Immunization challenges in low and middle income countries

U hasselt, February 25, 2016

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Vaccine & Infectious Disease Institute
University of Antwerp, Belgium
Content of the presentation

• **Polio immunization** = example of a programmatic challenge!
  • The challenge of the polio immunization!
  • The challenge of the polio eradication!
• **Hepatitis B immunization** = example of economical challenge!
  • Implementation of an immunization programme with new or under-used vaccines
  • Timeliness of immunization
• **Human papillomavirus immunization** = example of communication & safety management challenge!
Expanded Programme on Immunization coverage

Tetanus (b) 2nd dose  Measles (a)  DPT 3rd dose  OPV 3rd dose  BCG

GPV/EPI  29-Apr-97
Polio immunization

- The challenge of the polio immunization!
- The challenge of the polio eradication!
Polio - infantile paralysis

- enterovirus
- first described in 1789 (Underwood)
- 3 serotypes
- faeco-oral transmission
- replication in pharynx, glands,
- spread via blood and CNS
- affects motor neurones
Polio - infantile paralysis

- Incubation: 6-20 days
- 95% inapparent
- 2% flaccid paralysis
- CFR:
  - 2-5% in children
  - 15-30% in adults
Polio
London – 1957 (Drinker respirator °1828)
Incidence of polio in the USA (source: CDC)
1994, last polio case in the Americas
CERTIFICATE

WORLD HEALTH ORGANIZATION
EUROPEAN REGION
REGIONAL COMMISSION FOR THE CERTIFICATION
OF POLIOMYELITIS ERADICATION

THE COMMISSION CONCLUDES,
FROM EVIDENCE PROVIDED
BY THE NATIONAL
CERTIFICATION COMMITTEES
OF THE 51 MEMBER STATES,
THAT THE TRANSMISSION
OF INDIGENOUS WILD POLIOVIRUS
HAS BEEN INTERRUPTED
IN ALL COUNTRIES OF THE REGION.
THE COMMISSION ON THIS DAY
DECLURES THE EUROPEAN REGION
POLIOMYELITIS FREE.

SIR JOSEPH SMITH, CHAIRMAN
PROFESSOR MARGARETA RÖTHLICHER
PROFESSOR SIVAN DÖNÖE
DR. WALTER DÜWOLD

DE GEORGIS E. BERTA
PROFESSOR HERBERT G. BRODOV
DAMITRACI
PROFESSOR DONATO GRASSO
PROFESSOR HERMANN STÜCK.

COPENHAGEN, 21 JUNE 2002

21 June 2002
Control of polio in the world

- **Eradication**
  - No polio cases in the 6 WHO regions
  - No transmission
  - E.g. smallpox in 26.10.1977
  - Feasible for infections that only target humans and are transmitted from man to man

- **Elimination**
  - No transmission/ no cases in a specific region of the WHO
  - Polio: WHO EURO, WHO PAHO

- **Control**
  - Reduction in the incidence of a vaccine-preventable infection
THERE IS STRONG GLOBAL POLITICAL COMMITMENT TO ERADICATE POLIO

United Nations - A Global Call to End Polio, 27th September, 2012

"This decisive moment is a matter of health and justice. Every child has the right to start life with equal protection from this disease. That's why I have made eradicating polio a top priority for my second term as Secretary-General"

- Ban Ki-moon, United Nations Secretary-General

Photograph obtained from The Polio Emergency and Endgame - Strategy and Timelines
National immunization days

- India, February 2016 (NID = 1 week)
- Target > 137 million children in 1 week
- Rotary International (volunteers from Belgium, UK, Australia, Japan, ..) to assist UNICEF & WHO personnel
Legal Advice

www.business.com
Find, Compare & Research Vendors. Save Time & Money at Business.com!

TODAY'S NEWSPAPER

National

31 fell victim to polio carnage in 18 months

Fakhar Durrani
Wednesday, January 22, 2014
From Print Edition
ISLAMABAD: Thirty-one people, including 21 polio workers and 10 policemen, have been killed in Pakistan after the US operation, which killed Osama bin Laden in Abbottabad with the alleged support of Dr Shakil Afridi.

The Prime Minister’s Polio Monitoring Cell’s data reveals that the polio vaccination campaign has claimed 51 lives of polio workers and policemen from July 17, 2012 till date. With the rise of attack on polio workers the vaccination campaign has been badly hampered as the last year campaign missed almost 300,000 children to be vaccinated.

Not only this, but the international community is also closing the doors for Pakistanis to enter in their countries without obtaining polio vaccination certificates prior to leaving the country. Talking to The News Prime Minister’s Polio Monitoring Cell’s head Dr Altaf said the Cell has already derived National Emergency Plan according to which the government has formed committees on each level.

He said they already have provided the security guidelines to the provinces and the provincial governments were bound to provide security to workers and other team members of the entire polio campaign.

To a question he said although TTP has vigorously opposed the polio vaccination campaign but it has never accepted the responsibility, hence the government is facing unidentified miscreants who want to sabotage the whole campaign.

The World Health Organization has already declared the city of Peshawar as polio free.
Social determinants of polio vaccination in Pakistan
Mushtaq et al. Travel Medicine and Infectious Diseases 2015; 13: 360-366

• **Religion:** 98% Muslim (and literacy: 60%)
  • Anti-polio vaccination boycott:
    • Fear of sterilization
    • Infertility
    • Hidden foreign agenda
    • Contamination with HIV (as in Nigeria)
    • Rumors of animal fat derivates

• **Political**
  • Anti-US radical elements
    • CIA conducted a fake vaccination campaign for locating Osama Bin laden in Abbotabad (creates distrust)

• **Security issues for HCW**
• **Lack of leadership/governance**
• **Unawareness**
• **Inaccessibility**
• **Natural disaster**
Recent WHO data - 2016
Monthly Distribution of Wild Poliovirus Cases¹, 2011-2015

By date of onset of paralysis. WPV type 1 includes 1 case in 2012 with a mixture of W1W3 virus. Cases with onset in January 2016 will be reflected in the next update.

No WPV3 case reported in 2013-2015.

¹By date of onset of paralysis. WPV type 1 includes 1 case in 2012 with a mixture of W1W3 virus. Cases with onset in January 2016 will be reflected in the next update. No WPV3 case reported in 2013-2015.
Wild Poliovirus & cVDPV Cases\(^1\), Previous 12 Months\(^2\)

1 Excludes viruses detected from environmental surveillance.
2 Onset of paralysis 17 February 2015 – 16 February 2016

<table>
<thead>
<tr>
<th>Country</th>
<th>Wild poliovirus</th>
<th>cVDPV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Onset of most</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>recent case WPV1</td>
<td>cVDPV*</td>
</tr>
<tr>
<td>Guinea</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>Nigeria</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>Madagascar</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>AFR</td>
<td>0</td>
<td>02-Oct-15</td>
</tr>
<tr>
<td>Pakistan</td>
<td>17-Jan-16</td>
<td>38</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>20-Dec-15</td>
<td>19</td>
</tr>
<tr>
<td>EMR</td>
<td>17-Jan-16</td>
<td>57</td>
</tr>
<tr>
<td>Ukraine</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>EUR</td>
<td>0</td>
<td>07-Jul-15</td>
</tr>
<tr>
<td>Lao People's Democratic Republic</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>WPR</td>
<td>0</td>
<td>11-Jan-16</td>
</tr>
<tr>
<td>Myanmar</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>SEAR</td>
<td>0</td>
<td>05-Oct-15</td>
</tr>
<tr>
<td>Global</td>
<td>17-Jan-16</td>
<td>57</td>
</tr>
</tbody>
</table>

*cVDPV1 in Madagascar, Ukraine, Laos, cVDPV2 in all other countries.
NA: most recent case had onset of paralysis prior to rolling 12 months.

Data in WHO HQ as of 16 February 2016
Wild Poliovirus Cases¹, Previous 6 Months²

<table>
<thead>
<tr>
<th>Country</th>
<th>Onset of most recent case</th>
<th>Number of infected districts</th>
<th>Total WPV (All type1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakistan</td>
<td>17-Jan-16</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>20-Dec-15</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>EMR</td>
<td>17-Jan-16</td>
<td>22</td>
<td>37</td>
</tr>
<tr>
<td>Global</td>
<td>17-Jan-16</td>
<td>22</td>
<td>37</td>
</tr>
</tbody>
</table>

¹Excludes viruses detected from environmental surveillance.
²Onset of paralysis 17 August 2015 – 16 February 2016

Data in WHO HQ as of 16 February 2016
Poliovirus Weekly Update (Jan 2016)

- Total number of wild polio cases reported in 2014: 359
- Total number of wild polio cases reported in 2015: 71
- Total in endemic countries 71
  - 52 cases in Pakistan
  - 19 cases in Afghanistan
- Total number of wild polio cases reported in 2016 (so far): 0
Polio – “the end game”

- No circulation of polio type 2!
- Type 3 is almost eliminated!
- Only type 1 cases
- OPV2:
  - Some vaccine associated type 2 strains in stools/sewages = (circulating vaccine-derived polioviruses (cVDPV) which can further mutate and circulate easier/become more virulent.
  - OPV2 related to VAP (vaccine associated polio cases)
cVDPV Cases\(^1\), Previous 6 Months\(^2\)

<table>
<thead>
<tr>
<th>Country</th>
<th>Onset of most recent case</th>
<th>Number of infected districts</th>
<th>cVDPV* cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guinea</td>
<td>02-Oct-15</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Madagascar</td>
<td>22-Aug-15</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>AFR</td>
<td>02-Oct-15</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Lao People's Democratic Republic</td>
<td>11-Jan-16</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>WPR</td>
<td>11-Jan-16</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Myanmar</td>
<td>05-Oct-15</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SEAR</td>
<td>05-Oct-15</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Global</td>
<td>11-Jan-16</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

*Madagascar and Laos serotype 1.
Guinea and Myanmar serotype 2.

\(^1\)Excludes viruses detected from environmental surveillance.
\(^2\)Onset of paralysis 17 August 2015 – 16 February 2016

Data in WHO HQ as of 16 February 2016
Polio – “the end game”

• End game = stepwise approach

• Challenge 1:
  – Offer all infants 3 polio vaccine doses

• switch from tOPV to bOPV (type 1,3): April 2016

• Challenge 2:
  – Be ready with sufficient bOPV!
  – Destroy all remaining tOPV to avoid circulation of vaccine derived OPV2!
Polio – “the end game”

• At least one IPV in polio vaccine schedule
• Challenge 3:
  – Have enough IPV for offering at least 1 dose
  – Have the equipment/infrastructure (syringes/needle)
• Stock-pile monovalent OPV2 (100 million doses), in case if! = challenge 4!
• Development of new genetic engineered nOPV2 (much lower risk of circulation and VAP) and nOPV-trivalent
• Switch to IPV for all vaccines = same as challenge 3!
Polio – “the end game”

• Eradication with IPV and/or nOPV!!
• = Challenge 5!
Hepatitis B immunization

• Economical challenge
  • new and expensive vaccine!
• Programmatic challenge
  • Introduction, number of doses
  • Importance of the birth dose!
• Despite the availability of safe and effective HBV vaccines since more than 30 years
• Global burden of disease is still substantial:
  • About 2000 million (2 billion) have been infected
  • 240 - 350 million chronically HBV infected,
  • ~600,000 deaths/yr as a result of HBV infection
  • 57% of cirrhosis was attributable to either HBV or HCV
    – 30% of cirrhosis was attributable to HBV
  • 78% of HCC was attributable to HBV or HCV
    – 53% of HCC was attributable to HBV

<table>
<thead>
<tr>
<th>Region</th>
<th>Total Deaths</th>
<th>Percent Global Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFRO</td>
<td>69,000</td>
<td>11%</td>
</tr>
<tr>
<td>AMRO</td>
<td>12,000</td>
<td>2%</td>
</tr>
<tr>
<td>EMRO</td>
<td>21,000</td>
<td>3%</td>
</tr>
<tr>
<td>EURO</td>
<td>51,000</td>
<td>8%</td>
</tr>
<tr>
<td>SEARO</td>
<td>143,000</td>
<td>23%</td>
</tr>
<tr>
<td>WPRO</td>
<td>325,000</td>
<td>52%</td>
</tr>
<tr>
<td>Global</td>
<td>620,000</td>
<td>100%</td>
</tr>
</tbody>
</table>
### Ten Leading Causes of Infectious Disease Deaths Worldwide (2000)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Deaths per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower resp tract infections</td>
<td>~3.5 million</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>~3.0 million</td>
</tr>
<tr>
<td>Diarrheal diseases</td>
<td>~2.2 million</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>~2.0 million</td>
</tr>
<tr>
<td>Malaria</td>
<td>~1-3 million</td>
</tr>
<tr>
<td>Measles</td>
<td>~888,000</td>
</tr>
<tr>
<td><strong>Hepatitis B</strong></td>
<td>~500,000-750,000</td>
</tr>
<tr>
<td>Pertussis</td>
<td>~355,000</td>
</tr>
<tr>
<td>Neonatal tetanus</td>
<td>~300,000</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>~250,000</td>
</tr>
</tbody>
</table>

Source: CDC, WHO, UNICEF, UNAIDS
Outcome of HBV Infection According to Age at Time of Infection

WHO 2001

Proportion becoming carriers

Age at infection (yr)
Outcome of HBV Infection According to Age at Time of Infection

WHO 2001
Prevalence of Chronic Hepatitis B Virus Infection Among Children Before and After HepB Vaccine Introduction

- Taiwan
- Shanghai
- Rural China
- Gambia
- Alaska
- Thailand

Children born before hepB introduction vs. Children born after hepB introduction.
Number of countries having introduced HepB vaccine* and global infant HepB3 coverage, 1989-2013

*excluding 3 countries where HepB administered for adolescence

Immunization Vaccines and Biologicals, (IVB), World Health Organization. 194 WHO Member States. Date of slide: 29 July 2014.

2012: introduced in 181 countries
2013: introduced in 183 countries
Global Immunization 1989-2013, 3rd dose of Hepatitis B coverage in infants

Global coverage at 79% in 2012
81% in 2013

Source: WHO/UNICEF coverage estimates 2013 revision July 2014
Immunization Vaccines and Biologicals (IVB), World Health Organization.
194 Member States. Date of slide: 29 July 2014.
Early GAVI

• Previous collaborations in the Immunization community
  – Smallpox, EPI, UCI, Polio Eradication, CVI
• Children’s Vaccine Initiative (CVI) formed to get new vaccines into EPI (~1990). Never touched the ground.
• Death of CVI was the impetus for forming GAVI
• Working Group (WHO, UNICEF, WB, CVP, USAID, Donors)
  – Established “business case”, architects of structure
• Gates Family convinced to make immunization a major focus of their new Foundation
  – CVP at PATH Funded ($100m)
  – $750m grant established Global Fund for Children’s Vaccines
The Global Immunization Environment

WHO

UNICEF

National Immunization Services

World Bank

Civil Society

Bilaterals

Industry

Foundations

Academia

Technical Organizations
GAVI

• A PPP of bilateral and multilateral donors, foundations, technical agencies, industry and governments funded by donor governments, Gates, and “GAVI” bonds
• Funded vaccines and infra for the poorest 72 countries
• 54 countries now eligible for new vaccine support
• Great success in introduction of Hep B, safe injections, Hib, Pneummo. Rota, Mening A, and increasing coverage
• Vaccine manufacturers have publicly committed to offer GAVI low prices, said to be their “cost”
• Now has billions committed over next 10 years (Gates Foundation, Governments, International Finance Facility for Immunization, Advanced Purchase Commitments)
Slow introduction of Hep B and Hib vaccines into developing countries

GAVI Fund established

Hep B licensed in U.S.

Hib licensed in U.S.

Million doses

1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005

* WORLD BANK DATA
Lessons from Early GAVI

- Global Immunization had huge global political and funding support since smallpox and early EPI
- Hepatitis has a significant support community but until now not a global health political priority
- Existing institutions always resistant to new funding structures
  - Threatens influence, donor competition, competing agendas
- Good to find a “super donor” but don’t count on it
- GAVI is a mechanism to transfer resources from taxpayers in industrial countries to children in developing world
- Will these taxpayers pay for hepatitis Tx for adults?
Coverage and timeliness

• Coverage as indicator
• Underestimation of timeliness as indicator
  • Will now be added as an indicator
  • Examples:
    • Infant pertussis:
      • Consequence of delay in immunization, low coverage, or lack of passively transferred maternal antibodies
    • Neonatal hepatitis B:
      • Known consequence of late ‘birth’ dose
Situation in LMIC

- Vietnam is highly endemic:
  - >8% of adults (11 to 19% in the Mekong delta)
- In the Mekong delta, 13% of pregnant women are hepatitis B virus carriers:
  - A two stage cluster vaccine coverage survey was performed
Map of the Mekong Delta representing the three selected provinces
## Vaccination Register @ Commune Health Centre

<table>
<thead>
<tr>
<th>TT</th>
<th>Ho và tên trẻ</th>
<th>Ngày sinh</th>
<th>Ho ten me hoach cha</th>
<th>Dia chi gia dinh</th>
<th>BCG</th>
<th>Viêm gan B</th>
<th>Daktrong</th>
<th>DPT-04</th>
<th>DPT-2</th>
<th>Sốt</th>
<th>TCDR</th>
<th>Hai liều UV me da tiên</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nguyễn Thị Ба</td>
<td>03/04/2014</td>
<td>Ba Nguyễn Văn Trường</td>
<td>123 fake village</td>
<td>BCG</td>
<td>1-24 gia</td>
<td>Daktrong</td>
<td>1 2 3 4</td>
<td>1 2 3</td>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nguyễn Văn Dao</td>
<td>01/05/2014</td>
<td>Văn Nguyễn Thị Nhung</td>
<td>456 fake village</td>
<td>DPT</td>
<td>1-24 gia</td>
<td>Daktrong</td>
<td>1 2 3 4</td>
<td>1 2 3</td>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nguyễn Thị Danh</td>
<td>02/06/2014</td>
<td>Danh Nguyễn Thị Hằng</td>
<td>789 fake village</td>
<td>HCV</td>
<td>1-24 gia</td>
<td>Daktrong</td>
<td>1 2 3 4</td>
<td>1 2 3</td>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
<td></td>
</tr>
</tbody>
</table>

Note: This is a sample table for the vaccination register. The actual content may vary depending on the specific data collected in the health centre.
Home visit – Can Tho @ commune health centre
Situation in LMIC

- Vietnam is highly endemic:
  - >8% of adults (11 to 19% in the Mekong delta)
- in the Mekong delta, 13% of pregnant women are hepatitis B virus carriers:
  - A two stage cluster survey was performed
  - Preliminary data: first dose was offered between 12h after birth and 27 days after birth (> 75% of doses after 24h after birth)
    - Related to the presence of the health visitor at the commune health centre
Vietnam

- This is a nationally representative cross-sectional survey
- A total of 6,949 children were included in the survey analyses.
- The overall HBsAg prevalence among surveyed children was 2.7% (95% (CI): 2.20–3.30).
  - HBsAg prevalence was significantly higher among children born in 2000–2003 (3.64%) compared to children born 2007–2008 (1.64%) (PR: 2.22, CI 1.55–3.18).
  - HBsAg prevalence among children with ≥3 doses of hepatitis B vaccine including a birth dose (1.75%) was significantly lower than among children with ≥3 doses of hepatitis B vaccine but lacked a birth dose (2.98%) (PR: 1.71, CI: 1.00–2.91) and significantly lower than among unvaccinated children (3.47%) (PR: 1.99, CI: 1.15–3.45).
  - Infants receiving hepatitis B vaccine >7 days after birth had significantly higher HBsAg prevalence (3.20%) than those vaccinated 0-1 day after birth (1.52%) (PR: 2.09, CI: 1.27–3.46).
### Vietnam: birth dose coverage

**Hepatitis B vaccination coverage by birth cohort group.**

<table>
<thead>
<tr>
<th>Birth cohort</th>
<th>Total children</th>
<th>Hepatitis B vaccine 3-dose coverage&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Hepatitis B vaccine birth dose coverage&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>(95% confidence interval)</td>
</tr>
<tr>
<td>2000–2003</td>
<td>1740</td>
<td>46.1</td>
<td>(39.6–52.7)</td>
</tr>
<tr>
<td>2004–2006</td>
<td>1783</td>
<td>78.8</td>
<td>(74.1–83.5)</td>
</tr>
<tr>
<td>2007–2008</td>
<td>3426</td>
<td>84.0</td>
<td>(79.6–87.7)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Counting birth dose vaccination.

<sup>b</sup> Hepatitis B vaccination within 7 days of birth.
Device for intradermal administration of vaccines

VAX-ID
Need for VAX-ID

• Increased knowledge skin immunology

• Advantages intradermal injection of vaccines

• Limited availability of ID delivery systems
Product idea

• Device suitable for ID injections of vaccines
• Ease of use
• Safety considerations: needle-stick & re-use/abuse
• Injections by non-medical staff (and self-admin?)
• Technical specifications: needle length & thickness
  – Injections in children
  – Injections at different anatomic sites
    (time saving & near therapeutic indication)
Multi-Disciplinary Approach

**Vaxinjectio**
- Prof Dr Pierre Van Damme
- Dr Vanessa Vankerckhoven

**Nursery & Midwifery**
- Prof Dr Monique Elseviers
- Timothi Van Mulder

**Product Development**
- Dr Stijn Verwulgen
- Linda Scheelen
- Ruben Camerlynck

**Applied Economics**
- Prof Dr Annouk Lievens
- Charlotte Reypens

**Industrial Partner, SME**
- Koen Beyers

**BiR&D**
- Dr Ludo Lauwers
- Dr Guido Petit
VAX-ID – assembled device
## Technical specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needle thickness</td>
<td>Ranges from 29G to 31G</td>
</tr>
<tr>
<td>Needle length</td>
<td>1 mm injection depth</td>
</tr>
<tr>
<td>Reservoir</td>
<td>Adjustability volume: 0.1cc to 0.3cc</td>
</tr>
<tr>
<td>Administration</td>
<td>Self-administration → developing countries?</td>
</tr>
</tbody>
</table>
## Benefits

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usability</strong></td>
<td>Easy to use</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Avoid needle stick injuries &amp; re-use</td>
</tr>
<tr>
<td><strong>Anatomic sites</strong></td>
<td>Multiple: deltoid, fore arm, abdominal wall...</td>
</tr>
<tr>
<td><strong>Age groups</strong></td>
<td>Multiple: children, adults, elderly</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td>By medical &amp; non-medical staff</td>
</tr>
<tr>
<td></td>
<td>Self-administration</td>
</tr>
</tbody>
</table>
TEAMWORK
coming together is a beginning
keeping together is progress
working together is success

- Henry Ford
Programmatic challenges:

cold chain for vaccines!

Vaccines require a constant temperature between 2-8°C
Collaboration with product development
Antwerp University college (T Decoene)

<table>
<thead>
<tr>
<th></th>
<th>BCG</th>
<th>OPV</th>
<th>DTP</th>
<th>Hep B</th>
<th>Mazelen</th>
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<tr>
<td>Stabiliteit</td>
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<td>Lichtresistent</td>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
<td><img src="image3" alt="Image" /></td>
<td><img src="image4" alt="Image" /></td>
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<td>Warmeresistent</td>
<td>+8°</td>
<td>+8°</td>
<td>+45°</td>
<td>+30°</td>
<td>+8°</td>
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<tr>
<td>Vriesresistent</td>
<td>+2°</td>
<td>-...°</td>
<td>-0.5°</td>
<td>+2°</td>
<td>-...°</td>
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<tr>
<td>Aantal nodige injecties</td>
<td><img src="image6" alt="Image" /></td>
<td><img src="image7" alt="Image" /></td>
<td><img src="image8" alt="Image" /></td>
<td><img src="image9" alt="Image" /></td>
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<tr>
<td>Aantal dosissen in 1 flesje</td>
<td>10 of 20</td>
<td>10 of 20</td>
<td>10 of 20</td>
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<tr>
<td>Aantal flesjes in 1 doos</td>
<td>50</td>
<td>100</td>
<td>10</td>
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<tr>
<td>Cold chain volume</td>
<td>2.6cm³</td>
<td>2.0cm³</td>
<td>2.5cm³</td>
<td>4.0cm³</td>
<td>2.1cm³</td>
</tr>
<tr>
<td>Prijs per 10 of 20 dosissen ($)</td>
<td>10 : 1.0$</td>
<td>10 : 1.9$</td>
<td>10 : 0.8$</td>
<td>10 : 1.6$</td>
<td>10 : 2.6$ / 4.7$</td>
</tr>
<tr>
<td></td>
<td>Multi</td>
<td>Multi</td>
<td>Multi</td>
<td>Multi of single</td>
<td>Multi of single</td>
</tr>
<tr>
<td></td>
<td>1.</td>
<td>2.</td>
<td>3.</td>
<td>4.</td>
<td>5.</td>
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<td>---------------------------</td>
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<tr>
<td><strong>Indruk</strong></td>
<td>++</td>
<td>--</td>
<td>+/-</td>
<td>++</td>
<td>-</td>
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<td><strong>AANWEZIG?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Naalden</strong></td>
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<td><strong>Safety box</strong></td>
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<td>+</td>
<td>+</td>
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<tr>
<td><strong>Correct gebruik van safety box</strong></td>
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<td>/</td>
<td>/</td>
<td>-</td>
<td>--</td>
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<tr>
<td><strong>Vaccins</strong></td>
<td>/</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>Koelkast(op juiste temp)</strong></td>
<td>+</td>
<td>--</td>
<td>--</td>
<td>+</td>
<td>+/-</td>
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<tr>
<td><strong>Theoretische kennis over vaccins</strong></td>
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<td>+</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td><strong>Correct toepassen van kennis</strong></td>
<td>/</td>
<td>--</td>
<td>+/-</td>
<td>+/-</td>
<td>-</td>
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<tr>
<td><strong>Elektriciteit aanwezig</strong></td>
<td>+</td>
<td>+/-</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td><strong>Plan B als stroom uitvalt</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>Transport box</strong></td>
<td>/</td>
<td>-</td>
<td>+</td>
<td>+/-</td>
<td>+</td>
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<tr>
<td><strong>Cins op juiste manier getransporteerd</strong></td>
<td>/</td>
<td>--</td>
<td>+/-</td>
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<tr>
<td><strong>Donaties</strong></td>
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<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td><strong>Dokters aanwezig</strong></td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<td><strong>VVM systeem</strong></td>
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<td>/</td>
<td>/</td>
<td>/</td>
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</tbody>
</table>
Hepatitis B birth dose within 24h by birth place, 2004-2005, China

Source: National Serosurvey, in 2006
The impact of the free-vaccine policy on timely initiation and completion of hepatitis B vaccine in Fujian, China

- the Chinese government began the hepatitis B vaccination programme for newborns and infants in 1992 and included it in the Expanded Programme on Immunisation (EPI) in 2002 (the free-vaccine policy)

- a delay in the funding and implementation of the hepatitis B vaccine programme in Fujian resulted in children’s families having to pay the entire cost of the vaccination
Age specific HBsAg prevalence, 1992 and 2006 serosurveys, China


Results

- children from rural areas are less likely to have access to hepatitis B vaccines (cost is an issue)
- parents are less motivated to get their children vaccinated because they lack important knowledge on immunization come from a lower socioeconomic status
- Children with delayed vaccine initiation (>24 hours after birth) were less likely to complete the vaccine series than those who received a timely first dose
Human papillomavirus vaccination
The State of Vaccine Confidence

Download the full report, including details of confidence challenges, strategies, research methods, and the Vaccine Confidence Index.

Confidence Commentary:
European Medicines Agency releases new report confirming HPV vaccine safety

Latest News

1. Mali: New ChAd3-EBO-Z Ebola vaccine safe, stimulates strong immune response
2. UK: Give HPV vaccine to men who have sex with men, government told
3. Zimbabwe: Why the world is falling behind in the campaign to kill Measles
4. Canada: Doctors warn against homeopathic 'vaccine alternatives' for children
5. US: Vaccine exemption rates higher in white, affluent Calif. communities

Literature

Knowledge, attitudes and perceptions towards polio immunization among residents of two highly affected regions of Pakistan

MU Khan, A Ahmad, T Aqeel, S Salman, Q Ibrahim, J Idriss and MU Khan. 2015. BMC Public Health 15:1100. doi:10.1186/s12889-015-2471-1

Vaccine: Special Issue on Vaccine
Current issues in vaccine acceptance

• Many countries dealing with pockets of people who are delaying or refusing recommended vaccinations

• Factors underlying these decisions vary by population, context, time and vaccine, and include:
  – Safety concerns
  – Religious concerns
  – Distrust in manufacturers and/or governments
  – Misinformation and rumours
  – Lack of perceived need, low perceived effectiveness/efficacy
  – Lack of recommendation from HCWs
  – Other priorities

• No single intervention strategy will solve the issue, but interventions have to be adapted to target local challenges
Characteristics of HPV vaccines and potential communication challenges

Targets pre-adolescent and adolescent girls
- Different place of delivery than for infants/young children
- Fear of injections
- Psychogenic or psychosomatic reactions

A new vaccine
- Safety and efficacy trials

Multi-dose schedule within six months
- Maintaining support of schools and parents for 2-3 doses

Vaccine that protects against an STI
- Evokes moral judgments and religious and cultural taboos
- Issues of promiscuity
An example of an HPV vaccine safety crisis - from Japan to Denmark and EMA
Concerns are global and varied

Consumers’ Foundation urges HPV vaccines probe

SIDE EFFECTS: HPA official Wu Chien-yuan said clinics have to let people know about possible side effects, but only 100 issues have been reported in Taiwan.

The Consumers’ Foundation yesterday urged the government to launch an investigation into potential risks of the human papillomavirus (HPV) vaccine, which the foundation said have led to several cases of severe side effects and even death overseas.

Thousands of teenage girls report feeling seriously ill after routine school cancer vaccination

Tens of thousands of girls in Taiwan have reported a range of issues from fever to debilitating pain following a routine HPV vaccination.

About 146,000 results (0.33 seconds)

Japan withdraws HPV Vaccine Recommendation for girls


HPV vaccine withdrawal has left many girls feeling sick and questioning the vaccine’s safety.

Side effects in young girls take Gardasil out of Japanese

www.tokyotimes.com/side-effects-in-young-girls-take-gardasil-out-from-

Japan has decided to remove the HPV vaccine from the market, citing concerns over side effects.

Gardasil Vaccine - Huffington Post

www.huffingtonpost.com/news/gardasil-vaccine

HPV vaccine controversy continues as Japan decides to withdraw the vaccine.

Gardasil Debate Still On One Year After It Was Taken From

www.insidewire.com/gardasil-debate-still-on-one-year-after-it-was-taken

A year after the HPV vaccine was removed from the market, the debate continues.

Japan Halts HPV Shot for Girls over Safety Issues - Judicial

www.japancastanet.org/japan-halts-hpv-shot-for-girls-

Japan has temporarily halted the HPV vaccine for girls due to safety concerns.

HPV FAQ

HPV, or human papillomavirus, is a common virus that can cause various types of cancer.
The example of Japan

- October 2009: Cervarix introduced
- October 2010: HPV vac. subsidised
- March 2013: AEFIs reported in news
- April 13 2013: Compensation claims
- June 14 2013: Recommendation suspended
- March 2010: 3 CRPS, 9 chronic pain
- July 2011: Gardasil introduced
- April 1 2013: A routine vaccination
- June 13 2013: WHO declaration
- November 2015: Still suspended
Global transmission of HPV concerns

conclusions

• Many challenges
• Not a “one fits all” solution
• A perfect vaccine is no guarantee for a success full immunization program
• Importance of the “political will”