Prevention of perinatal HBV transmission: Evaluation of programs and success stories from Central Asia and Kazakhstan

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Division of Viral Hepatitis, NCID,
Centers for Disease Control and Prevention
Key Elements in Developing a Program to Prevent HBV Transmission

- Define epidemiology of disease
- Quantify disease burden
- Develop a comprehensive prevention strategy
- Identify resources to implement program
Define epidemiology of disease and quantify disease burden
### Reported Acute Viral Hepatitis Incidence Rate in Central Asia by Country, 1987-2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Kazakhstan</th>
<th>Kyrgyzstan</th>
<th>Tajikistan</th>
<th>Turkmenistan</th>
<th>Uzbekistan</th>
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<tbody>
<tr>
<td>87</td>
<td>1000</td>
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<td>500</td>
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<tr>
<td>88</td>
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<tr>
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<td>0.00390625</td>
<td>0.01953125</td>
</tr>
</tbody>
</table>

**Note:** Data represents reported cases per 100,000 population.
Etiology of acute viral hepatitis in Kazakhstan, 2004

- HAV: 81.0%
- HBV: 15.5%
- HDV: 0.1%
- HCV: 2.5%
- non A-C: 0.9%
- I EV: 0.02%
Acute Viral Hepatitis Sentinel Surveillance Sites, Kyrgyzstan

2000 Total Cases reported – 20,422 Sentinel Sites Cases – 1,178 (5.8%)

2001 Total cases reported – 11,398 Sentinel Sites Cases – 679 (5.9%)
Etiology of Acute Viral Hepatitis in Kyrgyzstan, Sentinel Surveillance Data, 2000-2005

N=3898
Chronic liver diseases reported in Turkmenistan, 1989-1995

HDV super-infection
Serologically defined viral hepatitis B, C, and D among patients with chronic liver diseases Ashgabat, Turkmenistan, 1995

N=300
Estimated Viral Hepatitis Disease Burden in Central Asia Region prior to HB Universal Immunization Implementation

Average number of patients per year:
- Acute Viral Hepatitis - 220,000
- Chronic Liver Diseases - 1,025,750

Average number of Deaths per year:
- Acute Viral Hepatitis - 2,310
- Chronic Liver Diseases - 12,265
Since 1996 CDC Central Asia office has been working in close collaboration with Ministries of Health in the five countries of the region. Technical support from Division of Viral Hepatitis, NCID, CDC, WHO, and UNICEF; Financial support from USAID CA Mission, and GAVI; Developed and implemented Comprehensive Hepatitis B Prevention Program in the region.
Hepatitis B Universal Newborns Immunization Status in CAR, 1998

- Sustainable Programs
- Government funds
  - Coverage > 85%
  - ≤5%
  - 0%
Hepatitis B Universal Newborns Immunization Status in CAR, 2001-2006

Since 2001

- 1998 (Government funds)
  Coverage > 85%

- 2001 (GAVI funds)
  Coverage > 80%

- 2001 (GAVI funds)
  Coverage > 80%

- 2000 (GAVI funds)
  Coverage > 80%

- 60% Newborns

Sustainable Programs
Incidence rate of acute hepatitis B by age group prior to vaccination (1990) and 2000, Kazakhstan
Acute HBV incidence rate in 2000 and 2005 in Kazakhstan

* universal vaccination since 1998
Reported Acute Viral Hepatitis B among vaccinated children, Kazakhstan, 2003-2005

- 2003 – 4
- 2004 – 0
- 2005 – 5
Hepatitis B incidence among children under 5, Kyrgyz Sentinel Surveillance, 2000-2005
HBV infection (anti-HBc total) and chronic HBV infection (HBsAg) among HB-immunized and non-immunized children, Almaty, Kazakhstan, 2001

- **1993-1994 (not vaccinated)**
  - % HBsAg: 0.0
  - % aHBcor-total: 14.3

- **1995-1997 (catch-up vaccination)**
  - % HBsAg: 1.2
  - % aHBcor-total: 4.8

- **1998-2000 (newborns)**
  - % HBsAg: 0.0
  - % aHBcor-total: 66.7

N=351

P1-2 <0.001
Anti-HBs among HB-immunized and non-immunized children, Almaty, Kazakhstan/ 2001

- 1998-2000: 92.4%
- 1996-1997: 99.1%
- 1995: 88.1%
- 1993-1994: 9.6%

P1-2 <0.001

N=351
Hepatitis B vaccine effectiveness study, Kyrgyzstan, 2005

- Design - Cohort Study
- Exposed group – vaccinated children 3-5 years of age
- Unexposed group – unvaccinated children 7-9 years of age
- Source of exposure data – medical records on HepB vaccination
- Outcome measure – lab tests for HBsAg and total anti-HBc
Hepatitis B Vaccine Effectiveness in Prevention of Chronic Hepatitis B, Kyrgyzstan, 2005

<table>
<thead>
<tr>
<th></th>
<th>HBsAg +</th>
<th>HBsAg -</th>
<th>Total</th>
<th>Attack rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vaccinated</strong></td>
<td>2</td>
<td>468</td>
<td>470</td>
<td>0.4</td>
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<tr>
<td><strong>Unvaccinated</strong></td>
<td>11</td>
<td>488</td>
<td>499</td>
<td>2.2</td>
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<tr>
<td><strong>Total</strong></td>
<td>13</td>
<td>956</td>
<td>969</td>
<td>1.3</td>
</tr>
</tbody>
</table>

RR = 0.2 (0.04 – 0.9) P<0.05  
VE = 80.6% (13.4 – 95.7) P<0.05
**Hepatitis B Vaccine Effectiveness in Prevention of Hepatitis B Infection, Kyrgyzstan, 2005**

<table>
<thead>
<tr>
<th></th>
<th>IgG antiHBC +</th>
<th>IgG antiHBC -</th>
<th>Total</th>
<th>Attack rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccinated</td>
<td>9</td>
<td>461</td>
<td>470</td>
<td>0.4</td>
</tr>
<tr>
<td>Unvaccinated</td>
<td>52</td>
<td>447</td>
<td>499</td>
<td>2.2</td>
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<tr>
<td>Total</td>
<td>61</td>
<td>908</td>
<td>967</td>
<td>1.3</td>
</tr>
</tbody>
</table>

**RR = 0.2 (0.09 – 0.4) P<0.05**

**VE = 81.6% (63.1 – 90.8) P<0.05**
Conclusion 1

- Viral hepatitis have presented and remain a significant threat to the public health in the countries of Central Asia

- HBsAg routine infant immunization is the most effective strategy for HBV, HDV prevention in the region

- More then 80% of cases of Chronic Hepatitis B, and Hepatitis B infection would have occurred among the vaccinated group had they not been vaccinated, were prevented by HBsAg immunization
Conclusion 2

- Estimate 10,000 lives were saved per year by implementation of regional Viral Hepatitis B prevention program.

- Program implementation is a crucial element of capacity building in the area of infectious diseases surveillance, prevention, and control through an integrated approach of epidemiological and laboratory strengthening.

- Sustainable programs positively impact the health of the region and serve to decrease the burden of infectious diseases.