Disclosures

• None
Agenda

• Epidemiology

• Hepatitis Basics

• Screening Recommendations

• Overview of Treatment Indications, Monitoring

• HCC Screening
Hepatitis B Virus (HBV) Epidemiology

- In 2015, **257 million** people worldwide living with chronic HBV

- Worldwide, perinatal or early childhood exposure are most common routes of transmission
  - 90% children with acute HBV < 5 years of age develop chronic HBV

Figure 8 - Chronic HBV: Global Prevalence Estimates, 2015
HBV
US Epidemiology

- ~862,000 persons in the US with chronic HBV or ~0.3%-0.5% of population
- In adults, IDU and sexual exposure are most common routes of transmission
HCV in the World

- Globally
  - Estimated **171 million** people
  - **400,000** people die annually

- USA
  - The **most common** blood-borne infection
  - > **1%** of the population
  - ~**2.4 million** people living with HCV between 2013-2016
  - < **10%** effectively treated and cured
  - Rising cases amongst IDU, non-Hispanic whites, women of reproductive age

US Care Continuum – HBV vs HCV vs HIV

- Up to **70%** are unaware of their HBV infection – screening uptake is sub-optimal (50%, 14%)

- Only 5% of acutely infected adults develop chronic HBV; 25% in HIV co-infected (60-80%, 100%)

- Between **20-40%** of people with chronic HBV will require antiviral treatment (100%, 100%)

- **15%-40%** (>20% within 20 years) with chronic HBV develop cirrhosis, hepatocellular carcinoma (HCC), or liver failure

- Many people with HBV (and HCV) are asymptomatic until onset of cirrhosis or end-stage liver disease
HBV & HCV Take Homes

• HBV is transmitted via percutaneous exposure to infected blood or bodily fluids.
• HBV is a vaccine preventable disease: infection causes avoidable morbidity and mortality.
• Chronic infection is a dynamic disease process that, at present, can be controlled but not cured.
• Active replication drives immune response that leads to hepatic inflammation and ongoing liver damage/fibrosis. Fibrosis can be reversible with treatment.
• Risk for end-stage liver disease (ESLD) and cancer increases with ongoing inflammation and HBV viremia

• HCV has similar transmission risks to HBV.
• There is no vaccine for HCV.
• HCV is curable with medication.
• Liver damage from HCV is also dynamic and reversible with treatment.
• The development of advanced fibrosis and cirrhosis increases risk for ESLD and cancer

• Both HBV and HCV are inadequately screened for and have sub-optimal care continuums
Screening
Screening Guidelines

Hepatitis B

- Risk-based screening
- All adolescents and adults at increased risk of infection (USPSTF Grade B)
- Pregnancy (USPSTF Grade A, CDC, AASLD, ACOG)

Hepatitis C

- Universal screening
- ALL adults ages 18-79 (USPSTF Grade B)
- Pregnancy (USPSTF Grade B, CDC, AASLD/IDSA)

Rescreening intervals for persons with ongoing risk factors not well defined
US Preventive Services Task Force: Screening Recommendation Updated March 02, 2020

The USPSTF recommends screening **adults 18 to 79 years of age** for HCV infection

*USPSTF determined with moderate certainty that HCV screening in adults aged 18 to 79 years has substantial net benefit. Physicians should offer or provide this service.*


Slide credit: clinicaloptions.com
HCV Screening Algorithm

**Hepatitis C Antibody (HCV Ab)**

- **Antibody (-)**: NO Chronic HCV
- **Antibody (+)**:
  - **HCV Ab+**
    - **HCV PCR+**: Chronic HCV
  - **HCV Ab+**
    - **HCV PCR-**: Cleared HCV**

**Concern for ACUTE Hepatitis C (within the last 6 months)?**

- Check HCV Antibody AND HCV PCR
- Re-Check HCV Antibody AND HCV PCR within 3-6 months

**Cleared HCV** – either spontaneously OR from prior HCV treatment
HCV Linkage to Care

• “All persons with HCV infection should be linked to a healthcare provider who is knowledgeable in and prepared to provide comprehensive management”
HCV Guidelines

• Partnership between 2 national organizations, American Association for the Study of Liver Diseases (AASLD) and Infectious Diseases Society of America (IDSA)
• Living online document
• Updated frequently to reflect latest research and data
• www.hcvguidelines.org
• 4 sections
  • Testing, Evaluation and Monitoring of Hepatitis C
  • Initial Treatment of HCV Infection
  • Retreatment of Persons in Whom Prior Therapy Has Failed
  • Management of Unique & Key Populations
Risk-Based HBV Screening

- **Born in countries with an HBV prevalence of ≥2%** *
  - Born in the US, not vaccinated as infants, with parents born in regions with high rates of HBV infection (HBsAg prevalence of ≥8%)
- Household and sexual contacts of HBV-infected people
- Pregnant women (HBsAg only)
- Infants born to HBV-infected mothers (HBsAg and anti-HBs only)
- Health-care related exposure

- People with elevated ALT levels (>19 IU/L for women and >30 IU/L for men)
- Men who have sex with men (MSM)
- People who inject drugs (PWID)
- People living with HIV (PLWH) or HCV
- People requiring immunosuppressive therapy
- People with end-stage renal disease (pre/hemodialysis patients)
- Blood and tissue donors
- Incarcerated/history of incarceration
- Developmentally disabled in residential facilities
HBV Virology

- *Hepadnaviridae* family
- Partially double-stranded, circular DNA virus (3.2kb) and a DNA polymerase
- Genetic material surrounded by a viral nucleocapsid (core) and outer lipoprotein envelope with 3 glycoproteins (surface Ag)
- HBV DNA integrates into host hepatocyte genome and may persist as covalently closed circular DNA (cccDNA)
<table>
<thead>
<tr>
<th><strong>Hepatitis B surface Antigen (HBsAg)</strong></th>
<th><strong>Hepatitis B surface Antibody (anti-HBs)</strong></th>
<th><strong>Hepatitis B core Antibody total (anti-HBc)</strong></th>
<th><strong>Hepatitis B envelope Antigen (HBeAg)</strong></th>
<th><strong>Hepatitis B envelope Antibody (anti-HBe)</strong></th>
</tr>
</thead>
</table>
| • Part of intact HBV envelope protein  | • (+) indicates either recovery from natural infection and HBV immunity OR response to vaccination with development of immunity | • Encloses viral DNA & polymerase  
• Includes IgM (acute) & IgG  
• Forms only in response to natural infection  
• (+) indicates past HBV exposure  
• Remains persistently IgG+  
• Does NOT form in response to HBV immunization | • Secreted by infected hepatocytes into circulation  
• Typically associated with elevated DNA levels & high infectivity  
• (+) is variable in those with chronic HBV | • Generally, coincides with declining HBeAg levels  
• Suggests favorable immune response to HBV infection |
| • (+) indicates acute or chronic infection  
• > 98% Sn and Sp  
• Annual rate of spontaneous HBsAg clearance from 0.5% to 2% | | | | |
HBV Timeline

• HBsAg: 1st serologic marker to appear
  • usually, detectable 4 weeks after exposure
  • Range 1-9 weeks
• Acute hepatitis 2-5 months after exposure
  • Asymptomatic
  • Fatigue, fevers, RUQ pain, nausea, jaundice
  • +HBsAg, +IgM anti-HBc, HBV DNA+, HBeAg+ rises and elevated transaminases
• Successful viral clearance = HBV DNA, HBsAg and HBeAg resolve and anti-HBs, anti-HBe and anti-HBc IgG develop
• <5-10% of immunocompetent adults (~20% HIV-infected individuals) will fail to clear an acute HBV infection
Acute versus Chronic HBV

**Acute HBV**
- Infection within the last 6 months
- Compatible clinical syndrome \(\text{AND} \) HepBsAg (+) \(\text{AND} \) IgM anti-HBc (+)
- Documented sAg seroconversion (or newly HepBeAg+ or HBV DNA+)

**Chronic HBV**
- Infection > 6 months
- IgM anti-HBc (-) \(\text{AND} \) a positive result on one of the following tests: HBsAg, HBeAg, or HBV DNA \(\text{OR} \)
- HBsAg (+) or HBV DNA (+) or HBeAg(+) two times at least 6 months apart (Any combination of these tests performed 6 months apart is acceptable)
# HBV Serologies Interpretation

<table>
<thead>
<tr>
<th>HBsAg</th>
<th>anti-HBs</th>
<th>anti-HBc (total)</th>
<th>HBV DNA</th>
<th>Interpretation</th>
<th>Notes, Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>N/A</td>
<td>HBV non-immune/susceptible</td>
<td>Vaccinate</td>
</tr>
<tr>
<td>-</td>
<td>+</td>
<td>-</td>
<td>N/A</td>
<td>HBV immune (vaccinated)</td>
<td>No action; reassure</td>
</tr>
<tr>
<td>-</td>
<td>+</td>
<td>+</td>
<td>N/A</td>
<td>Immune through natural infection</td>
<td>No action; reassure</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>+</td>
<td>Check</td>
<td>HBV-infected</td>
<td>Consider referral</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>+</td>
<td>Consider checking HBV DNA−</td>
<td>Prior exposure with anti-HBs loss</td>
<td>“isolated core positive” Consider vaccination</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>+</td>
<td>HBV DNA+</td>
<td>HBV occult infection</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Refer to the document for detailed explanations of the terms and their significance.
HBV and Pregnancy

• All pregnant females – HBsAg
• Check HBV DNA in HBsAg(+) pregnant females @ 26-28 weeks of pregnancy; level determines need for treatment
• Infants born to HBsAg(+) mothers
  • Hepatitis B immune globulin (HBIG) & HBV vaccine w/i 12 hours of birth
  • Subsequent vaccination at 1 then 3 or 6 months
  • >90% children will then be immune to HBV infection
• Vaccine failure associated with inadequate peri-partum therapy, high maternal HBV DNA levels (>200,000IU/mL)
• Breast-feeding is NOT contra-indicated in any current guidelines including amongst women receiving anti-HBV medication
Screening and Referral Algorithm for Hepatitis B Virus (HBV) Infection Among Pregnant Women

**HBsAg** (hepatitis B surface antigen)

- Assess if at high risk* for acquiring HBV infection
  - No: No further action needed
  - Yes: Vaccinate during pregnancy
    - Repeat HBsAg testing when admitted for delivery

- If on treatment, order HBV DNA at 26-28 weeks
  - <200,000 mL/L: Confirm that pregnant woman attended her appointment with primary care provider/specialist
  - >200,000 mL/L: Treat* at 28-32 weeks until birth
    - Stop TDF at birth and monitor for ALT flares at least every 3 months for 6 months

*High risk for HBV infection includes: household or sexual contacts of HBsAg-positive persons; injection drug use; more than one sex partner during the past six months; evaluation or treatment for a sexually transmitted disease; HIV infection, chronic liver disease, or end-stage renal disease; and international travel to regions with HBsAg prevalence of >2%.


*Vaccinate if not previously vaccinated with a complete hepatitis B vaccine series (refer to Schillie et al. for more information).

*Heptavax B vaccine birth dose and Hepatitis B immune globulin (HBIG) (refer to Schillie et al. for more information).

*Tenofovir disoproxil fumarate (TDF) should be used for the treatment of pregnant women.

www.cdc.gov/hepatitis

Updated 2020
Prevention of Transmission of HBV and HCV

- Have household and sexual contacts vaccinated (HBV)
- Use barrier protection during sexual intercourse if partner is not vaccinated or is not naturally immune (HBV)
- **Not share** toothbrushes or razors
- Not share injection equipment
- Not share glucose testing equipment
- **Cover** open cuts and scratches
- Clean blood spills with bleach solution
- Not donate blood, organs, or sperm
Prevention Amongst PWID & Intranasal Drug Use

• Avoid reusing or sharing syringes, needles, water, cotton & any other drug preparation equipment
  • Use new sterile syringes and filters, and disinfected cookers
  • Clean the injection site with a new alcohol swab
  • Dispose of syringes & needles after 1 USE in a safe puncture-proof container

• Intranasal drug use
  • Avoid reuse of sharing of materials used to deliver drug (straws, bills)

• Connection to appropriate services (MAT, PrEP, et al)
How HBV and HCV are **NOT** Transmitted

- Kissing, hugging, holding hands
- Coughing, sneezing
- Sharing utensils
- Working side-by-side with someone
- Food & water
- Breastfeeding
- Mosquito/insect bites
- Can participate in all activities, including contact sports
- Should not be excluded from daycare or school participation and should not be isolated from other children

www.cdc.gov/hepatitis/hcv/cfaq.htm Accessed 10 September 2018
Alcohol Counseling

- “Abstinence from alcohol and, when appropriate, interventions to facilitate cessation of alcohol consumption should be advised”
- Daily consumption of > 50 grams has a high likelihood to worsen liver disease.
- Some studies indicate that daily intake of smaller amounts has a negative effect on liver health. Data are controversial.
Impact of coffee on liver diseases: a systematic review

Sammy Saab¹,², Divya Mallam³, Gerald A. Cox II⁴ and Myron J. Tong¹,²,⁴

1 Department of Medicine, David Geffen School of Medicine at the University of California at Los Angeles, Los Angeles, CA, USA
2 Department of Surgery, David Geffen School of Medicine at the University of California at Los Angeles, Los Angeles, CA, USA
3 The Department of Medicine, Harbor-UCLA Medical Center, Torrance, CA, USA
4 The Huntington Medical Research Institutes, Pasadena, CA, USA

Table 3. Studies assessing impact on coffee on liver related health outcomes – Hepatitis B and C

<table>
<thead>
<tr>
<th>Reference</th>
<th>Year</th>
<th>Design</th>
<th>Cohort</th>
<th>Country</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ong et al (40)</td>
<td>2011</td>
<td>Cross-Sectional</td>
<td>1045</td>
<td>China</td>
<td>Caffeine not associated with decreased fibrosis HBV-infected patients</td>
</tr>
<tr>
<td>Costentin et al (44)</td>
<td>2011</td>
<td>Cross-Sectional</td>
<td>238</td>
<td>France</td>
<td>Caffeine consumption greater than 3 cups or more a day is associated with reduced histological activity</td>
</tr>
<tr>
<td>Freedman et al (42)</td>
<td>2009</td>
<td>Retrospective Cohort</td>
<td>766</td>
<td>USA</td>
<td>Coffee decreases rate of HCV disease progression in HCV</td>
</tr>
<tr>
<td>Freedman et al (43)</td>
<td>2011</td>
<td>Retrospective Cohort</td>
<td>885</td>
<td>USA</td>
<td>Coffee predictor of improved virologic response to peginterferon plus ribavirin for HCV</td>
</tr>
<tr>
<td>Modi et al (31)</td>
<td>2010</td>
<td>Retrospective Cohort</td>
<td>177</td>
<td>USA</td>
<td>Caffeinated coffee consumption associated with lower odds of liver fibrosis in HCV patients</td>
</tr>
<tr>
<td>Carrieri et al (45)</td>
<td>2012</td>
<td>Prospective Cohort</td>
<td>106</td>
<td>France</td>
<td>Coffee consumption alleviated pegylated interferon and ribavirin adverse effects</td>
</tr>
</tbody>
</table>

HBV, hepatitis B viral infection; HCV, hepatitis C viral infection.
†Studies from similar database.

Saab S, et al., Liver Int. 2014: 34: 495–504
Vaccinate

• Up-to-date on age-appropriate vaccinations

• Hepatitis A

• Hepatitis B

• Pneumovax vaccination (cirrhotic)
Counseling in Patients with HBV and HCV

- Wrap-around education
- Alcohol & Tobacco Usage
- Appropriate vaccinations
- Targeted risk reduction counseling

- Connection to appropriate mental health, substance use, HIV prevention & other specialty services

- Importance of maintaining a healthy body weight

- Glycemic control
Phases of Chronic HBV

Dynamic

Serial monitoring is very important

Phases marked by variable levels of serum ALT activity & HBV DNA
• **Chronic Hepatitis B (CHB)**
  1. HBsAg present for 6 months
  2. HBV DNA variable
  3. HBeAg(+)/(−):
     • HBeAg(+) - DNA >20,000
     • HBeAg(−) – DNA 2,000-20,000
  4. Normal or elevated ALT and/or AST
  5. Liver biopsy:
      • in immune-tolerant CHB: chronic hepatitis with variable necroinflammation and/or fibrosis
      • in immune-active CHB: chronic hepatitis with moderate or severe necroinflammation and with/out fibrosis

• **Immune-Tolerant CHB**
  1. HBsAg present for 6 months
  2. HBeAg (+)
  3. HBV-DNA >1 million
  4. Normal or minimally elevated ALT and/or AST
  5. Liver biopsy or noninvasive test results showing no fibrosis and minimal inflammation

• **Immune-Active CHB**
  1. HBsAg present for 6 months
  2. HBV DNA >20,000 in HBeAg (+) and >2,000 in HBeAg (-)
  3. Intermittently or persistently elevated ALT and/or AST levels
  4. Liver biopsy or noninvasive test results show chronic hepatitis with moderate or severe necroinflammation and with/out fibrosis

• **Inactive CHB**
  1. HBsAg present for 6 months
  2. HBeAg(−), anti-HBe(+)
  3. HBV DNA >2,000
  4. Persistently normal ALT and/or AST levels
  5. Liver biopsy confirms absence of significant necroinflammation. Biopsy or noninvasive testing show variable levels of fibrosis

• **Resolved CHB**: sustained loss of HBsAg in a person who was previously HBsAg positive, with undetectable HBV-DNA levels and absence of clinical or histological evidence of active viral infection
Monitoring in HBV Mono-infection

Measurement of serum ALT and HBV DNA q3 months

If levels are normal for 1 year → change to q6 month monitoring

Increases in ALT should trigger closer monitoring and therapy consideration
## Indications for HBV Treatment

<table>
<thead>
<tr>
<th>Indication</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic hepatitis (elevated ALT and HBV DNA levels)</td>
<td></td>
</tr>
<tr>
<td>Cirrhosis</td>
<td></td>
</tr>
<tr>
<td>HCC (liver cancer)</td>
<td></td>
</tr>
<tr>
<td>HIV co-infection</td>
<td></td>
</tr>
<tr>
<td>Chemotherapy or biologic response modifiers ie. Anti-CD20, TNF-alpha inhibitors</td>
<td></td>
</tr>
<tr>
<td>Females in third trimester of pregnancy if HBV DNA &gt;200,000 IU/mL</td>
<td></td>
</tr>
</tbody>
</table>

*“Persons diagnosed with HBV infection should be provided or referred for care, including treatment if needed, hepatocellular carcinoma surveillance, behavioral risk reduction counseling, and vaccination of appropriate contacts...”*

– 2018 AAFP Practice Guidelines
Control of HBV

- Control of inflammation – normalization of serum ALT (or per liver biopsy)

- Virologic control – reduction in HBV DNA

- Immune control – seroconversion from HBeAg(+) to anti-HBe(+) AND anti-HBs (+)
Treat Patients with Acute and Chronic HCV!

<table>
<thead>
<tr>
<th>RECOMMENDED</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment is recommended for all patients with acute or chronic HCV infection, except those with a short life expectancy that cannot be remediated by HCV therapy, liver transplantation, or another directed therapy. Patients with a short life expectancy owing to liver disease should be managed in consultation with an expert.</td>
<td>I, A</td>
</tr>
</tbody>
</table>
Benefits of Curing HCV Extend Beyond the Liver

**Cure**

- **Decreased transmission**[1]
- **Improved clinical outcomes**[1-3]

**Hepatic**

- Reduction in:
  - Cirrhosis
  - Decompensation
  - HCC
  - Transplantation

**Extrahepatic**

- Improvement in:
  - All-cause mortality
  - Quality of life
  - Malignancy
  - Diabetes, insulin resistance, renal/cardiovascular outcomes
  - Neurocognition


Slide credit: clinicaloptions.com
HCV Treatment for All.

- Patients with any degree of liver damage
- Active IDU, illicit drug use
- Active alcohol abuse or dependence
- ESRD/hemodialysis
- Acute or chronic HCV
When to **NOT** Refer for HCV Treatment

- Patients with active competing priorities
  - Life-limiting extra-hepatic diagnosis (<12 months)
  - Active, uncontrolled medical conditions
  - Unstable life circumstances that clearly preclude appointment attendance and/or medication adherence
<table>
<thead>
<tr>
<th>Population Group</th>
<th>Threshold Incidence for Efficacy of Surveillance (&gt;0.25 LYG; % per year)</th>
<th>Incidence of HCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveillance benefit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian male hepatitis B carriers over age 40</td>
<td>0.2</td>
<td>0.4%-0.6% per year</td>
</tr>
<tr>
<td>Asian female hepatitis B carriers over age 50</td>
<td>0.2</td>
<td>0.3%-0.6% per year</td>
</tr>
<tr>
<td>Hepatitis B carrier with family history of HCC</td>
<td>0.2</td>
<td>Incidence higher than without family history</td>
</tr>
<tr>
<td>African and/or North American blacks with hepatitis B</td>
<td>0.2</td>
<td>HCC occurs at a younger age</td>
</tr>
<tr>
<td>Hepatitis B carriers with cirrhosis</td>
<td>0.2-1.5</td>
<td>3%-8% per year</td>
</tr>
<tr>
<td>Hepatitis C cirrhosis</td>
<td>1.5</td>
<td>3%-5% per year</td>
</tr>
<tr>
<td>Stage 4 PBC</td>
<td>1.5</td>
<td>3%-5% per year</td>
</tr>
<tr>
<td>Genetic hemochromatosis and cirrhosis</td>
<td>1.5</td>
<td>Unknown, but probably &gt;1.5% per year</td>
</tr>
<tr>
<td>Alpha-1 antitrypsin deficiency and cirrhosis</td>
<td>1.5</td>
<td>Unknown, but probably &gt;1.5% per year</td>
</tr>
<tr>
<td>Other cirrhosis</td>
<td>1.5</td>
<td>Unknown</td>
</tr>
<tr>
<td>Surveillance benefit uncertain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B carriers younger than 40 (males) or 50 (females)</td>
<td>0.2</td>
<td>&lt;0.2% per year</td>
</tr>
<tr>
<td>Hepatitis C and stage 3 fibrosis</td>
<td>1.5</td>
<td>&lt;1.5% per year</td>
</tr>
<tr>
<td>NAFLD without cirrhosis</td>
<td>1.5</td>
<td>&lt;1.5% per year</td>
</tr>
</tbody>
</table>

Abbreviation: LYG, life-years gained.
HBV and HCC Risk

- Highest risk in those with **cirrhosis** however may also occur in absence of cirrhosis
  - HBV with cirrhosis: 2.2-4.3/100-person-years HCC incidence
  - HBV without cirrhosis: 0.1-0.8/100 person-years HCC incidence
- Increased HCC risk when **active viral replication** - persistent HBeAg(+) and high levels of HBV DNA
- Male
- Younger age at time of infection
- Excess alcohol consumption, NAFLD, HIV, HCV or HDV co-infection, genotypes C and Aa
- Family history of HCC
HCC Monitoring in HBV

- Cirrhosis
- Asian men ≥ 40
- Asian women ≥ 50
- Sub-Saharan African people > 20
- Family history of HCC
HCV and HCC Risk

• HCV is the most common cause of HCC in Western Countries

• HCC incidence without advanced hepatic fibrosis is <1%/year

• HCC risk increases to 2-8%/year once cirrhosis develops

• In those with cirrhosis, HCV treatment decreases but does not eliminate HCC risk

• In those without cirrhosis, HCV treatment decreases risk of developing cirrhosis
Ultrasound for HCC Screening

• Ultrasound is the recommended modality of choice
  • Every 6 months
  • +/- AFP

• Abnormal US should be followed by a diagnostic multi-phase CT or MRI

• CT and MRI findings concerning for HCC
  • Lesion size $\geq 1cm$
  • Arterial phase hyperenhancement
  • Suggestive washout, threshold growth, and capsule appearance
Medications in Patients Living with HBV or HCV

**No contra-indications**
- Statins
- Anti-hypertensive agents
- Anti-diabetic agents, including metformin

**Precautions**
- Acetaminophen (<2g/24h)
- Herbal/dietary supplements with potential hepatotoxicity
Drug-Drug Interactions with HCV DAAs

• Antacid therapy – PPIs, H2B

• Statin therapy

• Oral anti-coagulants

• Anti-epileptic therapy

• ART

• www.hep-druginteractions.org/checker
Healthy, HepFree Livers

- Vaccinations
  - Hep A, Hep B
- Perinatal testing
- IDU
  - Risk reduction counseling
  - Injection partner(s) testing
  - Connection to MAT, PrEP
  - Access to naloxone
- Polysubstance Use
  - Alcohol
  - Intranasal drug use
  - Tobacco
  - Other
- Safe(r) sexual practices
  - MSM sexual partner(s) testing
- Safe(r) injection practices
- Weight management
- Glycemic control
- Keep drinking > 2 cups of coffee daily (hold the creamer and syrup)
- Surveillance
- Re-testing
- Cirrhotic specific advice
  - Pneumococcal vaccination
  - Shellfish counseling
  - < 2g APAP daily
  - Avoidance of NSAIDs
HBV References

• ACIP
• ACOG
• Lo Re, V. Management of HIV/Hepatitis B Virus. Infectious Disease Special Edition, Fall 2015:39-45
HCV References


• HCV Liverpool Drug-Drug Interactions. www.hep-druginteractions.org/checker
Acknowledgements

• Organizers & Attendees of Eastern Shore Medical Symposium
• Heather Bittner Fagan
• Meghan Phelan
• Susan Szabo