

Liver Disease

INTRODUCTION

Questions/concepts

- Most liver complications are related to _____
- _____ liver failure is irreversible but _____
- How does chronic liver failure contribute to liver cancer and cirrhosis?

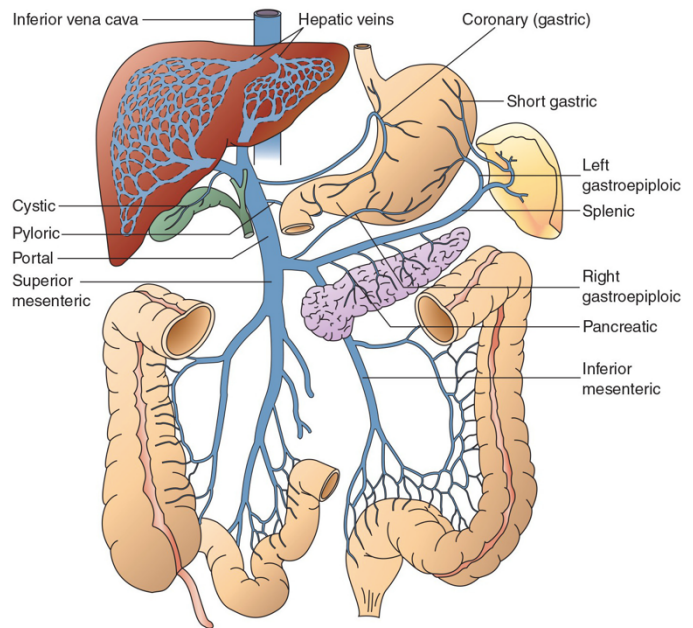
Liver Functions

- What are the main major liver functions?
 - What does the liver metabolize?
 - What does the liver synthesize?
 - What does the liver store?
 - How does the liver work with immunity?

Liver Cirrhosis

- What are the general causes of liver cirrhosis?
- Define steatohepatitis

- Liver is one of the **largest** organs
- Liver receives a LOT of blood
- Most liver complications are related to **portal system** (portal HTN)
- Chronic liver failure is **irreversible, but we can slow it down**
 - Can increase risk for **liver cancer** and **cirrhosis** due to constant process of "injury and healing"



Liver Functions

- **Metabolism**
 - Deactivates and activates drugs
 - You need to check PRN meds as doctors have **generalized orders** that may not be appropriate for pts with liver issues or you may have to adjust dose
- **Synthesis**
 - Albumin
 - Thrombopoietin
 - Bile
 - Clotting factors
 - Vit D activation
 - Others
- **Storage** (lots of **nutritional issues** if this is compromised)
 - Iron
 - Copper
 - Glycogen
 - Lots of vitamins
- **Immunity**
 - Kupffer cells (pre-cursors of macrophages)
 - Compliment proteins
 - Immunoglobulins (higher risk of infection if low)



General Overview of Liver Cirrhosis

- **Causes:**
 - Hep virus (esp. B and C)
 - Fatty liver disease (**very common in US**) –steatohepatitis
 - Alcohol use
 - Rare conditions like iron and copper buildup

Hepatitis

- Differentiate hep A, B, and C
 - Cause
 - Transmission
 - Chronic or not
 - Vaccine availability
 - Others
- Which hepatitis has highest risk for chronic liver issue?

Liver Disease Assessment

- What are some assessments to check for if a pt comes in with suspected liver issue?
- What are some early vs late s/s of liver disease?
- What is the normal serum bilirubin?
- What are the 2 causes of jaundice?
- What are the clinical manifestations of jaundice?

- Right sided HF (due to inadequate BF to liver)
- Others
- Tends to happen from acute toxicity like drug use or alcohol abuse

HEPATITIS

Hep A	Hep B	Hep C
<ul style="list-style-type: none"> - Caused by RNA virus - Transmitted via fecal oral route - Low mortality rate and is generally self-limiting - Commonly causes "out breaks" - Can be a little more life-threatening for older pts, though children tend to have it more; more common in low-middle income countries - Never gets chronic - Vaccine is available <ul style="list-style-type: none"> - Recommend for population at risk like immunocompromised pts, pts traveling in certain countries, pts who already have liver issue, etc. - Has 2-6 week incubation period 	<ul style="list-style-type: none"> - Caused by double strand DNA virus - Transmitted parentally, sexually, blood and body fluid contact; do not spread via casual contact or food <ul style="list-style-type: none"> - Easily transmitted compared to HIV - Acute can lead to hepatic failure - About 5% of pts progress to chronic hep B infection <ul style="list-style-type: none"> - If progressed, can increase risk for cirrhosis and cancer - Vaccination is available; all healthcare workers should be vaccinated 	<ul style="list-style-type: none"> - Caused by single strand RNA virus - Transmitted via parenteral exposure; sexual transmission is very rare <ul style="list-style-type: none"> - Most at risks: IV drug users and baby boomers - No vaccine but there's a cure - Causes most cases of posttransfusion hepatitis <ul style="list-style-type: none"> - But less than 5% of hep C cases are from transfusion - Fulminant/acute illness is uncommon (unlike hep B) <ul style="list-style-type: none"> - 80% develop into chronic infections and 20% of those cases progress into cirrhosis and liver cancer

LIVER DISEASE ASSESSMENT



- Some assessments to check for:
 - Liver tenderness
 - Ascites
 - Edema
 - **Altered mental status –highest priority**
 - Jaundice
 - Itchy skin
 - Others
- 1) Early s/s are very **non-specific**
 - Fatigue
 - Vague abdominal s/s (like indigestion, gas, RUQ pain, etc.)
- 2) Later s/s
 - **Jaundice –due to bilirubin in blood; normal serum bilirubin is <2.5mg/dL**
 - 2 causes:
 - ✓ **Hepatocellular:** liver cells are no longer able to **conjugate bilirubin** → unconjugated bilirubin is not very soluble and thus cannot be excreted
 - ✓ **Cholestasis:** bile flow disrupted due to **structural changes in liver** that causes bile ducts to be occluded → bile backs-up and ends up in circular system
 - Causes **stool changes** (clay colored)

- What are some **skin changes** caused by liver disease?

- Define **caput medusa**

Blood Tests

- Why might a provider order a **hepatocellular test** instead of **cholestatic test**? Why might he/she do the opposite?

- How is **alcohol induced liver damage** different from regular liver damage (in terms of blood tests)?

- What is the most **accurate measure of liver disease**?

- Which values increase, decrease, or stay the same in blood tests?

- AST
- ALT
- Albumin
- PT and INR
- Alkaline phosphatase
- GGT
- Bilirubin

Diagnostics

- What are some diagnostics tests you may have to do for a liver pt?

→ Can be **widespread** or **localized/isolated** (entire body or scleral icterus)

- **Peripheral edema and ascites**
- Skin changes
 - **Palmar erythema** (due to estrogen in skin)
 - **Spider nevi**
- **Peripheral neuropathies (due to buildup of toxins)**
- **Hematologic issues** like bruising
- **Endocrine issues** (due to liver making too much or too little of certain hormones); examples include **gynecomastia due to estrogen**
- **Caput medusa**
 - Serious tortuous veins in stomach due to **collateral circulation** build up (caused by portal HTN)

- You really want to address pt's **body image issues** once later s/s show

Blood Tests

Hepatocellular tests	Cholestatic tests
<ul style="list-style-type: none"> - Measures liver's job - Kind of like cardiac markers, when liver cells die, they release their content into blood - In alcohol induced liver damage: <ul style="list-style-type: none"> - ALT is lower than AST unlike any other liver diseases - GGT may be the only initial value to increase 	<ul style="list-style-type: none"> - Measure's bile stasis (reduced flow of bile)
<ul style="list-style-type: none"> - AST = increased - ALT (most accurate measure of liver disease) = increased - Albumin = decreased - PT and INR = increased (since liver makes clotting factors) <ul style="list-style-type: none"> - Your priority concern 	<ul style="list-style-type: none"> - Alkaline phosphatase: increased (since liver and bile duct make this) - GGT: increased (since liver and bile duct make this) - Total bilirubin: increases - Direct/conjugated bilirubin: increases

Diagnostics

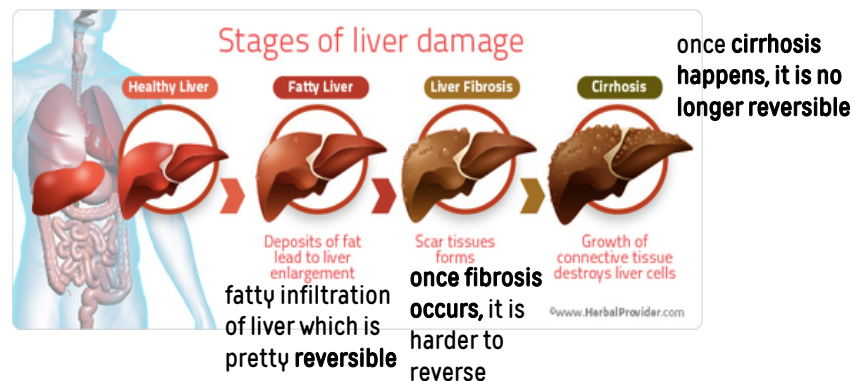
- Lab studies
- CT scans
- MRI
- Ultrasound
- **Liver biopsy** –most definitive approach; can also identify **intensity** of infection and **degree**
 - Pre-op nurs intervention:
 - Check **PT, INR, and baseline v/s**
 - Get consent

- Which diagnostic test is most definitive for liver disease?
 - Get donor blood
 - Make sure pt is NPO
 - Others
- What can a liver biopsy tell you?
 - During: ask pt to **inhale** and **hold breath** when the needle is inserted to stabilize liver and prevent puncturing **diaphragm**
 - Post-op nurs interventions:
 - Turn pt to right side after procedure to achieve **hemostasis**; place a **pillow under the right costal margin**
 - Monitor for bleeding
 - Check for infections (temp, WBC, etc.)
 - v/s (monitor more frequently in the beginning, then reduce frequency)
 - others
- What are the nursing interventions for **liver biopsy?** (pre, during, and post-procedure)

CIRRHOSIS

Cirrhosis

- What are the general stages of liver cirrhosis?
- Which state of liver cirrhosis is no longer reversible?
- Define **cirrhosis**
- What are the general complications caused by cirrhosis?
 - Consequence of decreased metabolic function
 - Consequence of altered hemodynamics



- **Def:** extensive scarring of the liver due to **necrotic injury** or a **chronic reaction to inflammation** over a long period of time
- Mechanics of cirrhotic complications
 - **Decreased metabolic function**
 - Buildup of **toxic metabolites** (esp. **ammonia** which can be life-threatening)
 - Drug toxicity
 - **Decreased protein synthesis**
 - Ascites
 - Lack of clotting factors and complement proteins → bleeding risks
 - **Altered hemodynamics**
 - Lack of metabolism of certain hormones like **aldosterone**
 - **Portal HTN**
 - Liver damage → blood is unable to leave liver → blood backs up in liver and creates **high pressure in portal veins** → **esophageal varices** and **ascites** (blood will end up more in the systemic circulation)

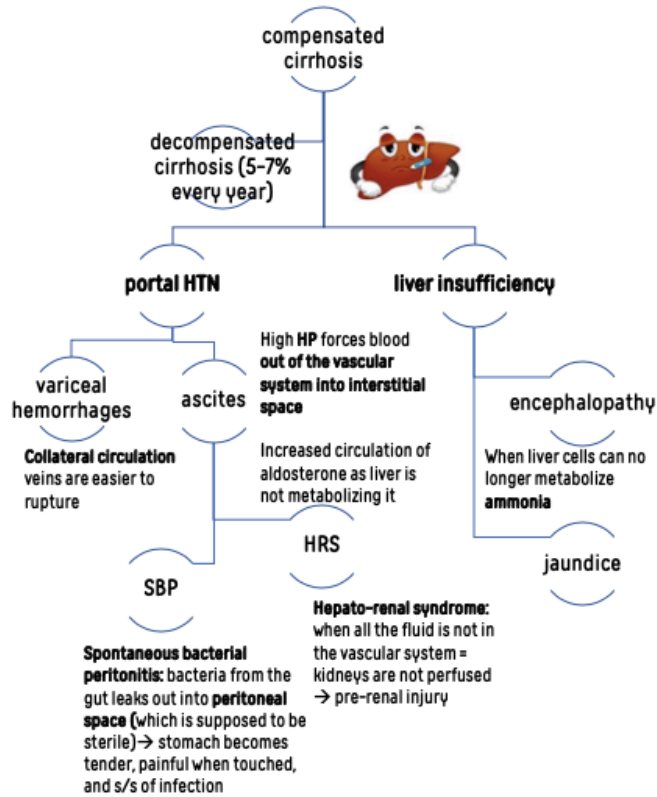
- Ascites can cause _____ and _____

- What are some causes of ascites related to portal HTN?

- Define spontaneous bacterial peritonitis

- Define hepato-renal syndrome

- What is the cause of encephalopathy?



Portal Hypertension

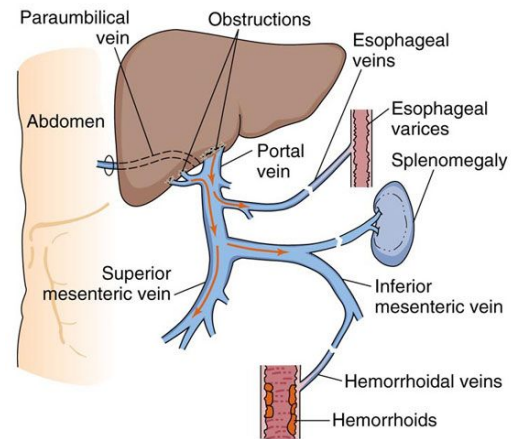
- What are some consequences of portal HTN?

- What are some serious effects of portosystemic shunting of blood?

- What are some serious consequences of splenomegaly?

Portal HTN

- Increased peritoneal capillary pressure
 - Causes ascites
- Portosystemic shunting of blood
 - Causes collateral circulation
 - Causes shunting of ammonia and toxins into systemic circulation
- Splenomegaly
 - Due to blood backing up into spleen from portal vein
 - Spleen kill RBC and other blood products like WBC → decreases immune function, O2 transport, ability to clot, etc.



Cirrhosis Complications

Ascites and peripheral edema	Esophageal and rectal varices	Haptic encephalopathy
- Def: third spacing of fluid due to increased portal pressure,	- Def: fragile collateral veins prone to rupture	- Mental dysfunction due to increased

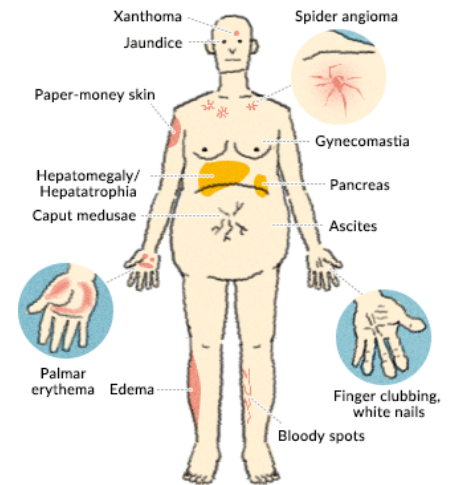
Cirrhosis Complications

- What is the top concern for **ascites**?
- What is the top concern for **varices**?
- Define **encephalopathy**
- A pt comes in the ER with **ascites**, what are the main nurs management?

<p>decreased intravascular osmotic/oncotic pressure, high aldosterone</p> <ul style="list-style-type: none"> - Can cause pressure on diaphragm → difficulty breathing - Ascites is very refractory 	<ul style="list-style-type: none"> - Top concern is bleeding 	<p>ammonia in blood</p>
--	--	--------------------------------

• Nursing management for ascites

- **ABCs**
 - Try and get the pt to sit **upright** to reduce compression on diaphragms
- Sodium restriction (not fluid in most cases)
- Diuretics
 - Can use combo if **K+ wasting and K+ sparing**; must monitor K+ levels
- Fluid removal –**paracentesis**
- Albumin infusion (to keep vascular fluid volume)



Paracentesis

- What are the nurs roles for **paracentesis**? (pre, during, and post-procedure)

Paracentesis Nursing role

- 1) Pre
 - Confirm consent
 - Review labs (**AST, ALT, creatinine, BUN**)
 - Have pt void **before procedure** to prevent bladder puncture
 - Position pt in **high fowler's position**
- 2) During: monitor v/s
- 3) Post:
 - Assess puncture site for **bleeding**
 - Monitor s/s of **infection**
 - Educate restriction of **physical activity** (esp. lifting things)
 - Check if pts have to lift groceries on their own and other lifestyle things
 - **Monitor v/s frequently** (may reduce as time progresses)

Esophageal Management

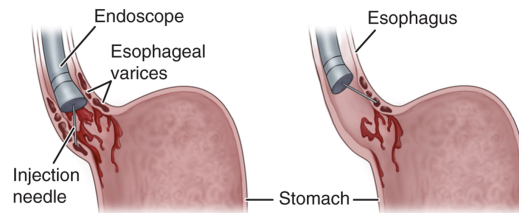
- What are some ways to manage esophageal varices?
- What are some meds used for **esophageal varices**?

Esophageal Pharmacologic Management

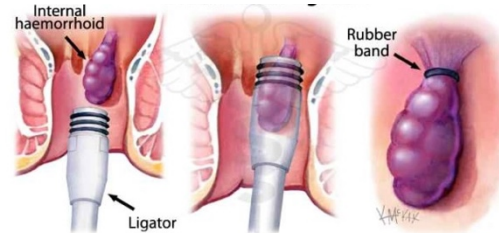
- Medications
 - **Beta blockers**
 - **Goal:** to reduce portal and collateral BF
 - Can be used as primary or secondary **prophylaxis**
 - May be combined with **nitroglycerine**
 - **Octreotide**

- How does **octreotide** help with varices?
- How does **vasopressin** help with varices?
- What are the 2 types of **endoscopic procedures**?

- Constricts **splanchnic arterioles** that feed the capillary system in abdomen → reduce portal pressure → reduce risk for bleeding
- Given via **continuous IV infusion**
- **Vasopressin** –constricts splanchnic arterioles
 - Used more in the past but not much now due to high risk
 - **Always monitor**
 - **May need to give nitroglycerine** to counteract the SE
- **Endoscopic procedures**
 - **Sclerotherapy** –injection of sclerosing agent into variceal lumen
 - Induces **thrombosis and fibrosis** → varix obliteration

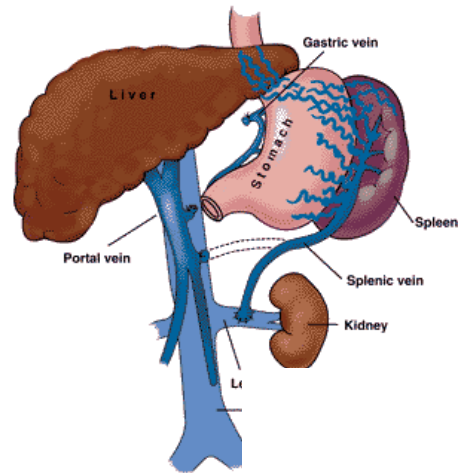
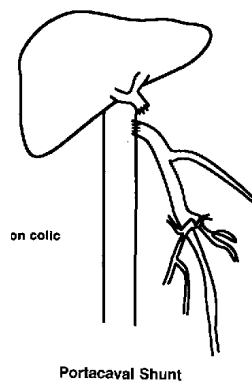


- **Band ligation** –use of elastic band to obliterate varix via strangulation



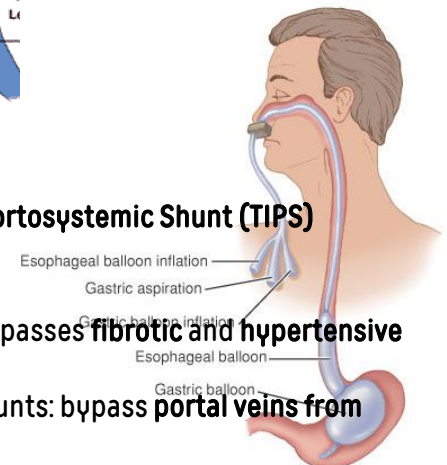
- Which procedure for esophageal varices is saved for **last resort**?

- **Shunting procedures**



- What are the types of **shunting**?

- **Last resort**
- **Types:**
 - **Trans-jugular Intrahepatic Portosystemic Shunt (TIPS)**
 - ✓ **Non-invasive**
 - **Surgical shunts:**
 - ✓ **Portacaval shunts: bypasses fibrotic and hypertensive areas**
 - ✓ **Distal splenorenal shunts: bypass portal veins from spleen to vena cava**



- What are some complications related to **shunting**? (which one is most serious)

- **Complications**
 - **Toxins are not filtered** → high risk for **encephalopathy**
 - **Bleeding risk**

- Embolism risk
- Esophageal varices can cause bleeding in the **stomach** as well
 - can increase **ammonia levels**
 - ✓ So if pt's ammonia level keep increasing despite medications, **may need to check for GI bleeding**

Management of Variceal Bleeding

- What are the nurs priority actions for a pt who has acute variceal bleeding?

- Describe **balloon tamponade therapy**
- What are the nurs interventions for **balloon therapy**?
- What will you do if pt is suddenly confused and anxious after balloon therapy?

Hepatic Encephalopathy

- What are the s/s? (early vs late)

Management of Acute Variceal Hemorrhage

- 1) Protect airway
 - Since pt can **aspirate blood**
 - Make sure to keep **suction on bedside**
- 2) Insure **2 IV access site**
- 3) Monitor hemodynamic status
 - May need to have **cardiac monitor**
- 4) Transfer to ICU –need to call **rapid response team**
- 5) Fluid/blood transfusions
 - Fluid is first, then may have to give blood in case pt bleeds out too much
- 6) **Balloon tamponade therapy** (stope refractory bleeding)
 - High risk; short-term use
 - Nurs interventions:
 - Monitor airway
 - Prevent aspiration
 - Monitor balloon
 - Keep emergency equipment like **suction** and **scissors** (in case occlusion due to balloon happens, you have to cut the balloon to deflate it)
 - Monitor skin near nose to prevent **skin breakdown**
 - ✓ Usually, a **sponge is applied in nose** to prevent this
 - Educate pt
 - Can end up occluding airway if the balloon in the stomach busts
 - Pt will get **anxious** and **confused** and may try to take balloon out!

Hepatic Encephalopathy

- **Very life-threatening**
- Hard to assess
- **Def:** decline of **neurological status** due to liver disease
- S/s
 - Early: subtle changes in mental status; can be overlooked
 - Restlessness
 - Insomnia
 - Cognitive and behavioral changes
 - Tremors
 - Computational skill declines
 - Fine motor skill declines
 - **Hyperreflexia (later on changes to hypo)**
 - Late: **stupor, confusion, hyporeflexia, COMA**

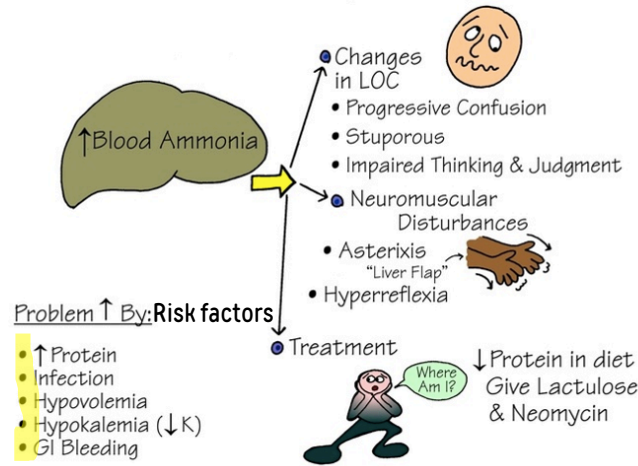
- What are some risk factors that can exacerbate encephalopathy for liver pts?

- Why is low protein diet no longer recommended for liver pts?

- What are some treatments for encephalopathy? (drug, lifestyle changes)

PORTAL SYSTEMIC ENCEPHALOPATHY (PSE)

HEPATIC ENCEPHALOPATHY (HEPATIC COMA)



Pts with cirrhosis often times in on **catabolic state**, so low protein diet it actually **not very common** now unless pt is in very severe liver cirrhosis; only done for **short time**;

Managing Hepatic Encephalopathy

- What are some preventive methods for hepatic encephalopathy?

- What is the main goal in treating encephalopathy?

- What are some meds that can treat encephalopathy?

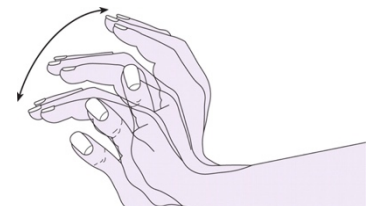
- What are some dietary education you can give to pts with encephalopathy?

- A pt comes in with encephalopathy, what are some safety precautions to take?

- What is one way to check if treatment has worked for encephalopathy?

Management of Hepatic Encephalopathy

- Preventive measures
 1. Monitor **ABCs** –always check for **loss of consciousness** and **RR depression**
 2. Frequent neuro checks
 - Decreased LOC, reflexes, cognition, motor function, EEG
 - Important to detect **small changes**
 - May want to check neuro status with another nurse since neuro check can be very **subjective**
- **Goal:** reduce ammonia formation
 - Meds:
 - **Lactulose** –type of laxative; traps **ammonia** in gut and excrete it via feces
 - ✓ AE: diarrhea which can contribute to **hypokalemia** and **hypovolemia**
 - **Rifaximin** (antibiotic)
 - **Neomycin** –antibiotic to kill certain **gut bacteria that make ammonia**
 - ✓ AE: killing of normal flora
 - Moderate protein intake (**vegetable** sources are better than animal)
 - Identify and treat contributing factors
- Safety concerns
 - Aspiration
 - Hypovolemia (due to diarrhea)
 - **May want to give adequate fluids**
 - Fall risk (low LOC)
 - **May want to keep pt near the nursing station**
- Check for **asterixis** to verify that meds and other interventions worked
 - **Asterixis** –when pt can't hold hands still
 - Caused by high ammonia



Acute Management of Cirrhosis

- What are the nurse's priority management to help pts with acute cirrhosis?

- Why are pts with cirrhosis at-risk for infection?

- What are some nutritional interventions you can do for cirrhosis?

Chronic Management of Cirrhosis

- What are some nutritional education to give to chronic cirrhosis pts?

- A pt has alcohol addiction and developed chronic cirrhosis, what are your interventions?

- Which herb should not be taken for liver pts?

Special Considerations

- What are some emotional issues to address for liver pts?

- Which "type" of liver pts tend to have higher emotional issues?

ACUTE MANAGEMENT OF CIRRHOSIS

- 1) **Maintain skin integrity** –due to edema, pruritus, low nutritional status, etc.
 - Keep skin dry
 - Moisturize if needed
 - Draw sheet and wedges (to prevent **pressure ulcers**)
 - Re-position pts
- 2) **Check for bleeding risks** –due to low clotting factors, varices development, thrombocytopenia, etc.
 - Monitor PT and INR
 - Monitor skin for bleeding
 - Teach pt to use knuckles to scratch
- 3) **Check infection risks** –due to low WBC, skin compromises, ascites, etc.
 - Monitor IV site
 - **Clean your hands! –most important**
- 4) **Check for imbalanced nutrition** –due to inability of liver to manufacture and metabolize nutrients, depletion of stored nutrients, n/v/anorexia, etc.
 - **Smaller meals**
 - **Supplements**
 - **Bed-time snack to prevent catabolic state**



CHRONIC MANAGEMENT OF CIRRHOSIS

- Goal is to **stop or slow progression**
- Nutritional management
 - **High calorie, high nutritional value (3000–4000 cal)**
 - **Moderate protein**, not strict
 - Supplement vitamins and minerals
 - Lots of doctors give **milk thistle**
 - **Abstinence from alcohol**
 - If pt needs to go through withdrawal, pt will be on “detoxifying protocol” and will be given **benzodiazepines**
- Avoid hepatotoxic meds (**esp. acetaminophen** since it's an OTC med that can be hidden)
 - Also educate to avoid **St. John's Wort**
- Adequate rest
 - Make sure pt has **built-in rest time throughout days**



SPECIAL CONSIDERATIONS

Psychosocial Consideration

- Monitor for **altered body image, low self-esteem due to alcohol, etc.**
- Lack of **social support or complicated family process**
 - Most common on alcohol-induced cirrhosis pts
 - Make sure to **identify specific pts with alcohol issue** and refer them to social services
- Do not encourage **false hope**

Gerontologic Consideration

- A 78 yr old pt comes to the hospital with liver failure, what are some special considerations to keep in mind?

Gerontologic Consideration

- Higher risk for liver issues
- Usually are on multiple meds → high liver injury
- Decreased **liver volume** → decreased drug metabolism
- **Baby boomers** should be educated for **hepatitis C** vaccination
- Educate about **lifetime behaviors**
 - Reduce alcohol
 - Obesity pre-cautions
 - Others