Adult CCRN/CCRN-E/CCRN-K Certification Review Course: Gastrointestinal

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Disclosures
- Nothing to disclose
Gastrointestinal

Digestive Structures and Functions
- Mouth
- Esophagus
- Stomach
- Small intestine
- Pancreas
- Gallbladder
- Liver
Digestive Structures and Functions (cont)
- Spleen
- Portal circulation
- Mesenteric circulation
- Large intestine
- Digestive hormones
- Digestive enzymes

GI Assessment
- Inspection
- Auscultation
- Palpation
- Percussion

Liver Function
- Metabolic factory and waste disposal plant
- Carbohydrate, fat, and protein metabolism
- Production of bile salts
- Production of clotting factors
- Bilirubin metabolism
- Detoxification
- Vitamin and mineral storage
- Blood reservoir
Liver Function Assessment
- Protein
- Albumin
- Prealbumin
- Ammonia
- Bilirubin
- Coagulation studies
- Enzymes

Hepatic Enzymes
- Alkaline phosphatase (ALP)
- Gamma-glutamyl transpeptidase (GGT)
- Aspartate transaminase (AST)
- Alanine transaminase (ALT)

Liver Dysfunction and Failure
- Cirrhosis
- Hepatitis
- Poisoning: acetaminophen
- Hypoperfusion: shock
Gastrointestinal

Liver Dysfunction
- Metabolic factory and waste disposal plant
- Carbohydrate, fat, and protein metabolism
- Production of bile salts
- Production of clotting factors
- Bilirubin metabolism
- Detoxification
- Vitamin and mineral storage
- Blood reservoir

Liver Dysfunction
- Hepatic encephalopathy
- Malnutrition
- Coagulopathy
- Portal hypertension
- Hepatorenal syndrome
- Ascites
- Infection
Pancreatic Function
- **Endocrine functions**
  - Synthesis and release of hormones: glycogen, insulin, gastrin
- **Exocrine functions**
  - Pancreatic enzymes break down protein, starch, fat >2 L/day
  - **Bicarbonate**
    - Raise pH

Pancreatic Enzymes
- **Trypsin**
  - Aids in protein digestion
- **Amylase**
  - Aids in carbohydrate digestion
- **Lipase**
  - Aids in fat digestion

Acute Pancreatitis—Pathophysiology
- Auto digestion
  - Tissue damage
  - Fat necrosis
  - Vascular damage and hemorrhage
  - Increased capillary permeability
  - Hypotension
- Forms/types
  - Edematous
  - Hemorrhagic
Acute Pancreatitis—Causes
- Alcoholism
- Biliary stones
- Hyperlipidemia
- Abdominal trauma
- Infection
- Shock
- Drugs

Acute Pancreatitis—Clinical Presentation
- Pain
- Low-grade fever
- Nausea and vomiting
- Distended/tender abdomen
- Jaundice
- Hypoactive bowel sounds
- Ascites?
- Hypovolemic shock

Necrotizing pancreatitis
Cullen sign: Bluish discoloration—umbilical
Grey Turner sign: Bluish discoloration—flank

Acute Pancreatitis—Clinical Presentation (cont)
- Labs
  - Hypocalcemia (classic sign)
  - Low calcium, magnesium, potassium
  - Hyperglycemia
  - Hyperbilirubinemia
  - Hypertriglyceridemia
  - Increased BUN and creatinine

Elevated amylase
Elevated lipase
Elevated liver function tests
Elevated WBC
Decreased hemoglobin and hematocrit
Increased hemoglobin and hematocrit
Acute Pancreatitis—Treatment Options

- Fluid resuscitation
- Rest the pancreas
- Pain management
- Monitor and replace electrolytes
- Multisystem treatment
- Nutritional support
- Surgery

Review Questions

Question 1

Which of the following lab results would be most indicative of pancreatitis?

A. Glucose 115, sodium 137, amylase 100
B. Lipase 250, glucose 218, total calcium 4.2
C. Amylase 325, total calcium 9.2, potassium 4.1
D. Sodium 162, amylase 120, lipase 101
Question 1—Rationale

Which of the following lab results would be most indicative of pancreatitis?

B. Lipase 250, glucose 218, total calcium 4.2—Amylase, lipase and glucose are high and total calcium is typically low
   - Glucose 115, sodium 137, amylase 100—Glucose and amylase are typically high
   - Amylase 325, total calcium 9.2, potassium 4.1—Total calcium is typically low
   - Sodium 162, amylase 120, lipase 101—Amylase and lipase are typically high

Gastrointestinal Bleeding

Causes of Lower GI Bleeding

- Diverticulitis
- Angiodysplasia
- Other
  - Cancer
  - Hemorrhoids
  - Inflammatory bowel diseases (ulcerative colitis; Crohn’s disease)
  - Bowel infarction

Not typically life-threatening
Causes of Upper GI Bleeding

- Peptic ulcer disease
  - Duodenal, gastric, and stomal ulcers account for 50% of bleeding episodes
- Gastritis or esophagitis
- Esophageal varices
- Mallory–Weiss syndrome

Acute Upper GI Bleeding—Clinical Presentation

- Hematemesis
- Melena
- Peptic ulcer disease
  - Distended and tender abdomen
  - Hyperactive bowel sounds
- Hypovolemia
- Shock

Acute Upper GI Bleeding—Assessment

- Hemoglobin and hematocrit
- Coagulation and platelets
- Hemococoncentration
- Elevated BUN
- Liver function tests
- Endoscopy
- Angiography
- Radionuclide scans
Acute Upper GI Bleeding—Treatment Options

- Nasogastric decompression/lavage
- Room temperature or iced
- Fluid resuscitation
- Blood products
- Endoscopic sclerotherapy

Acute Upper GI Bleeding—Treatment Options (cont)

- Pharmacology
  - H₂ blockers, antacids, proton pump inhibitors
  - Sucralfate
  - Vasopressin
    - Constricts splanchnic inflow to reduce portal pressure
  - Somatostatin and octreotide
    - Vasconsstricts splanchnic vessels to decrease blood flow

Acute Upper GI Bleeding—Treatment Options (cont)

- Bleeding esophageal varices
  - TIPSS – transjugular intrahepatic portosystemic stent shunt
  - Beta blockers—decrease pressure
  - Blakemore tube (old—not used much now)
Disorders of the Bowel

- Infarction
- Obstruction
- Perforation/peritonitis

Review Questions

Question 2

All of the following interventions might be used in the management of GI bleeding except:

A. D2W with 20 mEq potassium chloride at 100 mL/hour
B. Normal saline at 250 mL/hour
C. Nasal gastric tube water lavage
D. Octreotide 25 mcg/hour IV infusion
Question 2—Rationale

All of the following interventions might be used in the management of GI bleeding except:

A. D5W with 20 mEq potassium chloride at 100 mL/hour—Not even maintenance fluid, and fluid resuscitation is what is needed
   • Normal saline at 250 mL/hour—might be used as fluid resuscitation
   • Nasal gastric tube warm lavage—might be done
   • Octreotide 25 mcg/hour IV infusion—a selective gastric vasoconstrictor might used

Question 3

Which of the following assessment findings is indicative of a large bowel vs small bowel obstruction?

A. High-pitched bowel sounds, nausea and vomiting, acute pain
B. Ascites, rebound tenderness, jaundice
C. Low-grade fever, steatorrhea, no bowel sounds
D. Lower abdominal pain, distention, no vomiting

Question 3—Rationale

Which of the following assessment findings is indicative of a large bowel vs small bowel obstruction?

D. Lower abdominal pain, distention, no vomiting
   • High-pitched bowel sounds, nausea and vomiting, acute pain—Small bowel obstruction
   • Ascites, rebound tenderness, jaundice—Liver failure
   • Low-grade fever, steatorrhea, no bowel sounds—Pancreatitis
GI Surgery
- Exploratory laparotomy and lysis of adhesions
- Colon resection
- Colostomy or ileostomy
- Esophagogastrectomy
- Gastric bypass
- Splenectomy
- Appendectomy
- Oversew ulcer or tear
- Total or subtotal gastric resection
- Billroth I or Billroth II
- Whipple

GI Surgery (cont)
- Care concerns
  - Infection—leaks
  - Sepsis
  - Third spacing/hypovolemia
  - Bleeding
  - Electrolyte imbalance
  - Nutrition
  - Immobility
  - Pain
  - Potential respiratory compromise

Review Questions
Question 4
After ambulating, a postoperative gastric bypass patient complains of abdominal pain and develops tachycardia, tachypnea, diaphoresis, and a fever. Assessment reveals a clean, dry, closed abdominal staple line and large, firm, tender abdomen. The most likely diagnosis for these changes is:

A. Pulmonary embolus
B. Routine postoperative pain
C. Anastomosis leak and possible peritonitis
D. Acute gall stones

Question 4—Rationale
After ambulating, a postoperative gastric bypass patient complains of abdominal pain and develops tachycardia, tachypnea, diaphoresis, and a fever. Assessment reveals a clean, dry, closed abdominal staple line and large, firm, tender abdomen. The most likely diagnosis for these changes is:

C. Anastomosis leak and possible peritonitis—The post-op gastric bypass patient is at risk for all four of these complications; however, the assessment findings of increased HR, RR, temp, and tender abdomen point more toward C than the other possibilities:
- Pulmonary embolus—Would also have dropping SpO₂ and chest pain
- Routine postoperative pain—Would not include fever
- Acute gall stones—Would typically include vomiting

Acute Abdominal Trauma
### Mechanism of Injury
- Blunt trauma
  - Motor vehicle crash
  - Fall
  - Assault
  - Crush
  - Sports
- Penetrating trauma
  - Gunshot wound
  - Stabbing
  - Impalement

Abdominal trauma is frequently not as overt on primary and secondary assessment as other injuries. It is frequently more life-threatening.

### Types of Injury
- Organ contusion
- Organ laceration
- Splenic injury (common site)
- Solid organs vs hollow organs
- Crush with tissue damage
- Vascular injury
- Hypoperfusion
- Hemorrhage

Blunt trauma: solid organ—spleen, liver, kidney
Penetrating trauma: liver, intestines

### Assessment
- Abdominal exam
- Pain/tenderness
- Firmness
- Discoloration
- Bowel sounds
- Abdominal sonogram
- CT scan
- Diagnostic peritoneal lavage
- Laboratory tests
- X-ray
Assessment (cont)

- Cullen sign
  - Blush umbilical discoloration
- Grey Turner sign
  - Blush discoloration of flank
- Kehr’s sign: shoulder pain
- Abdominal compartment syndrome

Intraabdominal pressure
- 0–5 mmHg = normal
- >12 mmHg = hypertension
- >25 mmHg = fatal

Treatment

- Fluid resuscitation
- Diagnose problem
- Plug holes and/or repair lacerations
- Support damaged organ(s)
- Remove damaged tissue/organ(s)

Treatment (cont)

- Major concerns after treatment
  - Infection/sepsis
  - Hemodynamic status
  - Organ function
  - Acute respiratory distress syndrome
  - Acute kidney disease
  - Multiple organ dysfunction syndrome
Question 5

A patient who sustained blunt abdominal trauma complains of left shoulder pain. This could be a sign of splenic injury and is known as:

A. Cullen sign  
B. Kernig sign  
C. Kehr's sign  
D. Grey Turner sign

Question 5—Rationale

A patient who sustained blunt abdominal trauma complains of left shoulder pain. This could be a sign of splenic injury and is known as:

C. Kehr’s sign—A referred type pain assessed in spleen rupture and hemorrhagic pancreatitis
   - Cullen sign—Bluish discoloration around belly button seen in liver failure and hemorrhagic pancreatitis
   - Kernig sign—Positive in meningitis, pain in neck with leg lift
   - Grey Turner sign—Bluish discoloration on flank, seen in retroperitoneal bleeding and hemorrhagic pancreatitis
Question 6
Which of the following GI disorders is likely to present with these findings: heart rate 117, respiratory rate 31, blood pressure 172/94, temperature 37.9 C, PT elevated, aPTT elevated, albumin low, hematocrit low, AST high, ALT high?
A. Liver failure
B. Pancreatitis
C. Upper GI bleed
D. Ruptured spleen

Question 6—Rationale
Which of the following GI disorders is likely to present with these findings: heart rate 117, respiratory rate 31, blood pressure 172/94, temperature 37.9 C, PT elevated, aPTT elevated, albumin low, hematocrit low, AST high, ALT high?
A. Liver failure—Elevated coags → liver not making clotting factors; low albumin and Hct → liver not producing acute phase proteins; high liver enzymes → liver not using AST and ALT to help maintain health of hepatocytes
   • Pancreatitis—High amylase and lipase
   • Upper GI bleed—Hypotension, no fever
   • Ruptured spleen—Hypotension, no fever or high LFTs