$ 144↑ $\rightarrow$ 42WNL $\rightarrow$ 15↓
  o Acute Pancreatitis

• Lipase (5.6-51.3 U/dl)
  o 38WNL $\rightarrow$ >900↑ $\rightarrow$ 302↑ $\rightarrow$ 96↑ $\rightarrow$ 39WNL
  o Acute Pancreatitis

REFERENCE: Krause’s Food and Nutrition Therapy(12th ed.). Litchford, MD (pp415-427, 936-939)

Physical findings

J.S. appears ill and is aware of her condition. Although J.S. does not appear cachectic, she has an abundance amount of hanging skin from her 66# unintended weight loss. She says she is happy about the weight loss, but did not want it to happen the way it did. She reports that it is a positive aspect that she could take out of this pessimistic situation. Although J.S. lost muscle mass, she has been slowly gaining strength back since rehab. She reports that she is able to do most ADLs and have her sisters to help her and with the cooking and meal preparations. J.S.’s skin is intact and no sign of edema.
Food-Medication Interactions-Current Medications

REFERENCE: Food/Medication Interactions (16th ed). Pronsky, ZN.

- Lovenox (Anticoagulant) p.120
  - Monitor CBC and platelet count
  - Prevent DVT
- Zofran (Antiemetic, Antinauseant) p.227
  - Dry mouth, abdominal pain, constipations, diarrhea, fatigue
- Novolog Correction *PRN p.167
  - ↑ weight, ↓ glucose, ↓HbA1C
- D5W-1/2 NS

Nutrient Requirements

J.S.’s needs were estimated to be 1640-1965kcal/day based on 25-30 calories/KG of her current body weight (144#) to prevent further weight loss and weight maintenance. Protein requirements were increased to eliminate further muscle wasting and stress related to current medical condition: 65.5-79 grams of protein/day based on 1.0-1.2gm/KG of current body weight. Fluids were encouraged to prevent dehydration.

Evaluation of Nutrient Requirements

The estimated energy needs and protein needs were based on J.S.’s current weight, her inability to tolerate solids prior to admission, a 66# weight loss the past 7 months, and her current medical condition, so she has slightly increased needs. Estimating energy requirement needs using kilocalories per kilogram usual body weight is a method commonly used in determining energy needs. Winthrop University Hospital follows 25-30calories/KG is moderate-high weight maintenance or a low-moderate weight gain consideration. Protein needs were slightly increased from 1.0-1.2gms/KG. J.S. has an albumin level of 3.3g/dl,
which is slightly decreased from admission value of 3.6g/dl. A 3.0-3.4g/dl albumin level is an acceptable range at Winthrop. A pre-albumin level was requested to further assess protein needs. Fluids were encouraged.

**Nutrition Diagnosis: PES Statement**

1. Patient with unintended weight loss (NC-3.2) related to decreased ability to consume sufficient energy as evidenced by 31.4% weight loss in 7 months, poor po intake, and conditions associated with diagnosis and treatment (Chemo RT secondary to duodenal cancer and a gastric outlet obstruction)

2. Patient with altered GI function (NC-1.4) related to duodenal cancer as evidenced by N/V, abdominal distention, and NPOx4.

**Nutrition Intervention**

- Recommend Pre-albumin and MVI
- Follow-up after stent placement on po intake-provide supplements and prostat PRN
- Follow-up on glucose levels and accu-checks-Consistent CHO PRN when diet advances

**Nutrition Goals & Plans**

<table>
<thead>
<tr>
<th>Goals</th>
<th>Plans</th>
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<tr>
<td>Albumin Levels &gt;3.4mg/dl</td>
<td>-Provide supplements when diet advances</td>
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<tr>
<td>Prealbumin &gt; 19.9mg/dl</td>
<td>-Encourage po intake when diet advances</td>
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<tr>
<td>When diet advances within the next 3 days</td>
<td>-Request Pre-albumin levels to complete</td>
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<td></td>
<td>appropriate intervention</td>
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<tr>
<td>Deter further weight loss/Maintain Current weight of 144#</td>
<td>-Encourage po intake post stent placements</td>
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<tr>
<td>by &gt;75% po intake</td>
<td>-Education on smaller meals, more frequently</td>
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<td>to increase appetite</td>
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Methods for monitoring & evaluation

- Monitor weight
- Monitor pre-albumin levels
- Monitor po tolerance and intake when diet advances
- Monitor for supplements

Prognosis & future plans & Summary

J.S. suffers from duodenal cancer complications. She has shown a great amount of progress within her week stay at Winthrop University Hospital, especially with tolerating food. Education was given to J.S. about eventually increasing fiber into the diet as tolerated. Fiber will help prevent further complications. The family history of GI cancers and the 40 years of smoking highly influenced J.S.’s diagnosis and complications of duodenal cancer. J.S. is to report to primary care physician 1-2 weeks after discharge and GI doctors as needed. J.S. has a wonderful support system with her sisters living with her and providing her with care and comfort. This case was a great experience for me to see the progression of J.S. and her great attitude about the situation. I not only learned about duodenal cancer, but the importance of staying positive and strong through a situation like J.S. is experiencing.

References