Fluids, Electrolytes and Acid/Base Balance

PROBLEM 1
A 45 year old man with previously known duodenal ulcer disease presents with complaints of persistent vomiting for the past 36 hours. The vomit is clear-looking and acidic in taste. He has no abdominal pain. Prior to the vomiting, he had difficulty with solid foods causing "fullness" in the stomach and he had been taking only liquids for one week. His heartburn had been aggravated at the time of the "fullness", but antacids did not help and he did not seek medical attention until today. He complains of being dizzy when he stands up. His blood pressure changes from 120/70 when lying to 105/55 when standing, his pulse changes from 100 to 130.

Study Questions:
1. What is the electrolyte composition of gastric contents?
2. What is the most likely acid-base disturbance in the patient?
3. What percentage of intravascular volume has been lost?
4. What intravenous fluid would be most likely to correct the acid/base and volume deficit?
5. How much would be needed to replace the intravascular volume deficit?
6. What would be the sodium, potassium, and hydrogen ion concentration in the urine (normal, high, low for each)?
7. What is the most likely underlying diagnosis?

PROBLEM 2
A 72 year old man is admitted with painless jaundice of two weeks duration. Ultrasound demonstrates markedly dilated bile ducts with no gallstones. He undergoes transhepatic cholangiography which demonstrates an obstructing lesion in the distal common bile duct. A decision is made to leave a catheter in the duct to drain the bile pending surgical evaluation. the first 48 hours after the catheter is placed it drains 1000 cc/24 hours.

Study Questions:
1. What is the electrolyte composition of bile?
2. What intravenous fluid would you administer to replace the fluid and electrolytes lost in this patient?

PROBLEM 3
A 36 year old man has undergone a total colectomy and proctectomy for ulcerative colitis two years previously, and has an ileostomy which usually drains about 800 cc per day. Two days before coming to the hospital he developed crampy abdominal pain, bloating, and began draining large quantities of liquid from his ileostomy. Because of nausea and two episodes of vomiting he did not take any food or liquids over the past 24 hours.

Study Questions:
1. What is the usual amount of ileum output into the colon each day?
2. What are the electrolytes of ileostomy output?
3. What would be physical examination evidence of dehydration?
4. What laboratory tests would you order to assess the degree of dehydration and what alterations would you expect?
5. What intravenous fluid would you administer to replace the ileostomy output?
PROBLEM 4

A postoperative patient is noted to be oliguric with urine output of 10-15 cc/hr for the past eight hours. BUN and creatinine measurements reveal an increase from BUN 15 and creatinine of 1.0 to BUN of 40 and creatinine of 1.5. The urine specific gravity is 1.030 and urine electrolytes reveal a sodium of 2 Meq/l, potassium of 40 mEq/l.

Study Questions:
1. What are possible etiologies for the oliguria?
2. What renal mechanisms are most likely responsible for the specific gravity of the urine and the urine electrolytes?

PROBLEM 5

A 65 year old 70 kg man with known congestive heart failure treated with digoxin and a diuretic undergoes an “uneventful” abdominal aortic aneurysm repair with 1,000 cc of blood loss. During the four hours of surgery he is administered 4,000 cc of lactated Ringer's solution. During his first eight hours after surgery he is administered 1,000 cc of lactated Ringer's, has made 250 cc of urine and has drained 200 cc from a nasogastric tube.

Study Questions:
1. What methods would you use to evaluate the intravascular volume status in this patient eight hours after surgery?
2. What is considered an adequate urine output for this patient?
3. What methods could you use to evaluate the total body fluid status of this patient?

PROBLEM 6

A 75 year old woman who lives alone was discovered lying on the floor of her apartment by her landlady. She is brought to the emergency room by ambulance, and does not respond to commands. Her blood pressure is 120/70, pulse is 110, respirations 30 and temperature is 37°C. She is moving all extremities. Her abdomen reveals a lower midline scar and a stoma in the left lower quadrant with dark yellow fluid in a stoma bag. Her past history is not available. Arterial blood gases are as follows: pH 7.25, pO2 85, pCO2 25. Serum electrolytes are Na 145, Cl 123, K 6.5, PCO2 15, glucose 106.

Study Questions:
What is the acid-base disorder in this patient?
What are possible etiologies of this disorder?
What is the treatment for this disorder?
How much will pH be altered for each incremental change in pCO2 for both acute and chronic conditions?
PROBLEM 7

An 18 year old man was in a motorcycle accident; he was not wearing his helmet. He suffered a severe closed head injury with diffuse swelling of both cortices. He remains comatose three days after injury and is noted to have a urine output of 500 cc per hour. The specific gravity of the urine is 1.000 and his serum electrolytes demonstrate a sodium of 155, chloride of 125, potassium of 4.5 and PCO\textsubscript{2} of 25

**Study Questions:**
- What is the differential diagnosis of hypernatremia?
- What is the most likely etiology in this patient?
- How would you confirm the diagnosis?
- What treatment would you give?

PROBLEM 8

A 55 year old woman with alcoholic cirrhosis and ascites is admitted for upper intestinal bleeding. Upper endoscopy reveals gastritis which is not actively bleeding. She is admitted and given an intravenous of 5% dextrose and 0.2% NaCl at 125 cc/hr. Over the next 24 hours her abdomen becomes tense and her urine output is 15 to 20 cc per hour. Her serum sodium has decreased from 132 on admission to 122 and she is less responsive to verbal stimuli.

**Study Questions:**
1. What are possible etiologies of hyponatremia?
2. What is the most likely etiology in this patient?
3. What happens to urine sodium concentrations with the several etiologies listed above?
4. What is the treatment of hyponatremia in this patient?

PROBLEM 9

A 55 year old man fell from a scaffold which was toppled by a large concrete block as it fell from a crane. His left leg was pinned under the concrete. After extrication, his leg below the knee was pale and motionless with moderate pain. The patient was transported to your emergency room with a blood pressure of 110/60, pulse 120, temperature 37.5°C, and respirations of 25 noted on admission. Insertion of a Foley catheter revealed dark brown colored urine. EKG monitoring revealed peaked T waves. Serum electrolytes were Na 142, K 6.8, Cl 106, PCO\textsubscript{2} 18. Serum BUN was 25, creatinine 2.0.

**Study Questions:**
- What is the threatening electrolyte disturbance in this patient?
- What are the etiologies of this abnormality?
- What etiologies are likely in this patient?
- What would the blood pH likely be in this patient (low, normal or high)?
- What are the therapeutic options for this life-threatening electrolyte disturbance?

PROBLEM 10
A 66 year old woman with a history of asthma undergoes laparoscopic cholecystectomy using narcotic anesthesia. Her preoperative blood gases on room air are pH 7.42, pO₂ 75, PCO₂ 45. Thirty minutes after extubation the patient is noted to be somnolent with shallow respirations and a pulse of 110. A blood gas at this point reveals pH 7.32, pO₂ 225 on 50% face mask, pCO₂ 50.

**Study Questions:**
What is the primary acid-base problem?
What are etiologies of this problem?
What is the most likely etiology in this patient?
How would you treat this in this patient?

**PROBLEM 11**

A 74 year old presents to the Emergency Room with a chief complaint of colicky abdominal pain of three days duration. The patient has repeatedly vomited a foul-smelling fluid for the past 48 hours. The patient feels weak and is unable to get out of bed since today. She has been unable to retain any water or fruit juice. She has not voided for 12 hours. She underwent total abdominal hysterectomy at age 60 for a fibroid uterus.

Physical examination: weight is 143 lbs; height is 65"; blood pressure is 100 systolic; pulse is 114/minute; temperature is 99.2° F, respirations 24/minute. The abdomen is distended with a lower midline scar and tympanic. Bowel sounds are hyperactive. There is percussion tenderness in the left lower quadrant, as well as involuntary guarding. The rectal ampulla is empty.

Laboratory studies: Hemoglobin = 16.8 gms, Hematocrit = 57%; WBC = 11,000; Na+ = 126 mEq/1 (N-135-154); K+ 3.4 mEq/1(N-3.5-5.0); Cl- 92 mEq/1(N-95-106); Anion gap 22 mEq/1(N-8-16), BUN 50 mg/dl(N-7-19); Creatinine 3.2 mg/dl(N-0.7-1.4); Arterial blood gases-pH 7.28(N-7.35-7.45); PaO₂ 88 mmHg(N-75-100); PaCO₂ 38 mmHg(N-38-42); HCO₃ 12 mEq/1(N-16-24); Base excess -5; urine sp. gr. 1.031(N-1.003-1.025); urine pH 4.5(N-4.6-8.0).

**Study Questions:**
Based on the above data, what is the most likely diagnosis?
What acid-base alteration is indicated by the arterial blood gases.
Describe the mechanism of fluid and electrolyte losses.
Calculate the fluid and electrolyte losses suffered by this patient.
Outline the intravenous fluid orders required.
PROBLEM 12

A 64 year old man has surgical resection of an abdominal aortic aneurysm with graft interposition. The operation is difficult and six units of packed cells are infused during the surgery. The patient's blood pressure fell twice to 70 systolic during the four-hour operation. Eight liters of crystalloid were administered, 500 cc of fresh frozen plasma, and 1,000 cc of Hetastarch. The patient came to the intensive care unit with a systolic blood pressure of 60 mmHg. Three additional units of blood were given before his pressure is over 100 mmHg systolic. The patient made 100 cc of urine output during the case but in the ICU is noted to be oliguric, with 5 to 10 cc of urine output during the first four postoperative hours. Mannitol, which was given in the operating room, was repeated with no increase in urine output. During the next twelve hours six liters of crystalloid and 500 cc of packed red cells are administered resulting in 75 cc of dark yellow urine. By this time his hemoglobin and hematocrit have stabilized at 9.6 gms and 27.8%.

Laboratory values are:

- WBC 11,800
- BUN 55 mg/dl
- Creatinine 2.1 mg/dl
- Na+ 134 mEq/1
- K+ 5.8 mEq/1

Urinalysis:
- Sp. gr. 1.010
- Urine osmolarity 300 mOsm/L
- 0 rbc/hpf
- 0 wbc/hpf
- 0 pigmented granular casts
- Protein 2+
- Urine Na+ 45 mEq/1

Study Questions:
1. What is the differential diagnosis of the oliguria? The most likely diagnosis?
2. What is the most likely etiology?
3. What is the natural history of this disease?
4. What are the principles of management of this disease?
5. Instead of recovering, this patient develops aspiration pneumonia in the intensive care unit, progresses to multi-system organ failure, and expires on post-op day 17. This patient’s case is presented at the weekly morbidity and mortality conference, and the attending comments that this patient had a high expected mortality, so it shouldn’t have an impact on the hospital’s O/E ratio. What does he mean by the “O/E” ratio? How is this metric used?

PROBLEM 13

A 71 year old man is subjected to an open cholecystectomy. After surgery he is extubated in the operating room and moved to the recovery room. There he becomes restless and arterial blood gases are drawn. Blood gases are reported:

- PaO2 55 mmHg
- PaCO2 62 mmHg
- HCO3 12 mEq/1
- pH 7.26

Study Questions:
1. What is the primary acid-base alteration in this patient?
2. How should this patient be managed?
Surgical Nutrition

PROBLEM 14
A 24 year old man who weighs 60 kg has a three year history of Crohn's disease. At the onset of his disease a distal small bowel resection and appendectomy were performed for perforation of the terminal ileum and abscess. Over the past two weeks he has developed fever, crampy, abdominal pain, diarrhea and occasional vomiting, and he has lost 10 pounds during this time. Physical exam reveals a pulse of 100, a temperature of 38.5°C, a blood pressure of 120/70. His abdomen is distended with active bowel sounds and minimal tenderness in the right flank. His laboratory studies reveal:

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
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<tbody>
<tr>
<td>Hb</td>
<td>13.5 gm/dl</td>
</tr>
<tr>
<td>Hct</td>
<td>40.2%</td>
</tr>
<tr>
<td>WBC</td>
<td>18.9</td>
</tr>
<tr>
<td>bands</td>
<td>14</td>
</tr>
<tr>
<td>segs</td>
<td>76</td>
</tr>
<tr>
<td>lymphs</td>
<td>8</td>
</tr>
<tr>
<td>eos's</td>
<td>2</td>
</tr>
<tr>
<td>Albumin</td>
<td>2.7 gm/dl</td>
</tr>
<tr>
<td>BUN</td>
<td>34 mg/dl</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.4 mg/dl</td>
</tr>
<tr>
<td>Total Bili</td>
<td>0.7 mg/dl</td>
</tr>
<tr>
<td>Alk Phos</td>
<td>56 IU (within normal range)</td>
</tr>
</tbody>
</table>

Study Questions:
1. What features of this patient's condition are consistent with malnutrition?
2. How is the type and degree of malnutrition determined?
3. What effect, if any, does malnutrition have on the risk/benefit ratio of medical and surgical therapy for intestinal disease?
4. What are the options for nutritional support of this patient?

PROBLEM 15
A 68 year old man underwent an elective sigmoid resection for carcinoma seven days ago. On day six a temperature to 39°C and lower abdominal pain prompted a CT scan of the abdomen which revealed a left lower quadrant abscess. The following day the abscess was drained percutaneously and 100 cc of foul smelling purulent material was removed. His abdomen is distended with few bowel sounds. He is anorectic. He has not had anything more than clear liquids by mouth since his operation. His albumin is 2.5 gm/dl.

Study Questions:
1. What methods of nutritional support could be used for this patient?
2. What are the constituents of a typical 1,000 ml bottle of total parenteral nutrition?
3. What are the common metabolic complications that may occur during total parenteral alimentation? How are they recognized and treated?
PROBLEM 16
A 68 year old woman with a history of a 20 pound weight loss over the past six months presents to the emergency room with a history of passing bright red blood per rectum. Her pulse is 95, her blood pressure 120/70. She has not seen a physician in 40 years.

Study Questions:
1. What history and physical exam information would you gather to assess this patient's coagulation system?
2. If there is a problem present, what would be the most likely?
3. What laboratory tests would you order to assess this patient's coagulation system?

PROBLEM 17
A 24 year old man is in the operating room for a massive liver injury sustained when his motorcycle hit a truck. After one hour of surgery he has received 15 units of packed cells and has developed diffuse oozing from the surface of his liver. Clots are no longer forming. His body temperature is 34°C.

Study Question:
1. What are the most common coagulation difficulties associated with massive transfusion? What is the management of each?

PROBLEM 18
A 45 year old man is receiving the second of two units of packed red cells 48 hours after elective hip surgery. After 50 cc of blood has been given, he develops a temperature to 38.5°C and a pulse to 110.

Study Questions:
1. What are the standard methods of typing and crossmatching blood for transfusion? Where can errors occur?
2. What types of problems are associated with blood transfusions - both short term and long-term? What is the most likely problem in the patient described above? How are these problem differentiated?
Shock

PROBLEM 19
A 22 year old man was driving drunk and without his seatbelt fastened when he was involved in a single-vehicle automobile accident. When attended by EMT personnel, no information was available about the time of the accident. He was found to be agitated and complaining of abdominal pain. His airway was patent. At the scene, he was breathing at 20 breaths per minute with a blood pressure of 90/60 mmHg and a pulse of 130 bpm. He was placed in a hard cervical collar on a back board and transported to your emergency room. Upon arrival his vital signs are the same, with a temperature of 36°C. His abdomen is markedly distended. His hands and feet are cold, his legs mottled. A nasogastric tube reveals green liquid. A urinary catheter reveals dark yellow urine. His hemoglobin is 7. His FAST examination is positive in Morrison’s pouch.

Study Questions:
1. What type of shock does this patient exhibit?
2. What alterations in oxygen delivery are present?
3. What acid/base category would be expected?
4. What is the effect of this kind of shock on the kidneys, the heart, the lungs, the brain, the intestine?
5. What would be the cardiac output (low, normal, high)?
6. What would be the systematic resistance (low, normal, high)?
7. What would be the central venous and/or pulmonary capillary occlusion pressure (low, normal, high)?
8. What therapy would reverse the shock?

PROBLEM 20
A 65 year old man with known coronary artery disease (myocardial infarct three years earlier, currently taking a beta blocker) is admitted with acute left lower quadrant pain of six hours duration. His blood pressure is 90/50 mmHg, pulse 120 bpm, respirations 18 breaths per minute, temperature 39°C. He is flushed, with warm hands and warm feet. Physical examination reveals findings consistent with peritonitis in the left lower quadrant.

Study Questions:
1. What type of shock does this patient exhibit?
2. What alterations in oxygen delivery are present?
3. What acid/base category would be expected?
4. What is the effect of this kind of shock on the kidneys, the heart, the lungs, the brain, the intestine?
5. What would be the cardiac output (low, normal, high)?
6. What would be the systematic resistance (low, normal, high)?
7. What would be the central venous and/or pulmonary capillary occlusion pressure (low, normal, high)?
8. What therapy would reverse the shock?
PROBLEM 21

A 55 year old man with stable angina which occurs twice a week while walking uphill, who uses nitroglycerin, undergoes an uneventful sigmoid resection for diverticular disease. On postoperative day four he develops severe sub-sternal chest pain, sudden hypotension (85/55), tachycardia (120), and becomes agitated. Physical exam reveals total body mottling, cold hands and feet, distended neck veins and an S3 gallop. ECG demonstrates elevated ST-T wave segments in all of the anterior leads.

Study Questions:
1. What type of shock does this patient exhibit?
2. What alterations in oxygen delivery are present?
3. What acid/base category would be expected?
4. What is the effect of this kind of shock on the kidneys, the heart, the lungs, the brain, the intestine?
5. What would be the cardiac output (low, normal, high)?
6. What would be the systemic resistance (low, normal, high)?
7. What would be the central venous and/or pulmonary capillary occlusion pressure (low, normal, high)?
8. What therapy would reverse the shock?

PROBLEM 22

A 35 year old man dove into three feet of water at a swimming pool, did not emerge and was rescued by friends who performed CPR. When the EMTs arrived they found the patient to have a blood pressure of 80/50, pulse 100, and no spontaneous respirations, although he was opening his eyes. They began bag-mask ventilation and placed a hard cervical collar. He was placed on a back board and transported to your emergency room. Upon arrival he has the same vital signs with warm hands and feet and pink extremities.

Study Questions:
1. What type of shock does this patient exhibit?
2. What alterations in oxygen delivery are present?
3. What acid/base category would be expected?
4. What is the effect of this kind of shock on the kidneys, the heart, the lungs, the brain, the intestine?
5. What would be the cardiac output (low, normal, high)?
6. What would be the systemic resistance (low, normal, high)?
7. What would be the central venous and/or pulmonary capillary occlusion pressure (low, normal, high)?
8. What therapy would reverse the shock?
Wounds and Wound Healing

PROBLEM 23

A 55 year old man with a history of severe asthma (treated with chronic steroids) and non-insulin dependent diabetes underwent an emergent sigmoid resection with end colostomy for perforated diverticulitis. There was gross contamination of the entire abdominal cavity with large intestine contents. During the operation his blood pressure fell to 80 systolic. After irrigation of the abdomen to clear debris, the abdominal fascia was closed with running #2 nylon suture material and the skin and subcutaneous tissue left open and packed with saline-moistened gauze.

Study Questions:
1. What type of wound closure was used in this patient?
2. What is the sequence of wound healing events?
3. What specific factors about this patient will influence wound healing?
4. On post-operative day #7, this man accumulated a large amount of serosanguinous fluid in the base of the wound. What is the most likely etiology of this fluid? What are the management options for this condition?

Surgical Infections/Antibiotics

PROBLEM 24

A 55 year old woman undergoes an emergency cholecystectomy and common duct exploration for acute cholecystitis and cholangitis. E. coli, Klebsiella, and enterococcus grow out of the intraoperative bile cultures. She receives ampicillin and gentamicin preoperatively and this is continued in the postoperative period through day four. On day five she complains of increased pain in the stapled skin closure site. She has fever to 39°C, and erythema and warmth are noted in the mid portion of the wound.

Study Questions:
1. What type of wound (clean, clean-contaminated, contaminated, dirty) was present in this case? What is the relative risk of surgical site infection in these categories?
2. What type of surgical site infection (SSI) is likely in this patient?
3. What other risk factors can contribute to increased infection rates?
4. What organism(s) would you expect to culture from this wound?
5. How would you treat this patient’s surgical site infection?
6. You begin to wonder about the rate of surgical site infections at your hospital. Is this a problem for other patients? Is there something we can be doing better to prevent these? You decide to check the Hospital Compare website to find out.

What surgical site infection data is presented on this website? What are HUP’s rates?
7. Suppose that the rate of infection at HUP is higher compared to the state average for surgical site infections. You want to initiate a quality improvement project to understand the reasons why this is happening. Please give an example of one technique that might help you in this endeavor.
PROBLEM 25

A 65 year old male diabetic has had pain in the perianal region for three days. This morning his wife found him unresponsive and called an ambulance. Upon arrival to the emergency room he has a blood pressure of 90/50, pulse of 130, a temperature of 40°C and is foul-smelling. Examination of his perianal region reveals crepitus, bullae, and foul-smelling liquid draining from a spontaneously draining abscess just lateral to the right anal opening. A pelvic x-ray demonstrates air in the soft tissues of the perineum.

Study Questions:
1. What types of infections can cause crepitus and air in the soft tissues?
2. What type of patients are more prone to these infections?
3. How is a specific microbiologic diagnosis made quickly?
4. What is the major mode of therapy for such infections?
5. What adjuncts are available in the management of such infections?

PROBLEM 26

A 35 year old woman who was involved in a motor vehicle accident undergoes a splenectomy for a severely injured spleen. On postoperative day #1 she has a temperature to 38.5°C, with physical exam demonstrating tubulo-vesicular breath sounds and egophony at her left base. Preoperatively administered cephazolin is discontinued after two doses. Her temperature over the next four days never goes below 38°C and on day five increases to 39°C. Her physical exam is unchanged. Her abdomen is as distended as it was immediately postoperatively, and she has passed little flatus. Her wound looks normal. She has little appetite and still requires intravenous fluid. A urinary catheter is still in place. Her WBC fell from 15,000 immediately postoperatively to 10,000 on day three. On day five it is 18,000.

Study Questions:
1. What were the likely etiologies of fever during the immediate postoperative period? What was most likely?
2. What test(s) besides physical exam would confirm this diagnosis?
3. What etiologies of fever are likely on post-operative day #5? What test(s) would help you make a diagnosis?
PROBLEM 27

A 68 year old man with known COPD (FEV1 1.5 liters, pCO₂ 48 on room air) undergoes an uneventful resection of a 6cm abdominal aortic aneurysm. However, intubation was difficult and required three attempts. One dose of preoperative cephazolin was given. Central vascular access was placed during surgery but a pulmonary artery catheter was not used. On postoperative day one he fails extubation because of vocal cord swelling and is urgently reintubated. Despite the presence of a nasogastric tube, some gastric contents are suctioned from the endotracheal tube. He had been on H2 blockers since surgery. His repeat chest x-ray shows bilateral pulmonary infiltrates. Blood gases on 50% FIO₂, tidal volume 1000 and rate 12 are pO₂ 95 and pCO₂ 42. No antibiotics are given. Four days later he develops a temperature to 39°C with no drop in blood pressure but an increase in pulse to 120. His chest x-ray shows resolution of most of the infiltrates except for those in the right lower lung field. The central venous catheter is still in place. Urine output measured throughout with a bladder catheter is 30 cc to 40 cc per hour. His blood gases drawn through the arterial line placed in the operating room on 40% FIO₂ and an IMV of 6 are pO₂ of 105, pCO₂ 45.

Study Questions:
1. What are the most likely etiologies of fever in this patient on postoperative day five?
2. What role does preoperative antibiotics have in preventing infections postoperatively? Which type of infections are prevented?
3. How does gastric acid neutralization affect postoperative infection risk?
4. What is the most common nosocomial infection?

PROBLEM 28

A 19 year old man is brought into the emergency department following a motorcycle accident in which he was thrown 20 feet. Vital signs on admission to the emergency room are blood pressure 90/60, pulse 140, respirations 24 and noisy. He is unconscious, has a bruise over his forehead, there is fresh blood flowing from a laceration in his right groin, and his left leg is twisted in a deformed angle.

Study Questions:
1. What is the priority of steps for the initial evaluation and resuscitation of this patient?
2. What are the methods of securing control of the airway, particularly with facial and head trauma.
3. Which type of intravenous fluid should be administered initially in this patient and in what quantities? What would be the indications for giving blood transfusions?
4. What type(s) of shock could be present? How are the different types differentiated? Which is most likely?

PROBLEM 29

A 26 year old man sustained a stab wound to the left chest just below the mid-clavicle. His blood pressure is 70/50. He is cyanotic. His neck veins are markedly distended, and there is minimal external bleeding.

Study Questions:
1. What life-threatening injuries might account for this patient’s condition?
2. How would one differentiate among the injuries listed in “1”?
3. How should each of these possible injuries be managed emergently?
4. If an intercostal drainage tube yielded blood from the pleural cavity, what guidelines would indicate the need for a thoracotomy?
PROBLEM 30

A 45 year old woman who was wearing a lap seat belt is involved in a head-on automobile collision. She is awake and complains of abdominal pain. She is slightly pale and has a blood pressure of 110/80. There is a bruise across her upper abdomen, with slight guarding and moderate tenderness to palpation.

Study Questions:
1. What are the two diagnostic tests that would be most often used to assess this patient for significant intra-abdominal injury?
2. Describe how the above tests are performed and discuss the criteria that would indicate that a laparotomy should be performed.

PROBLEM 31

A 16 year old boy falls from a tree and lands on his head. He is found unconscious at the scene with vital signs of blood pressure 120/80, pulse 90, and spontaneous respirations at 16. In the emergency room his vital signs are the same, but he is mumbling incoherently and there is an enlarging hematoma on his forehead. He does not respond to verbal stimuli. He opens his eyes to painful stimuli and has a flexion response in both upper extremities. There are no other apparent injuries on physical examination, and there are no focal neurological signs.

Study Questions:
1. Describe how one would protect the cervical spine during the performance of resuscitation. How would one rule out a cervical spine injury?
2. What is the Glasgow Coma Scale? What is this patient's score?
3. How would one maximize perfusion of the brain and minimize cerebral edema during the initial assessment and stabilization of this patient? How can one best assess this patient for intracranial injury which would require surgical intervention?
Burns

PROBLEM 32

Part A
This 40 year old man was pulled from the bedroom of a burning house by firemen approximately one hour before admission to the hospital. He was able to state that he had no existing illness. His last tetanus toxoid booster was more than ten years before. Physical exam showed blood pressure at 100/60, pulse was 110, respirations 22. His face and neck were erythematous. There was some white, normal-appearing sputum when he coughed. The pharynx was normal in appearance. His entire left arm and upper half of his back showed blisters and erythema. The right arm and right leg were circumferentially brown, leathery, insensitive to pin prick, and thrombosed blood vessels were visible through the skin. At this time a hematocrit was 48. A Foley catheter produced about 100 ml of dark, yellow urine.

Study Questions:
1. What is the definition of 1st degree, 2nd degree, 3rd degree and 4th degree burns? What depth of burns are represented in this patient?
2. What is the percent of body surface area involved with each burn category in this patient?
3. What is the evidence for and against inhalation injury in this patient?
4. Calculate the fluid requirements for this patient for the first 24 hours post burn. How much of this fluid should be given in the first eight hours?
5. Why is this patient hemoconcentrated?
6. Does this patient need antibiotics?
7. How will you take care of his burn wounds?

Part B
The same patient is now 12 hours post burn. The toes and fingers of the right leg and arm are observed to be cold and cyanotic with very slow capillary refill. The urine output has been 10 ml for the past hour. His hematocrit is now 55. Blood pressure is 80/60, pulse is 125, respirations 22.

Study Questions:
1. Why is his blood pressure low, his urine output down, and his hematocrit rising? What is the pathophysiology behind these events?
2. What steps will you take to correct this problem?
3. What is the explanation for the change in appearance of the toes and fingers of the right extremities?
4. What needs to be done in order to alleviate this problem?

Part C
The patient is now seven days post burn. At this time he is able to tolerate clear liquids only. His blood pressure is 120/60, pulse is 110, temperature is 38°C. His weight is 70 kg. His hematocrit is 45. His urine output is quite adequate and he complains of some pain for which he receives analgesics. His face and neck appear essentially normal.

Study Questions:
1. Are this patient's caloric requirements increased, decreased or about the same as a normal person?
2. As he is tolerating clear liquids only, how could you improve his caloric intake?
3. How can you tell if his caloric needs are being met at this time?
Part D
On post burn day 10, during morning rounds the patient was noted to be alert and cooperative. He has expressed some interest in food. However, during the evening of the same day it is noted that he sensorium is somewhat dulled. His urine output is found to have fallen off to 15 ml in the previous two hours. His blood pressure is 80/60, pulse is 130, respirations 30, temperature is 40°. Careful physical examination results at this time are otherwise unchanged from the morning. Chest x-ray is clear. The urinalysis shows a few RBCs and 2-5 WBCs per high powered field; no bacteria. WBC is 22,000.

Study Questions:
1. What is the probable explanation for this turn of events?
2. What diagnostic steps will you take to elucidate the problem?
3. What immediate steps will you take in regard to therapy with:
   a. fluids? b. antibiotics?

PROBLEM 33

You are called to the emergency room of your 70 bed community hospital because there has been an explosion at the chemical plant which is your community's sole industry. The first patient's you see are described below:
   a. The first patient is a 30 year old man. He gives a history of working on a transformer at the plant and contacting an unexpectedly live wire with his right hand. His right arm is charred at the fingertips and the entire arm is severely swollen and erythematous. There is a 20 cm x 30 cm area of burn on his left flank where he came in contact with a metal door. Other than those areas he seems to be uninjured and is conversing with emergency room personnel.
   b. The second patient is a 28 year old man who was exposed to the explosion flash. He has blistering of his posterior trunk above the belt line and the posterior aspect of one arm. The total surface area is estimated at 12% to 15% of his body surface area.
   c. The third patient is a 45 year old man. He is diabetic and has flash burns producing blistering erythema of approximately 10% of his body surface. However, his face and neck (approximately 5%) have a brown, waxen appearance and are insensitive to pin prick.
   d. The fourth patient has blistering and erythema of parts of both arms (about 15% total) and an area of about 50% of the anterior chest which appears to be leathery, insensitive, and thrombosed vessels are apparent.

The major medical center to which your hospital normally refers complicated cases is located approximately 30 miles away.

Study Questions:
1. Which of these patients may be treated appropriately as an outpatient?
2. Which of these patients may be treated appropriately in your own hospital?
3. Which of these patients should be referred to the burn center?
4. What therapeutic steps will you take before transferring any patient to the burn center?
Brain and Nervous System

PROBLEM 34

Head Trauma
A 22 year old man was riding a motorcycle unhelmeted when he was involved in a crash at 55 mph. He was found unconscious but breathing spontaneously with a blood pressure of 110/70 and pulse of 100. Twenty minutes later in the emergency room, he does not open his eyes to verbal or noxious stimuli, there is no verbal response and noxious stimuli result in withdrawal of both upper and lower extremities. Both pupils react to light and are normal in size.

Study Questions:
1. What is the Glasgow coma scale for this patient?
2. What physical findings would be consistent with early tentorial herniation?
3. What are the management priorities for this patient's head trauma?
4. What are the possible trauma related etiologies of coma in this patient? Which is most likely? How does coma develop?

PROBLEM 35

Brain Death
Part A
A 38 year old man was shot in the head with a .38 pistol. He was intubated at the scene by the EMT team. In the emergency room, he is unresponsive to verbal and noxious stimuli and is not breathing spontaneously. His pupils are mid-position, fixed. Corneal reflexes are absent.

Study Questions:
1. What are the criteria for brain death?
2. Which criteria does this patient meet in the emergency room?
3. What is the most likely etiology of loss of brainstem function in this patient?

Part B
An 18 year old male presents to the trauma bay with a self-inflicted gunshot wound to the head. A CT scan shows a transtentorial trajectory, and the neurosurgeon deem this a non-survivable injury. He is transferred to the SICU.

Study Questions:
1. What is Pennsylvania Act 102?
2. What potential medical problems may occur while awaiting the determination of brain death?
3. If the patient does not progress to brain death, or expires prior to the determination of brain death, what options regarding donation remain available to the family?
**Thyroid**

**PROBLEM 36**
A 25 year old asymptomatic woman on routine physical examination is referred to a surgeon with a firm 1 cm nodule in the lower neck just to the right of the midline. It was nontender and moved up and down with swallowing.

Study Questions:
1. What is important in the history of patients with a neck mass as described above?
2. What investigations would you carry out to determine the nature of this nodule?
3. If a biopsy reveals medullary carcinoma of the thyroid (MCT), what are the genetic implications of this diagnosis? What further investigations would you order?
4. What is the treatment of MCT and the prognosis?
5. You suggest that her sister come for a neck examination and you find a nodule in the lower pole of the left lobe of the thyroid. A biopsy reveals a mixed papillary and follicular histological pattern. What are the implications of this finding? What are the options and rationale for treatment? What is the prognosis?

**PROBLEM 37**
A young woman presents with complaints of palpitations, insomnia, weight loss and irritability. She further reveals heat intolerance and increased swelling. Physical examination reveals hand tremor, a pulse of 110, and a smoothly enlarged thyroid. Her T4 level is twice normal.

Study Questions:
1. What is the differential diagnosis of the patient's condition?
2. What investigations would you order to determine the cause of the patient's problem?
3. What are the options in treatment for each of these diagnoses and the advantages and disadvantages for each?
4. What is thyroid storm? What are the clinical features? How would you treat the problem?
5. How would you prepare a patient with hyperthyroidism for surgery?

**Parathyroid**

**PROBLEM 38**

A 50 year old woman is admitted with renal colic and investigation reveals hypercalcemia.

Study Questions:
1. Describe the work-up for a patient with hypercalcemia.
2. What are the dangers of hypercalcemia and how would you treat the problems?
PROBLEM 39

A 35 year old man has blood chemistries drawn at the time of a yearly physical examination. His calcium was noted to be elevated and a parathyroid hormone level is increased.

Study Questions:
1. Differentiate between primary, secondary and tertiary hyperparathyroidism.
2. What is the difference between parathyroid adenoma and hyperplasia and how may this affect the surgical treatment?
3. What calcium management orders would you write for a patient who has had parathyroid surgery and why?

PROBLEM 40

A 30 year old woman with hypercalcemia is referred to you. She has a very high PTH level. The serum phosphatase level is decreased. The patient’s mother had parathyroid surgery for hypercalcemia.

Study Questions:
1. Is the familial history important in your work-up for the patient and why?
2. What type of work-up would you plan for this patient?

Esophagus

PROBLEM 41

A 69 year old man presents who has difficulty swallowing solid foods, some substernal discomfort and a 15 pound weight loss. All of these symptoms have been present for six weeks. His physician is most concerned that these symptoms are secondary to esophageal carcinoma.

Study Questions:
1. What benign and malignant diseases could produce these symptoms?
2. What diagnostic study(ies) will differentiate between these possibilities? Which would you order first?
3. If the diagnosis is cancer, what types are possible? What is the prognosis for each?
4. Based upon type, what are the therapeutic options available for esophageal carcinoma?
PROBLEM 42

A 46 year old woman is seen with a history of hiatus hernia and esophageal reflux treated medically 1 year ago with relief of symptoms. Over the year she gained 20 pounds and over the past several weeks has noted a return of symptoms.

Study Questions:
1. What are the common symptoms of esophageal reflux? What is the etiology of these symptoms?
2. How does esophageal reflux relate to hiatus hernia?
3. What types of hiatus hernia are there?
4. How is the diagnosis of reflux esophagitis confirmed? How is the diagnosis of hiatus hernia confirmed?
5. What are the treatment options for esophageal reflux?

PROBLEM 43

A 75 year old man complains of severe halitosis and the regurgitation of undigested food hours after eating. He has had this problem progress over the past two years and over the past six months has lost 10 pounds.

Study Questions:
1. What is the differential diagnosis for this disease progress?
2. What diagnostic test(s) would you perform to determine the diagnosis?
3. What is the most likely diagnosis and where can this type of condition occur in the esophagus?
4. What is the management of this condition and similar disease elsewhere in the esophagus?

PROBLEM 44

A 24 year old woman, who is highly anxious, visits your office with her mother. The mother states that her daughter has had considerable difficulty swallowing both liquids and solids resulting in a drop in weight from 120 to 105 pounds in six months. Neither substance seems to pass easily from mouth to stomach. They visited another doctor who prescribed "nerve pills" without relief.

Study Questions:
1. What is the differential diagnosis of this complaint?
2. What manometric and/or radiographic and/or endoscopic methods would you use to distinguish the etiology?
Breast

PROBLEM 45

A 40 year old woman with no family history of breast disease comes to your office with a complaint of a left breast mass of one month duration. She has regular periods, and no change in the mass was noted through one menstrual cycle. The mass is located in the upper outer quadrant of the left breast. It is smooth, non-tender with no skin retraction, no fixation to the chest wall, and the axilla is negative.

Study Questions:
1. What is the differential diagnosis for this mass? What is the most likely diagnosis?
2. What is the most likely diagnosis in a 20 year old woman? In a 65 year old?
3. What are risk factors for development of benign breast disease?
4. What are risk factors for development of malignant breast disease?
5. What diagnostic tests besides physical exam would you consider to help evaluate this mass?

PROBLEM 46

A 35 year old woman with a previously removed fibroadenoma of the right breast comes to your office complaining of a similar-feeling mass in the left breast. The referring physician did a needle aspiration which revealed no fluid and non-diagnostic material on cytologic examination. Physical exam reveals a rubbery, freely mobile 1-cm mass just to the left of the areola in the left breast. The mass is nontender.

Study Question:
1. What is the recommended treatment of this mass?

PROBLEM 47

A 48 year old woman with irregular menses has noted a painful mass in the upper outer quadrant of the right breast which is particularly painful during her periods. On physical exam there is a tender 3-cm mass which is not fixed to the chest wall.

Study Question:
1. What is the recommended management of this mass?

PROBLEM 48

A 70 year old woman with a 2-cm mass in the right breast of three months duration has a needle aspiration cytology positive for malignant cells.

Study Questions:
1. What are the types of breast cancer that this patient might have?
2. What features of the physical examination and surgical specimen determine the clinical and pathological stage, respectively?
3. For stages 1 and 2 what are the options for therapy?
4. What is the rationale for the use of radiation and/or hormonal, and/or chemotherapy in breast cancer?
5. What is the expected survival and recurrence rates for treated stage 1 and stage 2 disease?
PROBLEM 49

An 80 year old woman with a breast mass of undetermined duration is brought to your office because of a foul-smelling growth in the left breast. Examination reveals a necrotic 6-cm mass in the left breast with a foul-smelling exudate. The mass is fixed to the chest wall and is an obvious malignancy. The left axilla contains a 3 to 4 cm mass of matted lymph nodes.

Study Questions:
1. What is the clinical stage of this disease?
2. What is the risk of distant disease?
3. What would be your evaluation for distant disease?
4. If there is no evidence of distant disease what would be your treatment recommendation?
5. If there is evidence of distant disease what would be your treatment recommendation?

Biliary Tract

A 19 year old woman presents with history of intermittent epigastric and right upper quadrant pain which occurs about 15 minutes after eating and lasts for one to two hours. This pain has been happening for about one month, two to three times a week, especially after eating french fries. She is 5 ft. 4 inches tall and weighs 130 pounds. She has never been pregnant and is currently taking birth control pills. Physical examination is normal. An ultrasound of the gallbladder demonstrates multiple small stones.

Study Questions:
1. What types of gallstones can be formed? Which type is most likely in this patient?
2. What factors predispose to the formation of gallstones?
3. What is the pathophysiology of biliary colic? What differentiates it from chronic and acute cholecystitis? What are the presenting symptoms, physical examination, and laboratory findings for each? Which one does this patient have?
4. What are the treatment options for biliary colic, chronic and acute cholecystitis?
5. What complications of gallstones might develop in this young female if the gallbladder is not removed?

PROBLEM 51

A 36 year old woman presents to the emergency room with a history of right upper quadrant pain, shaking chills, and jaundice. This pain came on suddenly six hours earlier and has been progressing. She took her temperature at home and it was 102. She vomited once at the onset of the pain. She has had intermittent episodes of epigastric and right upper quadrant pain after eating for the past six months. The pain always abated after thirty to sixty minutes. Her blood pressure is 110/60, her pulse 110, and her temperature 39 in the emergency room.

Study Questions:
1. How is extra-hepatic obstructive jaundice differentiated from other etiologies?
2. What are the etiologies of obstructive jaundice?
3. What tests would you use to differentiate etiologies of obstructive jaundice?
4. Which etiology is most likely in this case? What are the treatment priorities and management options for this case?
PROBLEM 52

A 74 year old woman presents with a complaint of jaundice which her husband noticed two days before. She has had no specific pain but has noted post prandial epigastric discomfort which has not responded to antacids. She has lost 20 pounds over the past three months, but is on a diet. Physical exam reveals an obviously icteric woman with a non-tender globular mass in the right upper quadrant.

Study Questions:
1. How is extra-hepatic obstructive jaundice differentiated from other etiologies?
2. What are the etiologies of obstructive jaundice?
3. What tests would you use to differentiate etiologies of obstructive jaundice?
4. Which etiology is most likely in this case? What are the treatment priorities and management options for this case?

Pancreas

PROBLEM 53

A 44 year old woman who weighs 160 pounds and has four children comes to the emergency room complaining of severe epigastric pain, which has lasted for three hours and radiates straight to the back. The pain began suddenly, but was less severe at the beginning. She has vomited clear material three times. She drank five to six mixed drinks earlier, with the last drink about two hours before the pain began. She has been on a diet and has been told that she has elevated fat in her blood but has not taken any medicines. Her 38 year old sister had her gallbladder removed. Physical exam reveals a pulse of 110, blood pressure of 120/70, respirations 16 and temp of 38.3. Her abdomen is distended in the epigastrium, bowel sounds are hypoactive, she has percussion tenderness, involuntary guarding, and referred tenderness in the epigastrium. A flat and upright abdomen x-ray reveals a dilated transverse colon with no free air. Her hemoglobin is 15, her WBC 15,000. Her serum amylase is 2,000. She is admitted with a diagnosis of acute pancreatitis.

Study Questions:
1. What are the best possible etiologies of acute pancreatitis in this patient? Which is most likely? What test(s) would you perform to assess etiology?
2. What are less common etiologies of pancreatitis?
3. How would you assess the severity of this patient's disease?
4. What would be your initial management?
5. If this case proves to be severe, what early complications (first 3 days) might develop? What complications might develop 7-10 days after admission?
**PROBLEM 54**

A 50 year old male alcoholic presents to your office with chronic, nagging epigastric pain. It has been recurrent several times within the last decade. He denies hematemesis, diarrhea or jaundice, but admits to weight loss (about 20 pounds in the last six months) and continuing alcohol intake. Flat plate of the abdomen reveals pancreatic calcifications. White count and amylase are normal.

**Study Questions:**
1. What types of pancreatic condition does this patient exhibit?
2. What is the cause?
3. What are the adverse sequelae of this disease?
4. Which of these can be treated with surgery?
5. What additional information about the pancreas is needed to assess possible surgical intervention?
6. What are indications for resection?
7. What are indications for decompression?

**PROBLEM 55**

A 35 year old male alcoholic is seven days into an episode of moderately severe pancreatitis (four Ranson's criteria). His fluid sequestration has resolved and his serum amylase has fallen from 1000 on admission to 250 on day 7 (normal up to 200). His nasogastric tube drains 750 to 1000 cc per day. He has a low grade temperature (38), a pulse of 100, and fullness in the epigastrium which is slightly tender. The severe epigastric pain and peritonitis present on admission have disappeared. The rest of his abdomen is soft with normoactive bowel sounds present. His WBC has fallen from 15,000 on admission to 10,000. An abdominal CT scan shows better definition of the pancreas compared to the CT on admission with an apparent fluid collection in the lesser sac.

**Study Questions:**
1. What is the differential diagnosis of this fluid collection?
2. How would you differentiate between diagnoses?
3. Which diagnosis do you favor?
4. How does such a disease process develop?
5. What is the natural history of this disease if left untreated?
6. What are the management options for this disease?
PROBLEM 56

A 40 year old female alcoholic with known chronic pancreatitis and pain treated with intermittent courses of narcotics comes to your office complaining of increased pain and a tender fullness in her left upper quadrant which has been present for about a week. Her appetite is diminished and she complains of early satiety. She has lost 15 pounds over the last month. She is afebrile with a pulse of 80 and blood pressure 120/80. Her abdominal exam reveals a mass about 5 cm in diameter in the left upper quadrant which is slightly tender. Her WBC is 7000, her hemoglobin 12.

Study Questions:
1. What is the differential diagnosis of this mass?
2. What test(s) would you order to determine a specific diagnosis?
3. Which diagnosis do you favor?
4. How does this disease develop?
5. What is the natural history of this disease in this patient?
6. What therapeutic option would you recommend?

PROBLEM 57

A 65 year old retired executive presents with jaundice, epigastric pain, mid-back pain and weight loss. Physical exam demonstrates obvious jaundice and a globular mass in the right upper quadrant.

Study Questions:
1. What is the differential diagnosis of jaundice in this patient?
2. What test(s) would you order to determine a specific diagnosis?
3. Which diagnosis do you favor?
4. What is the role of surgery for that disease?
5. What is the prognosis for that disease?

Spleen

PROBLEM 58

A 27 year old woman was involved in a motor vehicle accident; she was driving the vehicle and was not wearing her seatbelt. On arrival to the emergency department, she is mildly disoriented, her blood pressure is 120/60 mm Hg, and her heart rate is 100 per minute. She has alcohol on her breath. Physical examination reveals ecchymosis and tenderness in the left lower chest area. Her abdomen is non-tender. Chest x-ray shows 7th, 8th and 9th rib fractures on the left.

Study Questions:
1. What is the likelihood of a splenic injury in this case?
2. What are the initial management steps in the care of a potential splenic injury in a multiple trauma patient?
3. What is the relative value of diagnostic peritoneal lavage versus abdominal CT scan in the diagnostic evaluation of splenic trauma?
4. What factors play a role in the decision to manage a splenic injury non-operatively?
5. What types of splenic injuries can be surgically repaired, without performing a splenectomy?
6. What precautions should be taken, in children and adults to prevent postsplenectomy sepsis?
PROBLEM 59

A 24 year old man sees an internist for complaints of fatigue and jaundice. He has noted intermittent right upper quadrant pain, usually after eating fatty foods. His urine turned dark three days ago. He has no pain or fever at present. On physical examination there is scleral icterus and his spleen is noted to be enlarged enough to feel just below the costal margin. His hemoglobin is 8.0 and white blood count 7,000. The platelet count is 170,000.

Study Questions:
1. What is the differential diagnosis of anemia and splenomegaly in this patient?
2. What further information from history, physical examination, and laboratory tests would you obtain?
3. Which diagnosis is most likely?
4. What is the management of this condition?

PROBLEM 60

An otherwise healthy 35 year old woman presents to her gynecologist for increased menstrual bleeding. On review of systems, she also notes easy bruising. On physical examination, her uterus and ovaries feel normal, but her gynecologist notices petechiae on her legs and arms. She is not pregnant. Her hemoglobin is 11 and her platelet count is 20,000. Her prothrombin time and partial thromboplastic time are normal.

Study Questions:
1. What is the differential diagnosis of thrombocytopenia in this patient?
2. What information from history, physical examination, and other laboratory tests would you use to select a diagnosis?
3. What is the most likely diagnosis in this patient and why?
4. What is the management of this condition (For this patient specifically, and in general)?

PROBLEM 61

A 65 year old man sees his internist for complaints of fatigue, weakness, and increasing abdominal size. On physical examination his spleen is markedly enlarged, extending to the left iliac crest. His liver is palpated two fingerbreadths below the costal margin. His hemoglobin is 9.9, white blood count 4,500, and his platelet count is 100,000.

Study Questions:
1. What is the differential diagnosis of splenomegaly in this patient?
2. What information from history, physical examination, and other laboratory tests would you use to select a diagnosis?
3. What is the most likely diagnosis in this patient and why?
4. What is the management of this condition?
Abdominal Wall

**PROBLEM 62**
A 25 year old man presents to your office complaining of an intermittent bulge in his right groin. It is not present all the time, but is most noticeable and sore at the end of the day.

**Study Questions:**
1. What is the differential diagnosis of this patient’s chief complaint?
2. What other history is important to elicit from this patient?
3. On physical examination, a finger placed through the upper scrotum into the external ring palpates a bulge with Valsalva maneuver. What is the most likely diagnosis?
4. At the time of surgery the patient is noted to have a bulge through a weakness in Hesselbach's triangle. Define Hesselbach's triangle. Is this a direct or indirect hernia? Compare and contrast direct and indirect hernias.
5. What are your operative options for repair of this hernia defect?

**PROBLEM 63**
An 80 year old woman presents to the emergency room with a three-day history of intermittent abdominal distension and vomiting. On physical exam she appears slightly dehydrated. Her abdomen is distended and tympanic to percussion but without evidence of peritonitis. A bulge is noted in the right groin, slightly inferior to the inguinal ligament.

**Study Questions:**
1. What is your diagnosis?
2. What is the preoperative workup and preparation needed for this patient?
3. What other complications of hernias are possible?

**PROBLEM 64**
You perform surgery for a perforated duodenal ulcer in a 70 year old man who has a history of steroid-dependent chronic obstructive pulmonary disease. Postoperatively, he develops an infection of his upper midline abdominal incision. After the wound is fully healed, the patient presents back to your office several months later with complaints of a bulge at the incision site.

**Study Questions:**
1. What is the differential diagnosis, and what is the most likely diagnosis in this patient?
2. What risk factors contribute to the development of this diagnosis (in this patient specifically, and in general)?
3. What are the indications for surgical intervention? How can you minimize risk factors for recurrence after the repair?
PROBLEM 65

A woman brings her two month old infant to your office with complaint of a umbilical hernia. The child is otherwise healthy. On physical examination you find a 1 x 1 cm bulge at the umbilicus. This is easily reducible and you palpate a fascial defect the size of your small finger.

Study Questions:
1. What treatment is indicated?
2. How would the etiology, history, and treatment differ if this were an adult?

Acute Abdomen

PROBLEM 66

Patient A:
A 44 year old woman comes to the emergency room with a complaint of upper abdominal pain of four hours duration. The pain came on 30 minutes after eating a hamburger and french fries. She vomited once at the beginning of the pain and at present still has nausea. The pain has been gradually getting worse, yet has periods when it seems to subside, but not disappear. She points to the entire upper abdomen to describe the location of the pain. The region of her right shoulder blade hurts. She cannot seem to find a comfortable position and is continuously moving.

Patient B:
A 50 year old male alcoholic was drinking whiskey this morning when he developed upper abdominal pain. He vomited the alcohol and could not drink anything further. The pain increased steadily with no periods of relief. The pain is most severe in one spot, high in the epigastrium. The pain travels through to his back and he feels better when sitting up and leaning forward. Otherwise, he does not want to move.

Study Questions:
1. What patterns of pain differentiate visceral from somatic abdominal pain? Which do these patients exhibit?
2. What innervation is responsible for transmitting visceral and somatic abdominal pain?
3. Which type of pain is characteristic of peritonitis?
PROBLEM 67

Patient A:
A 70 year old man with a complaint of left lower quadrant pain exhibits the following physical examination: Blood pressure 120/80, pulse 100, temperature 38.5°C, respirations 16. He is lying still with his left leg flexed at the hip. He is silent. Inspection of the abdomen reveals lower abdominal distention with no masses and no scars. Auscultation reveals diminished bowel sounds. Percussion is tender in the left lower quadrant. Palpation demonstrates involuntary guarding in the left lower quadrant. Palpation in the right lower quadrant produces discomfort in the left lower quadrant. Rectal exam is tender on the left with stool hemetest negative.

Patient B:
A 55 year old woman who complains of abdominal pain and vomiting exhibits the following physical examination: blood pressure is 120/70, pulse is 90, temperature 37°C, respirations 12. She sits up, then lays down, then moves on one side, then the other. She periodically moans with increased pain, then seems relieved. Inspection reveals diffuse abdominal distention with a scar in her lower midline. Auscultation reveals hyperactive bowel sounds. Percussion demonstrates tympany throughout with no tenderness. Palpation reveals diffuse voluntary guarding. Rectal exam is non-tender, there is no stool in the vault.

Study Questions:
1. What are the physical findings which differentiate visceral from somatic abdominal pain? Which do these patients exhibit?
2. What diagnostic evaluation would you use to differentiate between the possibilities?

PROBLEM 68

A 55 year old man who is in general good health arrives by ambulance with a complaint of severe, progressing abdominal pain which came on suddenly three hours earlier. His blood pressure is 90/50, pulse 130, temperature 38°C, respirations 16. His physical examination reveals abdominal distention, no bowel sounds, and involuntary guarding throughout, a "board-like abdomen." An upright chest x-ray reveals free air under the diaphragm.

Study Question:
1. What are the management priorities for this patient?
Gastrointestinal Hemorrhage

PROBLEM 69

A 64 year old man presents to the emergency room complaining of having passed a cup of blood per rectum into the toilet. He has had no pain, but was frightened by the blood. He denies previous bleeding but has a history of hemorrhoids. His medical history is significant for stable angina for which he takes an occasional nitroglycerin and chronic obstructive lung disease for which he uses an inhaler.

Study Questions:
1. What are hematochezia, melena, and hemetest positive stools and what is the significance of each?
2. What does this patient have?
3. What is the differential diagnosis for this patient?
4. What is most likely?
5. What is your plan of action? Be specific about the order in which you will proceed.
6. What would be the indications for operative intervention in this man's case?

PROBLEM 70

You find hemetest positive stool in a 57 year old man during his yearly office visit. The prostate was smooth and slightly enlarged. No mass was palpated in the rectum. He had smoked for 40 years, but stopped three years ago because of progressing COPD. He currently uses theophylline and inhalers. Twice in the past year he has required steroids for exacerbations of bronchospasm. He is on quinidine for a supraventricular arrhythmias. He has been depressed since losing his wife to cancer eight months ago.

Study Questions:
1. What is the differential diagnosis for the occult blood?
2. Which is most likely?
3. What would be your sequence of evaluation?

PROBLEM 71

A 45 year old Native American woman presents with her first episode of hematemesis. At the Indian Health Service Hospital she is noted to have a blood pressure of 80/40 and a pulse of 120. After initial irrigation of blood and clots, nasogastric tube drainage continues to demonstrate active bleeding. She is transferred 30 miles to your hospital because of the acuteness and severity of her illness. Upon arrival to your emergency room, her blood pressure and pulse are still 80/40 and 120, respectively, despite the administration of two units of packed cells during transfer.

Study Questions:
1. What are the management priorities for this patient?
2. What questions would you ask this patient?
3. What physical examination findings would you search for?
4. What is the differential diagnosis?
5. What diagnostic study(ies) would you order?
6. What are the therapeutic options for each common etiology of major upper intestinal hemorrhage?
7. What are the indications for surgical intervention for each of these etiologies?
Stomach and Duodenum

PROBLEM 72
A 40 year old male business executive, with a history of ethanol consumption consisting of one mixed drink a day, and two pack-per-day smoking habit, presents to your office with a history of intermittent epigastric pain. The pain is burning in character, usually occurs three to four hours after eating and is relieved by food intake. The physical examination is normal. Workup includes an upper GI series which reveals a duodenal ulcer. You institute therapy on this patient. He does not come back for his scheduled appointment in two weeks, but instead presents three weeks later to the emergency room with hematemesis. His blood pressure is 110/70 with a pulse of 100 lying down. This changes to 90/50 and 130 when sitting and he complains of being lightheaded.

Study Questions:
1. Discuss the initial treatment and further workup you would undertake at this point. If his bleeding continues despite medical management, what are the surgical options?

PROBLEM 73
A 70 year old woman presents to your office with a history of weight loss, decreased appetite and epigastric discomfort. Examination reveals her to be thin but ne cachectic and the stools to be positive for occult blood. An upper GI series reveals a gastric ulcer on the greater curvature.

Study Questions:
1. What further workup is indicated for this patient?
2. How do the pathophysiology and symptoms of gastric ulcer differ from a duodenal ulcer?
3. What is the relative risk of malignancy for a duodenal versus a gastric ulceration?
4. Does the exact location of the gastric ulcer have any significance?
5. What are the possible histologic types of gastric malignancy and how do they differ in terms of epidemiology, risk factors, diagnosis, treatment and prognosis?

PROBLEM 74
A 70 year old woman presents to your office with a history of weight loss, decreased appetite and epigastric discomfort. Examination reveals her to be thin but not cachectic and the stools to be positive for occult blood. An upper GI series reveals a gastric ulcer on the greater curvature. Upper endoscopy reveals an ulcer with an irregular border. Biopsies are positive for adenocarcinoma.

Study Questions:
1. What conditions predispose to the development of gastric carcinoma?
2. How would you proceed to stage this lesion?
3. What are the curative and palliative treatment options for different stages of this disease?
PROBLEM 75

A 30 year old woman comes to your office complaining of epigastric pain and vomiting which have been present for six months. Food relieves some of the discomfort. She underwent an upper GI series three months ago which demonstrated a large duodenal ulcer and accentuated rugal folds. Therapy with cimetidine and ranitidine have not relieved the symptoms. She has lost 15 pounds in the last month and has loose bowel movements three times a day. There has been no blood in the bowel movements or black stools. Physical examination demonstrates a thin female with mild tenderness to palpation in the epigastrium. Stool is negative for occult blood.

Study Questions:
1. What is the differential diagnosis of persistent duodenal ulcer disease?
2. What would be your method of evaluation of this patient?
3. Which diagnosis is most likely?

PROBLEM 76

A 60 year old male diabetic on dialysis for chronic renal failure develops severe, sudden epigastric pain while on dialysis. His blood pressure drops from 110/80 to 90/60 and his pulse increases to 120 from 90. Dialysis is stopped and he is given 1000 cc of normal saline with increase in blood pressure to 120 systolic and pulse decrease to 100. He refuses to move and wants to stay flat in bed. Physical exam reveals mild distention, absent bowel sounds, and diffuse involuntary guarding. A flat plate x-ray of the abdomen is unremarkable. A left side down lateral decubitus x-ray demonstrates free air over the liver.

Study Questions:
1. What is the differential diagnosis for this man's sudden intra-abdominal process?
2. Which is most likely?
3. What is your recommended management for your diagnosis?

Small Intestine and Appendix

PROBLEM 77

A 22 year old woman presents with a two-day history of increasingly severe abdominal pain. The pain began in the periumbilical region, and after 24 hours migrated to the right lower quadrant where it has remained. She has vomited three times and has had a poor appetite. Bowel movements are normal. There are no urinary symptoms. Her last menstrual period was two weeks ago. She is sexually active, and she has noted a foul-smelling vaginal discharge during the past week.

On physical examination, the patient has a temperature of 101°F and is in moderate abdominal stress. There is significant guarding and tenderness in the right lower quadrant, and slight tenderness without guarding in the left lower quadrant. On bimanual vaginal examination there is mild tenderness on motion of cervix; no adnexal masses are palpable.

Study Questions:
1. What is your differential diagnosis?
2. If this patient had never had sexual intercourse, how would that change your differential diagnosis?
3. Which laboratory and imaging studies (if any) would be useful?
PROBLEM 78

A five year old boy presents with abdominal pain of four days duration. Three days ago his parents took him to his pediatrician because he had a fever of 102°F, was complaining of a "bellyache," and was vomiting. The parents were told that the boy probably had gastroenteritis, that he should be given a clear liquid diet and that the symptoms would resolve. Instead, the boy has become increasingly ill with worse abdominal pain. He continues to vomit and his temperature has reached 104°F. On examination, the child appears to be dehydrated and he lies on his side quite still with his knees drawn up. The abdomen is distended, with a diffuse guarding and tenderness. Rectal examination reveals tenderness and fullness anteriorly. A surgeon is consulted and takes the child to the operating room with a preoperative diagnosis of perforated appendicitis.

Study Questions:
1. What is the differential diagnosis of the child's abdominal problem?
2. If it is perforated appendicitis, what will be the definitive treatment for this child's condition?
3. Why does appendicitis so frequently perforate in this age group?
4. What is the usual pattern of temperature elevation in patients with non-perforated and perforated appendicitis? If perforated appendicitis is found, what are the more frequent postoperative complications for which this patient is at risk?

PROBLEM 79

A 14 year old boy presents with a two-day history of suprapubic and right lower quadrant pain. He has localized guarding and tenderness, and surgery is performed for suspected appendicitis. At operation the appendix appears to be normal, but an acutely inflamed Meckel's diverticulum is noted.

Study Questions:
1. If the appendix appears normal during a laparotomy for presumed appendicitis, where should one look for a possible Meckel's diverticulum?
2. Are there any signs or symptoms of Meckel's diverticulitis that can readily differentiate it preoperatively from appendicitis?
3. What is the etiology of a Meckel's diverticulum? What are the different types and how do their presentations differ?
4. Following the resection for the inflamed Meckel's diverticulum, should one also remove the normal appendix?
PROBLEM 80

A 54 year old man is admitted to the hospital because of crampy abdominal pain and bilious vomiting that has lasted for three days. He has not had a bowel movement or flatus for two days. Ten years ago he had an appendectomy for a perforated appendicitis, with no postoperative complications. Physical examination reveals a pulse of 100, blood pressure of 110/60, temperature 37.5°C. His abdomen is distended with tympany throughout. There is no abdominal tenderness to palpation. His hemoglobin is 15.4, WBC 10,000.

Study Questions:
1. What is the most likely diagnosis and what is the likely etiology for this patient's current condition?
2. How would your answer to question #1 be altered if this individual had never had any previous abdominal surgery?
3. Which signs and symptoms, if present, would be ominous indications that the patient needed urgent operative treatment?
4. Which diagnostic laboratory tests are indicated? Which imaging study should be initially obtained to confirm your clinical diagnosis?
5. Discuss your immediate and subsequent management of this patient. Is more than one treatment option available?

Colon and Rectum

PROBLEM 81

A 65 year old man presents to the emergency room with a five-day history of left lower quadrant pain and a 24 hour history of fever. He has a long history of constipation for which he occasionally takes a laxative. He has not had any recent change in his bowel habits. He saw his private MD three days ago and was started on an unknown antibiotic, taken orally. On physical examination his temperature is 38.5°C, heart rate is 78, blood pressure is 145/85. He is moderately tender in the left lower quadrant but has no peritoneal signs. WBC count is 14,500 with five bands.

Study Questions:
1. What is the differential diagnosis? What is the most likely diagnosis in this man?
2. What kind of diagnostic studies would you order?

PROBLEM 82

A 55 year old obese man with known diverticular disease presents to the emergency room complaining of severe left lower quadrant pain of four hours duration. Prior to the severe pain he had crampy, poorly localized lower abdominal pain and nausea. His temperature is 38.5°C, his pulse 100 bpm, his blood pressure 120/70 mmHg. He abdomen is distended and tympanic. He has pain on percussion and involuntary guarding in the left lower quadrant. Rectal exam reveals hemoccult negative stool and tenderness on the left. His WBC is 15,000, hemoglobin is 13, platelet count is 87,000.

Study Questions:
1. What characteristics of this patient’s presentation are concerning?
2. Which complication(s) of diverticular disease is most likely in this patient?
3. What is the next best diagnostic test for this patient?
4. Based on this patient’s presentation, what is the most likely preferred treatment?
5. If instead he presented with diffuse peritonitis, a HR of 120bpm and a BP of 97/54, what might be the best treatment?
PROBLEM 83

A 60 year old woman presents to the emergency room complaining of the sudden onset of painless bright red blood per rectum which has occurred three times in two hours and is associated with feeling faint when standing. She has no previous significant medical or surgical history and is not taking aspirin or anticoagulants. Physical exam reveals a pulse of 110 bpm supine with a blood pressure of 100/60 mmHg. These change to a pulse rate of 130 bpm and a blood pressure of 90/50 mmHg when sitting. Her temperature is 37°C. On physical examination, her abdomen is non-tender, non-distended, and not tympanic. Rectal exam demonstrates frank blood with clots with no obvious hemorrhoidal disease.

Study Questions:
1. What are the next best steps in treatment of this patient?
2. What is the differential diagnosis for massive rectal bleeding?
3. What is the most likely etiology in this patient?
4. What diagnostic procedures would you recommend and in which order?

PROBLEM 84

A 72 year old man presents to your office for a routine physical. On physical examination you find guaiac positive stool but are unable to feel any masses. He has no history of ulcer disease.

Study Questions:
1. What are some important questions to ask this patient? How would you proceed to evaluate his guaiac positive stools?
2. What is the differential diagnosis for guaiac positive stools?
3. What diagnostic test(s) would you recommend?

PROBLEM 85

A 65 year old man has a complaint of crampy lower abdominal pain and constipation. His physician finds hemoccult positive stool with no rectal mass and recommends a colonoscopy. At colonoscopy a large, friable mass partially obstructing the sigmoid colon at 35 cm is biopsied and is positive for adenocarcinoma. No other colonic lesions are noted.

Study Questions:
1. What preoperative tests would you order as part of the work-up of this patient?
2. What are the stages of colon cancer and how do these relate to prognosis and treatment?
3. How might this patient’s presentation be different if he had a right colon carcinoma?
4. If this patient was found to have no other lesions, what are the operative treatment choices for this patient?
5. How would you follow this patient postoperatively after resection of a colon cancer?
PROBLEM 86

Ulcerative Colitis and Crohn's Disease of the Colon
A 45 year old woman has just moved to town and has an 18 year history of "colitis". She comes to your office because she's been told that she needs close follow-up. She does not know if she has Crohn's colitis or ulcerative colitis, but she is fairly sure it is one of the two. She complains of two to three loose bowel movements per day that occasionally contain mucous and/or blood. Her medical history is otherwise negative.

Study Questions:
1. What points in her history might help you distinguish what type of colitis she has?
2. Which diagnostic tests would you get to help distinguish which type of colitis she has? How do the radiographic and pathologic findings differ?
3. What is the risk of cancer in ulcerative colitis? In Crohn's Disease?
4. What is the role of surgery in these two diseases?
5. Are there any medical therapies for either of these diseases? If so what are they?

PROBLEM 87

A 95 year old woman is sent to the emergency room from a nursing home with complaints of abdominal pain and distention. It is unclear, but staff at nursing home think it has been about four days since she had a bowel movement. On examination, the woman has an expressive aphasia and a right hemiparesis from a previous stroke. Her vital signs are pulse 90, blood pressure 120/80, and she is afebrile. Her abdomen is markedly distended with hyperactive bowel sounds and tympany throughout. There is no abdominal tenderness. Rectal exam reveals large quantities of soft, brown, guaiac negative stool. KUB and upright reveal marked dilated colon consistent with obstruction.

Study Questions:
1. What is the differential diagnosis of a large bowel obstruction?
2. What test(s) would you employ to determine a specific diagnosis?
3. Where can a volvulus develop and why? What would you see on abdominal x-rays if this patient had a volvulus?
4. What are the treatment options for a patient with volvulus (either type)?
5. What are the potential complications of a patient with large bowel obstruction if left untreated?
PROBLEM 88

A 21 year old man complains of severe pain in his anal area, especially after a bowel movement. He reports no history of trauma or anal intercourse. He has no history of fever. He is otherwise healthy.

Study Questions:
1. What is the differential diagnosis of painful defecation? What should you look for when examining this patient?
2. Is anoscopy indicated in this patient? What are your diagnostic options if you can't determine the etiology of his pain?
3. How do perianal abscesses form? How does a fistula-in-ano form? What symptoms and history might the patient have if he had a perianal abscess, a fistula-in-ano?
4. What causes a perianal fissure? How is it treated?
5. What are your diagnostic options if you can't determine the etiology of his pain?
6. What is the treatment for a perianal abscess? For a fistula?

PROBLEM 89

A 65 year old man, in previous good health, has undergone an uneventful sigmoid resection for colon carcinoma. During the operation his blood pressure fell into the 90's systolic despite only 250 cc of blood loss, and he required five liters of crystalloid to maintain a systolic pressure above 100 and a urine output of 50 cc per hour. During the first 18 hours after surgery he has required an additional 8 liters of fluid. His temperature is 38.8 the morning after surgery. After this eighteen hour period his hemoglobin is 12.2 (13.5 pre op), his sodium is 130, potassium 5.5., chloride 105, PCO₂ 24. His WBC is 14,000 with 65 polys, 10 bands, 15 lymphs, and 10 eosinophils.

Study Questions:
1. What is the differential diagnosis for this man's large intraoperative and immediately postoperative fluid requirements?
2. How would you differentiate the possibilities?
3. Which is most likely?
4. How would you manage your most likely diagnosis?
PROBLEM 90

A 24 year old man with a three year history of Crohn's disease of the terminal ileum comes to the hospital complaining of nausea, vomiting, and diarrhea of three days duration. He had been exposed to friends with a viral gastroenteritis seven days earlier. His symptoms of Crohn's disease has been crampy abdominal pain and loose bowel movements for which he intermittently received up to 30 mg of prednisone a day. His last prednisone therapy was six months ago. At this time the diarrhea is more severe than his usual and he has felt lightheaded. His blood pressure is 90/60 sitting, 110/70 lying flat. Corresponding pulses are 120 and 105. His temperature is 38. His abdomen is slightly distended with hyperactive bowel sounds and is nontender. His hemoglobin is 15, WBC 12,000 with 75 polys 10 bands, 8 lymphs and 7 eosinophils. His serum sodium is 130, potassium 5.5, chloride 105, and pCO2 22. His BUN is 30 with a creatinine of 1.2.

Study Questions:
1. What are the management priorities for this patient?
2. What is your differential diagnosis for his illness?
3. How would you select a diagnosis?
4. Which is most likely?
5. How would you manage your most likely diagnosis?

PROBLEM 91

A 37 year old woman with a diagnosis of hypertension for one year treated with salt restriction comes to your office complaining of fatigue and weakness. Her menstrual bleeding has been increased for the last three months. Physical exam demonstrates a blood pressure of 150/90. Her BUN is 25 with a creatinine of 1.0 Her sodium if 140, potassium 2.7, chloride 100, and pCO236.

Study Questions:
1. What is your differential diagnosis of this patient's hypertension and fatigue?
2. Which is most likely?
3. How would you differentiate among the possibilities?
4. What is the management of the most likely diagnosis?

PROBLEM 92

A 16 year old woman is referred to you for a thyroid nodule discovered during a routine physical examination. Her mother died at age 38 of thyroid cancer. The patient has a blood pressure of 140/80. You perform needle aspiration cytology on the thyroid nodule which is consistent with medullary carcinoma.

Study Questions:
1. How would you further assess this young female's thyroid disease and hypertension?
2. How does the mother's history influence your evaluation?
3. What would be your recommended management of the medullary carcinoma?
Vascular System

PROBLEM 93
A 67 year old man presents in the ER with the sudden onset of severe back and abdominal pain and a syncopal episode. BP 100/60, P 110, R 24. Physical examination reveals a pale, disphorectic anxious man with a tender pulsatile abdominal mass.

Study Questions:
1. What are your preliminary differential diagnoses?
2. Describe your initial management of this patient -- diagnostic and therapeutic.
3. What is the definitive treatment for this condition?
4. Describe any differences, if any, in management if the patient was completely asymptomatic.
5. What are the major complications which may occur following operation for this condition?
6. Are there any other medical problems commonly associated with this condition?

PROBLEM 94
A 64 year old woman presents in the ER with a one-hour history of severe left leg pain and numbness. Examination shows a pale, cool leg without palpable pulses. The right leg is normal with palpable pulses.

Study Questions:
1. What are the possible causes of acute leg ischemia?
2. How would you establish the correct diagnosis?
3. What would be your initial treatment?
4. Discuss the alternatives of management for each of the diagnostic possibilities you have considered.

PROBLEM 95
A 44 year old lawyer is referred to you for a chronic ulcer over his right lateral malleolus. He is an obese, non insulin-dependent diabetic who smokes 1.5 packs of cigarettes per day. The ulcer has been present for six months and is painful, especially at night. He has a two year history of progressive calf, thigh and buttock claudication to the point that he can now walk only 200 yards before having to stop and rest.
Physical examination reveals an obese male in no distress. BP 180/100 in both arms. A left carotid and bilateral femoral bruits are noted. No peripheral pulses are palpable in the lower extremities below weak femorals. A 1.5 cm ulcer is present over the later malleolus of the right ankle.

Study Questions:
1. List your preliminary diagnoses.
2. What are your initial recommendations?
3. What further diagnostic studies are indicated?
4. What is the etiology of his malleolar ulcer?
5. What treatment would you recommend if further studies revealed: a) myocardial insufficiency, b) a tight left carotid stenosis, c) severe aorto-iliac occlusive disease with a 50% stenosis of the right renal artery, and d) diffuse femoral popliteal tibial occlusive disease without complete occlusion.
6. Discuss the initial and long-term management of his primary complaint.
7. What is the long-term prognosis for this patient? Can it be influenced by appropriate treatment?
PROBLEM 96

A 72 year old woman complains of a sudden episode of left-arm and left-hand weakness which lasted only a few minutes on the previous evening. She also reports several episodes of transient partial blindness in her right eye over the past few months. On physical examination she has bilateral carotid bruits. The remainder of her vascular examination and a careful neurologic examination are normal.

Study Questions:
1. What is the most probably diagnosis?
2. Describe the pathophysiology of the transient neurological and ocular episodes described above. What are they called?
3. List further diagnostic tests that are indicated.
4. What are the alternatives for treatment in this patient?
5. What are the long-term results of treatment?

PROBLEM 97

You are called to see 32 year old man who complains of the sudden onset of respiratory distress six days following open reduction and internal fixation of a right femoral and bilateral tibial fractures sustained in an auto accident. On examination the patient is cyanotic, dyspneic, tachypneic, and hypotensive with a BP of 90/60.

Study Questions:
1. What is your differential diagnosis of this acute episode?
2. How would you establish the diagnosis?
3. What would be your initial treatment?
4. Could this acute problem have been prevented? How?
5. What is the long-term management of this condition?
6. Are there any long-term sequelae of this condition? If so, how can they be prevented and/or treated?

PROBLEM 98

A 44 year old woman presents with a swollen ulcerated left leg. She has had a moderately swollen leg for many years following a knee injury. The ulcer began with an abrasion from a minor injury six months ago, which has progressed to a large infected ulcer measuring 8 x 15 cm over the lower medial aspect of the leg. In addition to the ulcer, there are numerous varicose veins in the left leg which is 5 cm greater in circumference compared to the right leg at both the ankle and calf level.

Study Questions:
1. List the possible causes of chronic unilateral leg edema and discuss the pathophysiology of this condition.
2. List the differential diagnoses of leg ulceration. What is the probable cause in this case?
3. Differentiate between primary and secondary varicose veins. What is the treatment for each?
4. What is your recommended management for this particular patient?
Transplantation

PROBLEM 99
A 48 year old woman with mild hypertension was in a motor vehicle accident and sustained chest wall contusion and a severe head injury. There are no abdominal or extremity injuries noted. The patient has been managed by the neurosurgical service with Mannitol, hyperventilation and fluid restriction. Heart rate is 118, blood pressure is 105/55, urine output has been > 200 cc per hour.

Study Questions:
1. What would be criteria for establishing brain death?
2. Which organs and tissues would be acceptable for donation in this patient?
3. What would be the management of this patient should she become an organ donor prior to taking her to the operating room?
4. Should this patient have a cardiac arrest, what organs and tissues would be available for donation?

PROBLEM 100
A 28 year old man comes to your office. He underwent an orthotopic liver transplant eight weeks prior, and has noticed a feeling of lethargy, joint aches, low-grade temperatures to 38.1°C, and has been eating normally. The patient is currently on Cyclosporin, Imuran and Medrol for immunosuppression. Labs on admission show a creatinine that has risen to 3.2, bilirubin that has risen from a baseline of 1.8 to 2.1, and a white count of 4.8.

Study Questions:
1. What is the differential diagnosis in this patient?
2. Which immunosuppressives would likely cause the abnormalities of laboratory tests noted above?
3. If your differential diagnosis included rejection:
4. How would you make this diagnosis?
5. What would be the pathological criteria to establish the diagnosis?
   a. If this is an acute rejection, what would be your therapy?
   b. If this was chronic rejection, what would be your therapy?

Soft Tissue

PROBLEM 101
A 72 year old man presents with a firm mass measuring 4 cm, located approximately 3 cm superior to the gluteal crease over the sacrum. Ten years previously, he had a colon carcinoma resected and then underwent a full course of radiation therapy to his pelvis.

Study Questions:
1. What is the differential diagnosis of this mass?
2. What method(s) of evaluation would you employ to determine the diagnosis?
3. What are the therapeutic modalities available for each of the diagnoses you considered?
PROBLEM 102

A 16 year old woman presents with a non-tender 2 cm mass in her left anterior neck. This mass had been present for several weeks and has not changed.

Study Questions:
1. What further information would you like to know about this patient's history?
2. What is your differential diagnosis of this mass?
3. What diagnostic study(ies) would you employ to evaluate this mass?

PROBLEM 103

A 22 year old man with left axillary adenopathy, night sweats, and a five-pound weight loss, has had an axillary lymph node removed which revealed Hodgkin's disease.

Study Questions:
1. What is the staging criteria for Hodgkin's disease and how would you stage this patient's disease?
2. What is a staging laparotomy and when is this recommended?
3. What is the stage for stage treatment for Hodgkin's disease?