History & Future of the Expanded Programme on Immunization

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The Gates Challenge

‘If we can find approaches that meet the needs of the poor in ways that generate profits for business and votes for politicians, we will have found a sustainable way to reduce inequity in the world. This task is open-ended. It can never be finished. But a conscious effort to answer this challenge will change the world.’

Bill Gates
Commencement Address
Harvard University Class of 2007
Expanded from what?

• **Smallpox eradication**
  – Globally coordinated programme under WHO leadership
  – Last case in 1977, eradication certified in 1979

• **Expanded Programme on Immunization**
  – EPI launched 1974
  – Build on smallpox infrastructure
  – Six diseases (four vaccines) in ‘Traditional EPI’
    • TB, Polio, Diphtheria, Tetanus, Pertussis, Measles

• EPI progressively adopted by all countries
  – Universal by early 1980s
DTP3 coverage, 1980-2006

% coverage


Global
African
American
Eastern Mediterranean
European
South East Asian
Western Pacific

GAVI support

UCI
DTP3 unvaccinated infants, 2000-2006, projection 2010*

## Original EPI infant schedule

<table>
<thead>
<tr>
<th>Vaccine/Age</th>
<th>Birth</th>
<th>6 weeks</th>
<th>10 weeks</th>
<th>14 weeks</th>
<th>9 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>BCG</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OPV</td>
<td>OPV1</td>
<td>OPV2</td>
<td>OPV3</td>
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<tr>
<td>DTP</td>
<td>DTP1</td>
<td>DTP2</td>
<td>DTP3</td>
<td></td>
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<tr>
<td>Measles</td>
<td></td>
<td></td>
<td></td>
<td>Measles</td>
<td></td>
</tr>
</tbody>
</table>

Tet. Tox to pregnant women
Up to 5 doses, 2 in first preg, 1 in each subsequent
Additions to EPI

- **Yellow fever** in 1988
  - for endemic countries only: 33 in Africa, 11 in S.America
  - Given with measles vaccine

- **Hepatitis B** in 1992
  - In high seroprevalence (>7%) countries by 1995
  - In all countries by 1997

- **Haemophilus influenzae** type b (Hib)
  - 1998: based on disease burden and capacity
  - 2006: all countries. (Lack of data should not be obstacle)
The impact and potential of immunization (2002 data)

Traditional EPI

Deaths
Deaths averted

3.3 million prevented
1.1 million to be prevented

0.5 million prevented
1.0 million to be prevented

3 million to be prevented

Polio
Diphteria
Tetanus
Pertussis
Measles

Influenza
YF
Rubella
JE
Hep B
Hib

Pneumo
Rota
Men A
Dengue
Cholera
Typhoid
HPV

Slide from P. Zuber, WHO
HepB and Hib

• GAVI supported vaccines since 2000
  – Enabled poorest countries to add to EPI
  – DTPHepB and DTPHepBHib supported by GAVI

• Hib still a challenge for Middle Income countries
  – WHO and UNICEF developing strategies
  – Affordability expected to improve with more suppliers

• DTPHepBHib expected to replace DTP
  – Impact on DTP and DTPHepB demand
  – Birth dose of HepB still needed for perinatal transmission
Countries having introduced HepB vaccine and infant HepB3 coverage, 2006

164 countries introduced in national infant immunization schedule

- **HepB3 ≥ 80%** (131 countries or 68%)
- **HepB3 < 80%** (30 countries or 15%)
- HepB vaccine introduced but no coverage data reported (3 countries or 2%)
- HepB* vaccine not introduced (29 countries or 15%)
  * 4 countries introduced HepB in adolescent immunization schedule


Date of slide: 20 August 2007

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

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Hib in national immunization system, 1997 & 2008

Source: WHO/IVB database, February 2008
193 WHO Member States.

Accelerated uptake: new WHO position; GAVI support to 2015 co-finance incentive; Hib initiative; ?peer pressure
?Asia in 2009
Global coverage estimates, 1980-2006
BCG, DTP1, DTP3, Polio3, Measles HepB3 and Hib

Date of slide: 20 August 2007

GAVI support
BCG in HIV+

• BCG is not used in richer countries
  – Highest coverage vaccine in most countries
• BCG does not impact on TB overall
  – Does prevent TB meningitis and other serious in infants
• Recent data showing benefits <risk for HIV+
  – SAGE recommendation not to use in HIV+ (2007)
  – Programmes not yet clear how to implement
Future EPI schedule

- Pneumococcal conjugate vaccine (PCV)
  - Estimated ~800,000 deaths in under-five-year-olds
  - 3 doses in infancy > 16% reduction in deaths in Gambia*
  - Herd immunity/ single dose if age > 12 months

- Rotavirus vaccine (RV)
  - Estimated ~500,000 deaths in under-two-year-olds
  - Data from Africa and Asia on efficacy needed
  - Intussusception and age (>32w)

- Regional/Special groups
  - MeningA, Japanese Encephalitis, Typhoid

- Older age groups
  - Booster doses of DTP/Td
  - Human Papillomavirus (HPV)

Implications for vaccine manufacturers

• Pace of implementation of ‘new EPI’ uncertain
  – Especially for lower mid-income countries
  – Demand forecasting difficult

• More vaccines needed
  – Coverage increasing, booster doses

• More combination vaccines needed
  – Complex choices / Transitional vaccines (eg, DTPHepB)

• All liquid vaccines preferred
  – Removes a step – potential for errors
  – Simplifies storage and use

• Optimal number of doses per vial
  – Balance between cold chain and wastage
  – Will price per dose vary for new vaccines?