Global Epidemiology and Prevention of Hepatitis B

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WHO Geneva

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Global Disease Burden

- Estimated 2 billion people infected with HBV
- More than 350 million have chronic HBV infection
- Approximately 88% of the world's population live in areas where the prevalence of chronic HBV infection is high (>8% HBsAg +) or moderate (2-7% HBsAg +)
- Estimated 600 000 HBV-related deaths in 2002
- Approximately 93% of deaths were the result of chronic infection
Deaths from Vaccine-Preventable Diseases

- Tetanus
- Pertussis
- Polio
- Measles
- Yellow Fever
- Hepatitis B
- Hib
- Rotavirus
- Meningococcus
- Pneumococcus

4 Million Deaths to Be Prevented (2000 estimates)
## Global Pattern of HBV Infection

<table>
<thead>
<tr>
<th>Endemicity</th>
<th>% World’s Population</th>
<th>Lifetime Risk of Infection</th>
<th>Primary Age at Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>45%</td>
<td>&gt;60%</td>
<td>Perinatal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Early childhood</td>
</tr>
<tr>
<td>Intermediate</td>
<td>43%</td>
<td>20-60%</td>
<td>All ages</td>
</tr>
<tr>
<td>Low</td>
<td>12%</td>
<td>&lt;20%</td>
<td>Adults</td>
</tr>
</tbody>
</table>
Geographic Distribution of Chronic HBV Infection

HBsAg Prevalence
- ≥8% - High
- 2-7% - Intermediate
- <2% - Low
Geographic Distribution of HDV Infection

HDV Prevalence
- High
- Intermediate
- Low
- Very Low
- No Data

Taiwan
Pacific Islands
# Primary Modes of HBV Transmission by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Primary Mode of Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>• Perinatal</td>
</tr>
<tr>
<td>Early childhood</td>
<td>• Unsafe injections</td>
</tr>
<tr>
<td></td>
<td>• Inapparent parenteral (horizontal)</td>
</tr>
<tr>
<td>Late childhood, adolescence, adulthood</td>
<td>• Unsafe injections</td>
</tr>
<tr>
<td></td>
<td>• Sexual</td>
</tr>
<tr>
<td></td>
<td>• Injection drug use</td>
</tr>
</tbody>
</table>
Epidemiology of Chronic Infection

• Most HBV infections occur in perinatal period/early childhood
• Infections at this early age lead to high proportion chronic infections
• Large proportion of chronic infections unrecognized and lead to long-term complications (cirrhosis and HCC)
• ~21% of HBV-related deaths result from infection in perinatal period
• ~48% from infection in early childhood (age <5 years)
Figure 1. Outcome of hepatitis B virus infection by age at infection

- **Chronic infection**
- **Symptomatic infection**

<table>
<thead>
<tr>
<th>Age at infection</th>
<th>% of infections with outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>100</td>
</tr>
<tr>
<td>1-6 months</td>
<td>80</td>
</tr>
<tr>
<td>7-12 months</td>
<td>60</td>
</tr>
<tr>
<td>1-4 years</td>
<td>40</td>
</tr>
<tr>
<td>Older children and adults</td>
<td>20</td>
</tr>
</tbody>
</table>
WHO Objectives

• In 1992, WHO set goal: all countries integrate hepatitis B vaccination into EPI by 1997
• Primary objective to prevent chronic HBV infection, disease and death
• Secondary objective to prevent acute hepatitis B
WHO Strategy

• Vaccination of infants and children is highest priority for hepatitis B programs
• 3 doses of hepatitis B vaccine 90%–95% effective in preventing HBV infection and chronic sequelae
• To prevent perinatal HBV transmission, 1st dose vaccine should be given within 24 hours after birth—the birth dose
Priorities

- Priorities for hepatitis B immunization in order of importance are:
  - routine infant vaccination;
  - prevention of perinatal HBV transmission (the birth dose);
  - catch-up vaccination for older age groups.
Impact of Vaccination

• Effective implementation of hepatitis B immunization has been shown to dramatically decrease the prevalence of chronic HBV infection and the incidence of HCC
• Gambia prevalence chronic infection among children declined from 10% to 0.6%
• Alaskan villages prevalence of HBV infection from 16% to ~0%
• Similar impact on chronic infection demonstrated in China, Indonesia, Senegal, and Thailand
Hepatitis B (HB) Carriers Among Children Before and After HB Vaccine Introduction

Percentage of children with chronic hepatitis B infection

Taiwan | Shanghai | Rural China | Gambia | Alaska | Thailand

Pre-Hepatitis B Vaccine

Post-Hepatitis B Vaccine
Barriers and Progress

• Historically, 3 major barriers to introduction HepB:
  – high cost of vaccines,
  – poor immunization infrastructure, and
  – lack of recognition of disease burden, esp in children

• Progress being made:
  – Price of monovalent HepB from ~USD 3.00/dose 1990 to USD 0.27/dose 2004
  – Recent GAVI/VF support critical in accelerating the introduction
Global Progress

• WHO goal for integration of HepB into EPI by 1997 not achieved, however,
  – By 2002, 141 of 192 (73%) WHO Member States had introduced
  – 41% of the world's children less than 1 year of age had been fully vaccinated
  – Coverage by WHO region: WPR 70%; AMR 71%; EUR 60%; EMR 43%; SEAR 11%; and AFR 24%
  – Of 137 Member States that introduced and data available, 76 (55%) have birth dose

• Global goals are now introduction HepB in all countries by 2007 and coverage HepB3 90% by 2010
FIGURE. World Health Organization member states with universal infant or childhood hepatitis B vaccination programs, 2003
WHO Regional Vaccination coverage (%)  
HepB3 < 1 year of age: 2002
Challenges

• Countries eligible for GAVI/VF support to develop plans and apply
• Countries with DTP3 coverage < 50% develop plans to strengthen immunization systems
• Countries ensure coverage HepB3 = DTP3 and increase coverage with both to > 90%
Status of GAVI/Vaccine Fund Support for Hepatitis B Vaccine--May 2004

Countries approved/applied not yet introduced (8)

Countries not eligible (9)

Eligible countries (8)
Other Challenges

• Delivery of Birth Dose
  – In countries with high proportion infants born in facilities/home with TBAs
  – In countries with large number home births not attended by trained person
• Prevention of vaccine freezing (shipment and storage)
• Decreasing wastage
• Catch-up immunization (older children and high-risk adults)
• Impact assessment
• Financial sustainability
Questions?