HCV in Children with and without HIV
Epidemiology

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Disclosures

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Global epidemiology of HCV infection

- Globally 130–170 million people HCV seropositive
- >500,000 people dying from HCV-associated causes worldwide annually
- Around a quarter of cases of HCC and of liver cirrhosis can be attributed to HCV
Genotype 1 predominates (46%), followed by genotype 3 (22%)
Egypt: almost entirely genotype 4

Hajari zad eht a el 2013 Nat Rev Gastroent Hepatol; Gower et al 2014 J Hepatol
Children

• Estimated 13.2 million children (11.5-21.2) are HCV seropositive worldwide
  – 6.6 million viremic infections
• Epidemiology of paediatric HCV is quite poorly defined
• Under-ascertainment of paediatric HCV
  – In US study, only 1 in 7 children with HCV estimated to be diagnosed
  – In Scottish study, estimated two-thirds of children with HCV infection undiagnosed

85% of the 6.6 million viremic HCV infections in children are in low and lower middle income countries.

>50% of all viremic infections are in 7 countries.
Estimated global prevalence of paediatric viremic infections: 0.4% (0.1-0.8%)

HCV in children

Map: Studies of anti-HCV prevalence in children

- **Canada:** 0.1 per 10,000 in <15 yrs; 5% in street-involved youth
- **US:**
  - 6-12 yrs: 0.2%
  - 12-19 yrs: 0.4%
- **Libya:** <5 yrs: 1%
  - 6-10 yrs: 0.8%
- **Russia, Moscow:** in-patients 0.56%, 2004
- **China, Eastern**
  - 2011-2012:
    - <10 yrs: 0.09%
    - 11-20 yrs: 0.20%
- **Brazil:** children & adolescents in day care / school: 0.02%
- **Egypt:** 2.0% 2007
  - Incid. in 1-5 yr olds: 2.0/1000 PY, 2010

Hepatitis C: transmission routes

- Sharing injecting equipment
- Unsafe health care injections
- Multiple invasive procedures
- Via contaminated blood transfusions or blood products
  - Prior to introduction of screening of blood products
  - In settings with poor blood safety
- Mother-to-child transmission
- Unprotected sex with an infected partner
Unsafe health care injections

2000 - WHO

• 42% of HCV infections acquired in developing and transitional countries due to unsafe health care injections

• Annually, contributing 2 million new infections

By 2010, global reuse of injecting devices had declined from around 40% to 5.5%

http://safepointtrust.org/

Pepin et al 2013, PLoS ONE e80948
Iatrogenic HCV infections

- Groups at increased risk of HCV infection include childhood cancer survivors, those with transfusion-dependent haemoglobinopathies, renal patients
- Iatrogenic infections mainly historic in resource-rich countries but on-going in some low and middle-income countries
- HCV seroprevalence in children with thalassaemia major: 24%-76% in Egypt, 10% Malaysia, 12.5% Bangladesh


Kazakh Officials Probe Claims That Leukemia Patients Exposed To Hepatitis

Kazakhstan’s Health Ministry has asked the state prosecutor-general’s office to launch a probe into claims that more than 30 young leukemia patients were recently infected with the hepatitis C virus (HCV) at a medical center in Astana.

The request stems from complaints from parents who alleged their children contracted HCV while treated for leukemia at the National Children's Medical Center.
Injecting drug use and HCV

- Half of PWID in developed countries and 80% in developing / transitional countries had acquired HCV by 5 years after onset of injecting drugs, 1996-2006

Eastern Europe and Central Asia: PWID

- Injecting drug use driven HIV and HCV epidemics
- For needle and syringe exchange programmes to be effective, \( >200 \) syringes / year per PWID are needed
- Region average = \( \approx 50 \) syringes
- No opioid substitution therapy in Russian Federation

- Eight cities study in Russia among \( >2500 \) PWID
  - 71% HCV+, 30% HIV+
  - HIV/HCV co-infection - 44%

Heimer et al 2014 BMC Inf Dis
Adolescents and injecting drug use

YPWID have poor access to harm reduction services (e.g. age restrictions)
More likely to share injecting equipment and less knowledge of safer injecting practices
Street children at very high risk

UNICEF report “Blame and Banishment”
Krug et al 2015 JIAS
HCV vertical transmission

• Most (~70%) transmission occurs around time of delivery
• Rates of HCV vertical transmission from meta-analysis of 109 studies
  – HIV-negative mothers: 5.8% (95% CI 4.2-7.8%)
  – HIV-positive mothers: 10.8% (95% CI 7.6-15.2%)
• High HCV viral load is a risk factor, but not maternal genotype, mode of delivery or breastfeeding
• Vertical transmission rate of HIV/HCV co-infection likely to be declining alongside HIV MTCT rates
  – Pregnant women who inject drugs face PMTCT access barriers
  – HCV transmission risk in HIV-positive mothers may be reduced if on successful ART

HCV seroprevalence in pregnant women

HCV seroprevalence in pregnant women living with HIV

- 1.5% Nigeria (2006-2011)
- 1% Côte d’Ivoire (1998)
- 2.1% Uganda/Rwanda (2007)
- 2% UK (2013)
- 2.9% Thailand (1997-1999)
- 4.8% Burkina Faso (2006)
- 29% in 2000, 8% in 2008 Italy
- 32% Ukraine (2008-2012)
- 50% St Petersburg, Russia (2010)

Seroprevalence of HCV in HIV-positive children and adolescents

- 1.5% US – PACTG 1028S (2002)
- <1% Northern Europe, 5.8% Southern Europe, 6.7% Central & Eastern Europe (2014)
- 5.5% Ethiopia (2014)
- 8% Ukraine (2011-2015)
- 7% Nigeria (2009)
- 9.6% China (2005-2009)
- 13.8% Tanzania (2006)

European Pregnancy and Paediatric HIV Cohort Collaboration (EPPICC)
HIV/HCV Co-infection Study

• 229 subjects (age <24 years) identified across European paediatric HIV cohorts
  — 58% female, 68% from Central / Eastern Europe
  — Median age at last follow-up was 16.2 years
  — 23% history of AIDS
• 61% had vertically-acquired HCV infection, 7% iatrogenic infection, 18% were PWID and the remainder had unknown mode of acquisition
• Genotypes: 55% GT1, 3% GT2, 31% GT3, 11% GT4

EPPICC: Thorne et al ESPID 2014
Growing up with vertical HCV infection

• Studies show that development of advanced liver disease is uncommon in childhood (<2% will develop cirrhosis)
• Probability of liver fibrosis is associated with increasing patient age, duration of infection, or both
• Few children will experience end-stage liver disease during childhood, but they may be at risk of cirrhosis and HCC in early adulthood
• In study of adults with HCV, a 26-fold increased risk of liver-related death associated with childhood-acquired HCV was reported

*Bortolotti et al 2008 Gastroenterology; Omland et al 2010 J Hepatol*
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