EVALUATION OF THE SCHOOL-BASED HEPATITIS B VACCINATION PROGRAMME IN CATALONIA (SPAIN)

Prof. L. Salleras
Department of Public Health
University of Barcelona
Hospital Clínic Barcelona

Hepatitis B vaccine: Long term efficacy, Booster policy, and Impact of Mutants on Hepatitis B Vaccination Programmes

Viral Hepatitis Prevention Board Meeting
Sevilla, Spain. March 11-12 2004
MASS HEPATITIS VACCINATION OF PRE-ADOLESCENTS OF 12 YEARS IN SCHOOLS OF CATALONIA

- 1991  Hepatitis B
- 1998  Hepatitis A + B
DESCRIPTIVE EPIDEMIOLOGY OF HEPATITIS B IN CATALONIA IN THE PRE-VACCINATION ERA

♣ ANNUAL REPORTED MORBIDITY
   3.3 per 100,000 inhabitants

♣ ANNUAL ESTIMATED MORBIDITY
   20 per 100,000

♣ PREVALENCE OF MARKERS ( >= 25 years)
   HBsAg: 1 per 100 (60,000)
   Anti-HBs : 20 per 100

♣ SEROEPIDEMIOLOGICAL PATTERN
   Intermediate type
HEPATITIS B VACCINATION PROGRAMMES IN CATALONIA

♣ BEGUN IN 1984

♣ CONCENTRATED ON
  ♦ High risk groups
  ♦ Newborns of HBsAg+ mothers

♣ LIMITED IMPACT ON
  ♦ Incidence of the disease
  ♦ Long term consequences
UNIVERSAL HEPATITIS B VACCINATION IN CATALONIA (December 1990)

Three options of mass vaccination

- Infant
- Pre-adolescent
- Infant + pre-adolescent
1. High risk of infection and disease during adolescence and early adulthood and a low risk in infants and younger children.

2. Rapid impact of the vaccination on disease incidence rates.

3. Presumed high vaccination coverages in schools.

4. Efficiency of the intervention.
PREVALENCE OF HEPATITIS B MARKERS IN THE POPULATION OF CATALONIA (1989)

## ESTIMATED RISK OF PERINATAL TRANSMISSION OF THE HEPATITIS B VIRUS IN CATALONIA 1999

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of births per year</td>
<td>60,000</td>
</tr>
<tr>
<td>Pregnant women</td>
<td></td>
</tr>
<tr>
<td>HBsAg+ (1.2 per 100)</td>
<td>720</td>
</tr>
<tr>
<td>HBeAg+ (5 per 100)</td>
<td>36</td>
</tr>
<tr>
<td>HBeAg- (95 per 100)</td>
<td>684</td>
</tr>
<tr>
<td>Infectious mothers*</td>
<td>134</td>
</tr>
<tr>
<td>Infant chronic carriers**</td>
<td>120</td>
</tr>
<tr>
<td>Estimated prevalence of HBsAg+ at birth*** (%)</td>
<td>0.2 per 100</td>
</tr>
</tbody>
</table>

* 90% of HBsAg+ and HBeAg+ and 15% of HBsAg+ and HBeAg-
** 90% of infected subjects at birth
*** Without vaccination programme

### Prevalence of Chronic Carriers of HBsAg

#### At Birth and in the 6-11 Years Age Group

**CATALONIA 1989**

<table>
<thead>
<tr>
<th>Age</th>
<th>Prevalence of HbsAg+ x 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>At birth*</td>
<td>0.2 per 100</td>
</tr>
<tr>
<td>At 6-11 years**</td>
<td>0.2 per 100</td>
</tr>
</tbody>
</table>

*Estimated from the prevalence of HbsAg+ mothers, 1989.
**Seroepidemiological survey in the child population 1989.
HEPATITIS B REPORTED MORBIDITY BY AGE
CATALONIA 1990

Age groups

Absolute figures

0-4 5-14 15-24 25-34 35-44 45-54 55-64 >=65

Mass Hepatitis B vaccination
SCHOOL-BASED VACCINATION PROGRAMMES IN SCHOOLS

- Established 1988
- MMR at 11 years
- Td at 14 years
- High vaccination coverage achieved
## COST-EFFECTIVENESS ANALYSIS OF HEPATITIS B VACCINATION STRATEGIES IN CATALONIA (SPAIN)

<table>
<thead>
<tr>
<th>VACCINATION STRATEGY</th>
<th>COST-EFFECTIVENESS RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost/infection avoided</td>
</tr>
<tr>
<td></td>
<td>(in 1991 pts)</td>
</tr>
<tr>
<td>Vaccination of infants</td>
<td>254,000 pts</td>
</tr>
<tr>
<td>Vaccination of infants and pre-adolescents</td>
<td>182,000 pts</td>
</tr>
<tr>
<td>Vaccination of pre-adolescents</td>
<td>129,000 pts</td>
</tr>
</tbody>
</table>

PRE-adolescent Universal Hepatitis B Vaccination Programme

- LAUNCHED IN OCTOBER 1991
- VACCINATION OF PRE-adolescents OF 12 YEARS IN SCHOOL
  - No pre-vaccination screening for markers
  - 3 doses of vaccine (0, 1 and 6 months)
    - Engerix B 10µg HBsAg
- ANNUAL COST OF THE PROGRAMME
  - 3.1 million Euros in 1991 prices
# HEALTH AND OPERATIONAL TARGETS OF PRE-ADOLESCENT HEPATITIS B VACCINATION PROGRAMME

**Catalonia 1991**

<table>
<thead>
<tr>
<th>Type of target</th>
<th>Indicator</th>
<th>Situation in Catalonia 1989</th>
<th>Situation to attain by the year 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational target</strong></td>
<td>Vaccination coverage of pre-adolescents in schools</td>
<td>---</td>
<td>High level of coverage</td>
</tr>
<tr>
<td><strong>Health target</strong></td>
<td>Prevalence of hepatitis B virus infection (antiHBc+) in 15-24 years age group</td>
<td>9.3 per 100</td>
<td>90% reduction</td>
</tr>
</tbody>
</table>
OPERATIONAL TARGET: VACCINATION COVERAGE

- Administrative data: Vaccine administered to school children
- Serological data: Prevalence of vaccine-induced immunity (anti-HBs+ and anti-HBc-) in adolescents of 14 years

HEALTH TARGET: PREVALENCE OF HEPATITIS B VIRUS INFECTION IN 15-24 YEARS AGE GROUP

- Serological data: Prevalence of antiHBc+ in the 15-24 years age group.
VACCINATION COVERAGE (VACCINES ADMINISTERED) IN PRE-ADOLESCENTS OF 12 YEARS WITH THE HEPATITIS B VACCINE
Catalonia 1991-2000
## Prevalence of Hepatitis B Vaccine-Induced Immunity in Adolescents of 14 Years

**Catalonia (Spain) 1986-2001**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>n</th>
<th>Hepatitis B vaccine-induced immunity (antiHBs+ antiHBc-)</th>
<th>Number</th>
<th>X100</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>479</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1996</td>
<td>299</td>
<td>281</td>
<td>94.0*</td>
<td>91.3-96.7</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>305</td>
<td>287</td>
<td>94.1*</td>
<td>91.5-96.7</td>
<td></td>
</tr>
</tbody>
</table>

* P<0.001 against 1986

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>Hepatitis B virus infection susceptibility (anti-HBs- &amp; anti-HBc-)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>1986</td>
<td>479</td>
<td>467</td>
</tr>
<tr>
<td>1996</td>
<td>299</td>
<td>16</td>
</tr>
<tr>
<td>2001</td>
<td>305</td>
<td>17</td>
</tr>
</tbody>
</table>

- p < 0.001 against 1986
### Prevalence of Hepatitis B Vaccine Induced Immunity in Adolescents of 14 Years According to the Number of Doses Received

<table>
<thead>
<tr>
<th>Number of doses received</th>
<th>n</th>
<th>Hepatitis B vaccine induced immunity (anti-HBs+, anti-HBc-)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>3 doses</td>
<td>322</td>
<td>312</td>
</tr>
<tr>
<td>2 doses</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>343</td>
<td>332</td>
</tr>
</tbody>
</table>

### PREVALENCE OF HEPATITIS B VIRUS INFECTION IN THE 15-24 YEARS AGE GROUP

Catalonia 1986-2001

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>Number</th>
<th>Per 100</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>72</td>
<td>7</td>
<td>9.3</td>
<td>2.6-16.0</td>
</tr>
<tr>
<td>1996</td>
<td>118</td>
<td>4</td>
<td>3.3</td>
<td>0.1-6.5</td>
</tr>
<tr>
<td>2001</td>
<td>207</td>
<td>2</td>
<td>0.9</td>
<td>0-2.2</td>
</tr>
</tbody>
</table>

HEPATITIS B MORBIDITY IN THE 10-19 YEARS AGE GROUP AND VACCINATION COVERAGE OF PRE-ADOLESCENTS OF 12 YEARS WITH THE HEPATITIS B VACCINE
Catalonia 1991-2000

![Graph showing vaccination coverage and morbidity percentage per 100,000 inhabitants over school years 1991 to 2001.](image-url)
COMPARISON WITH OTHER MASS HEPATITIS B VACCINATION PROGRAMMES OF PREADOLESCENTS

The results of the Catalan Programme compare favorably with similar programmes

Vaccination coverage
♦ Italy
♦ Canada
♦ U.S

Effectiveness of the programme
♦ Israel
♦ China
♦ Taiwan
♦ South Africa
♦ Gambia
♦ Some Pacific Islands
IN SUMMARY

HEPATITIS B VACCINATION PROGRAMME OF PRE-ADOLESCENTS OF 12 YEARS 1990-2001

- High level of coverage (94%)
- 90% reduction in prevalence of HBcAg+ in 15-24 years old
- 80% reduction in incidence of the disease in 10-19 years age group.