Vaccination as a tool for handling epidemics and improving health inequalities

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Vaccination as a tool for handling epidemics
• 20th cen: 1,680 mil deaths attributed to communicable diseases
  – 400 mil smallpox
  – 97 mil measles
  – 38 mil pertussis
  – 37 mil tetanus
  – 7 mil rabies

www.informationisbeautiful.net
“Immunization is one of the most powerful and cost-effective of all health interventions”

“With the exception of safe water, no other modality, not even antibiotics, has had such a major effect on mortality reduction…”

State of the world’s vaccines and immunization, WHO, World Bank & UNICEF, 2009
Effectiveness of vaccines - I

- Very good to excellent
  - Most vaccines against the commonest “childhood diseases” provide 90-100% protective antibodies
  - Seasonal influenza: depends
Prevention

- Vaccines prepare our immune system to face future threats and attacks.
- They contain antigens such as killed or live attenuated microorganisms, parts of microbes or genetic material or products which are presented to our immune system in a way which leads to protective antibody production.
  - smallpox vaccine: > 200 antigens
  - 1960s: >3,000 (smallpox and whole cell pertussis)
  - current recommended schedule: 50-70 antigens
Protection

• Vaccines protect on a personal and community level!

• *Herd immunity*: protection even for the members not vaccinated

Source: NIAID/ www.vaccines.org
“Immunization of children against measles is probably the single most important (and cost-effective) preventive measure in emergency-affected populations, especially those living in camps”

M Toole and R Waldman Annual Rev Public Health 1997;18-283-312

Measles

- Vaccinate all children between 6 months and 14 years of age against measles!
- Provide vitamin A supplementation
- Provide vaccines and critical inputs such as cold-chain equipment, training and social mobilization expertise
- Provide other emergency supplies such as blankets, tarpaulins and cooking sets.
- Introduce nutritional monitoring and surveillance
- Support the establishment of essential health-care services
- Provide essential drugs, emergency health kits
Mumps

• Recent outbreaks involving young adults document loss of immunity over time
  – 3rd dose MMR is recommended to control outbreaks with high attack rates AR decreases by 75%
  – MMR as PEP for
    • measles within 72 hrs
    • mumps: moderate efficacy
Cholera

• Conflicting evidence for proactive vs. reactive vaccination
  – 2-dose oral vaccine
  – Campaigns in refugee camps have cost 0.18-18USD per person
  – WHO advises on implementing sanitation measures first, obtain high commitment and vaccination should not interfere with other priority measures
Smallpox

• Where everything started
  – “Vaccine” 1796
• Ring vaccination
  – Vaccination of close contacts of a case
  – Vaccination of contacts
Poliomyelitis

• Europe is Polio-free since 2002
  – Imported outbreak in Tajikistan in 2010
• October 2013: AFP & WPV in Syria

The UN brands polio outbreak in Syria And Iraq most challenging in history...

theguardian.com
Poliomyelitis-III

WPV in Afghanistan & Pakistan 2011-12 and UN security threat

Polio Endgame not straightforward

- Tripped by
  - Armed conflict and threats to the safety of health workers in immunization campaigns
  - Religious fundamentalism
  - Rumors and superstitions
Vaccination as a tool for improving health inequalities
Determinants of Health

• Determine why
  – A woman’s life expectancy differs
    • Botswana: 43 years
    • Japan: 86 years
• A 26-year difference of life expectancy between neighborhoods within the city of Glasgow
• Infant mortality rate doubles for children born to mothers without any primary education

www.who.int/social_determinants
Social Determinants of Health

Figure 3. Social determinants, vulnerabilities and health inequalities

- Structural determinants (income, education, employment, etc.)
- Intermediary determinants (living & working conditions)

- Differential exposures
- Vulnerabilities determined by population, community, and individual-levels

- Differential health outcomes depending on V and SD
- Health inequalities: adverse outcomes more common for disadvantaged

ECDC, Health Inequalities and IDs in Europe, Oct 2013

- Health inequalities are *avoidable inequalities*
  – Between countries and within countries

www.who.int/social_determinants
Vaccines and health inequalities

• Disparities in access to various vaccines has been documented according to
  – Ethnicity
  – Health coverage
  – Family income
  – Parental education

• E.g.: seasonal influenza, HPV, other childhood immunizations
Healthy lives

• Tetanus
  – Reduction by 96% of cases
  – 1988: 798,000 cases of neonatal tetanus
  – 2008: 92% reduction of neonatal tetanus by vaccination of pregnant women in high risk areas

• Measles
  – 96% reduction of cases until 2007-08

• Mumps
  – >90% reduction of cases until recent years

• WHO: if all countries raised vaccination coverage for available vaccines to 90% by 2015, we would avoid 2 mil deaths!
Healthy lives and more..

- Vaccination provides healthy life years free of disability
  - by keeping children healthy and in school, immunization helps extend life expectancy
  - Increase the time spent on productive activity
  - thereby contributing to poverty reduction
Putting it in numbers..

- **Project Tycho**
  - University of Pittsburgh
    - [www.tycho.pitt.edu](http://www.tycho.pitt.edu)
  - cohort 2009: > 69billion USD saved by 9 childhood vaccinations
  - For every 1USD, 10USD!

*Nature*, March 2014
“The Cow Pock – or – the Wonderful Effects of the New Inoculation!”
J. Gillray, 1802
• Currently major measles outbreak in the NL
  – Measles in a cruise ship
• Major outbreak of rubella in Poland
Still a lot to be done

• 24 mil children difficult to reach in developing countries

• Hard to reach populations “in our back yard”
  – Ethnic minorities & Roma
  – Immigrants

• What about the “children of crisis”?
  – GR: ↑ Children (13,2%) in families w/o employment
Vaccines DO address inequalities

provided

• there is universal access to prevention and care!
7 April 2014
World Health Day
Thank you for your attention!

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