Vaccination in Republic of Macedonia: Standards and Actual Trends

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Vaccination and Communicable Diseases

• Vaccines are one of the greatest achievements in the history of medicine and public health, and vaccination is one of the most cost-effective health investments!!!

• Vaccination is a proven tool for controlling and eliminating life-threatening communicable diseases!!!
Legislation on Vaccination in R. Macedonia

- Regulations for immunoprophylaxis, chemoprophylaxis, people subject to these measures, means of realization and keeping records and documentation (Official Gazette of RM No. 65/2010)
- Compulsory Immunization Program for the population in the Republic of Macedonia and National Annual Public Health Program in the Republic of Macedonia (annually, Off. Gazette of RM)
Compulsory Vaccination in R. Macedonia

Compulsory vaccination in RM has two periods:
• first campaign period until 1960 and
• second continuous period since 1960.

Continuous compulsory immunization in Macedonia is implemented against:

1. **Tuberculosis** (introduced in 1948)
2. **Diphtheria** (introduced in 1951)
3. **Tetanus** (introduced in 1951)
4. **Pertussis** (introduced in 1960)
5. **Poliomyelitis** (introduced in 1961)
6. **Morbilli** (introduced in 1972)
7. **Parotitis epidemica** (introduced in 1982)
8. **Rubella** (introduced in 1982)
9. **Hepatitis B** (since October 2004)
10. **Haemophilus influenzae type B** (since September 2008)
11. **Human Papillomavirus** (since October 2009)
Implementation of Compulsory Vaccination of the Population in the Republic of Macedonia in 2013
# Vaccination Schedule in 2013

<table>
<thead>
<tr>
<th>Age of people subject to compulsory vaccination</th>
<th>Disease against the vaccine is administered</th>
<th>Vaccination/Revaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 24 hours of birth, 1 and 6 months</td>
<td>Hepatitis B (3 doses)</td>
<td>Vaccination</td>
</tr>
<tr>
<td>up to 12 months</td>
<td>Tuberculosis (without testing) (1 dose)</td>
<td>Vaccination</td>
</tr>
<tr>
<td>2, 3 and 5 months</td>
<td>Infections with Haemophilus influenzae type B (Hib) (3 doses)</td>
<td>Vaccination</td>
</tr>
<tr>
<td></td>
<td>Diphtheria, Tetanus, Pertussis (3 doses)</td>
<td>Vaccination</td>
</tr>
<tr>
<td>2, 3 and a half and 5 months</td>
<td>Poliomyelitis (3 doses three-type oral vaccine)</td>
<td>Vaccination</td>
</tr>
<tr>
<td>12 months</td>
<td>Morbilli, Rubella, Parotitis epidemica (1 dose)</td>
<td>Vaccination</td>
</tr>
<tr>
<td>18 months</td>
<td>Infections with Haemophilus influenzae type B (Hib) (1 dose)</td>
<td>I revaccination</td>
</tr>
<tr>
<td></td>
<td>Diphtheria, Tetanus, Pertussis (1 dose)</td>
<td>I revaccination</td>
</tr>
<tr>
<td></td>
<td>Poliomyelitis (1 dose)</td>
<td>I revaccination</td>
</tr>
<tr>
<td></td>
<td>(3 doses)</td>
<td></td>
</tr>
<tr>
<td>4 years (I grade)</td>
<td>Diphtheria, Tetanus, Pertussis (1 dose)</td>
<td>II revaccination</td>
</tr>
<tr>
<td>6 years (II grade)</td>
<td>Morbilli, Rubella, Parotitis epidemica (1 dose)</td>
<td>I revaccination</td>
</tr>
<tr>
<td>7 years (II grade)</td>
<td>Poliomyelitis (1 dose)</td>
<td>II revaccination</td>
</tr>
<tr>
<td></td>
<td>Diphtheria, Tetanus (1 dose)</td>
<td>III revaccination</td>
</tr>
<tr>
<td>12 years, 2 and 6 months after the first dose (VII grade)</td>
<td>Infections with Human Papillomavirus (HPV) (only girls) (3 doses)</td>
<td>Vaccination</td>
</tr>
<tr>
<td>14 years (final year of primary school)</td>
<td>Poliomyelitis (1 dose)</td>
<td>III revaccination</td>
</tr>
<tr>
<td></td>
<td>Diphtheria, Tetanus (1 dose)</td>
<td>IV revaccination</td>
</tr>
<tr>
<td>18 years (final year of secondary school)</td>
<td>Tetanus (1 dose)</td>
<td>V revaccination</td>
</tr>
</tbody>
</table>
## Primary Vaccination in Macedonia in 2013

<table>
<thead>
<tr>
<th>TYPE OF VACCINE</th>
<th>COVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTP vaccine</td>
<td>98,1%</td>
</tr>
<tr>
<td>OPV vaccine</td>
<td>97,9%</td>
</tr>
<tr>
<td>Vaccine against Haemophilus influenzae type B</td>
<td>97,1%</td>
</tr>
<tr>
<td>Vaccine against Hepatitis B</td>
<td>96,5%</td>
</tr>
<tr>
<td>MRP vaccine</td>
<td>96,1%</td>
</tr>
<tr>
<td>HPV vaccine</td>
<td>40,1%</td>
</tr>
</tbody>
</table>
## Revaccination in Macedonia in 2013

<table>
<thead>
<tr>
<th>Type of revaccination</th>
<th>Order</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine against Haemophilus influenzae type B</td>
<td></td>
<td>96.2%</td>
</tr>
<tr>
<td>DTP vaccine</td>
<td>I</td>
<td>97.6%</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>96.4%</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>95.7%</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>97.3%</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>97.8%</td>
</tr>
<tr>
<td>OPV vaccine</td>
<td>I</td>
<td>97.3%</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>95.0%</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>97.2%</td>
</tr>
<tr>
<td>MRP vaccine</td>
<td></td>
<td>96.2%</td>
</tr>
</tbody>
</table>
Vaccination and Revaccination Coverage of the Population in Macedonia in Ten-year Period from 2004 – 2013
DTP Vaccination and Revaccination Coverage in R. Macedonia, 2004-2013

- DTP, vacc.
- DTP, I revacc.
- DTP, II revacc.
- DT, III, IV revacc.
- T, V revacc.
MRP Vaccination and MRP Revaccination Coverage in R. Macedonia, 2004-2013

![Coverage graph showing MMR vaccination and revaccination percentages from 2004 to 2013.]

- **MMR, vacc.**
- **MMR, I revacc.**
OPV Vaccination and Revaccination Coverage in R. Macedonia, 2004-2013
Vaccination Coverage against Hepatitis B and Hib in R. Macedonia, 2005-2013

* vaccination against Hepatitis B of all newborns has been initiated since 2004

** vaccination against diseases caused by Haemophilus influenzae type B has been initiated since 2008
Vaccine-preventable Diseases in the Republic of Macedonia – Before and After the Introduction of the Vaccination
Diphteria

- The last recorded death was in 1972
- The last recorded case of disease was in 1976

Average number of deaths/affected in period 1947-1976

- Vaccination introduced in 1951

<table>
<thead>
<tr>
<th>Year</th>
<th>Average number of deaths</th>
<th>Average number of affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947-1951</td>
<td>27</td>
<td>366</td>
</tr>
<tr>
<td>1952-1956</td>
<td>28</td>
<td>486</td>
</tr>
<tr>
<td>1957-1961</td>
<td>15</td>
<td>375</td>
</tr>
<tr>
<td>1962-1966</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1967-1971</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>1972-1976</td>
<td>0.2</td>
<td>3</td>
</tr>
</tbody>
</table>
Tetanus

The last recorded case in newborns was in 1993

Average number of deaths/affected in the period 1947-2013

- Vaccination introduced in 1951

- Average number of deaths
- Average number of affected
Pertussis

The last recorded epidemic was in 1987

Average number of affected in period 1956-2000

Number of pertussis cases, 2001-2013

Vaccination introduced in 1960
Pertussis

The last recorded death was in 2001

Average number of deaths in period 1956-2001

Vaccination introduced in 1960
Poliomyelitis

The last case of disease was recorded in 1987.

As a member of the European Region, in June 2002 the Republic of Macedonia achieved certification of poliomyelitis eradication by WHO.
Morbidity and changes in the Immunization schedule against measles and rubella, in period 1967-1997

- 1972, M-vaccine
- 1983, MRP vaccine
- 1987, M-revaccination R-revaccination
- 1997, MRP revaccination
Morbidity from measles and rubella, in period 1998-2013

The last epidemic of morbilli was in 2010-2011, with 908 affected people in total

- 90.0% (n = 796) of patients with proven vaccination status were unvaccinated or with unknown vaccination status

- Most of the affected were in the age group above 20 years (n = 380)
The last epidemic was in 2008-2009, with over 15,000 affected people
Epidemics of parotitis epidemica, 2008-2009

• Most affected is the group born in 1991-1995, which accounts for 51.8% of the recorded cases in total.

• The age grouping of patients and the outbreak of the epidemic was probably due to omissions in vaccination in the corresponding period.

• There is a negative correlation between the number of affected people by year of birth and vaccination coverage ($r = -0.84$, $p < 0.01$).
Vaccination Coverage in Period 1983-2007 and Distribution of Cases in 2009, Per Year of Birth

Number of parotitis epidemica cases

Year of birth

Vaccination coverage %

- Number of affected
- % MR(P) vaccination coverage
- % MR(P) revaccination coverage
Conclusion

• Primary vaccination against diphtheria, tetanus and whooping cough continuously has maintained high coverage over 95% in the last decade, with an exception of three years – when it was between 90 and 95%.

• Vaccination and revaccination with OPV vaccine against poliomyelitis was implemented in the country with high coverage over 95% in the previous ten years, with an exception of four years when primary-vaccination coverage was between 90% and 95%.

• Vaccination and revaccination coverage against morbilli, rubella and parotitis epidemic (MRP vaccine) was high - over 95% in the past ten-year period, with an exception in 2006 and 2008, when the range was between 90 and 95%.

• Since the introduction of compulsory vaccination against hepatitis B for all newborns in 2004, this vaccination coverage has ranged from 90.4% (2010) to the highest 98.1% in 2012.

• Vaccination against infections with Haemophilus influenzae type B (Hib) was initiated in 2008, primary vaccination and revaccination coverage remained under 90% by 2010, after which it increased above the recommended 95%.

• Only the last introduced vaccine in the regular Immunization schedule in 2009 - HPV vaccine has coverage under the recommended 95%.
Conclusion

• Drastic reduction in the number of affected and deaths from vaccine-preventable diseases is evident as a result of the vaccination effects.


• In the past ten-year period there were 7 recorded cases of tetanus in total, 3 of which ended with death.

• There were individual cases of whooping cough reported, with most cases in the previous ten years recorded in 2012 (n = 9). The last death was reported in 2001.

• There has been a steady decline in the morbidity from morbilli and rubella since 1998, with an exception in 2008 and 2010-2011 when there were two outbreaks of morbilli.

• There has been a continuing decline in the number of parotitis epidemica cases since 1997, except in 2008-2009 when there was epidemic of parotitis epidemica.
Challenges

• Continuous maintenance of the coverage over 95% with vaccination and revaccination in each separate territory ("micro" - "macro" area) around the country

- Continuous and active searching for unrecorded, unvaccinated and under-vaccinated individuals, with a special emphasis on hard-to-reach populations (Roma population, migrants, etc.), finding and vaccinating these individuals to complete their vaccination status

• Promotion and strengthening the system of supervision over vaccine-preventable diseases.
Challenges

- Introduction of polyvalent vaccines for successful implementation of continuous immunization, providing an opportunity for introduction of new vaccines in the Immunization schedule.

- Implementation of standardized immunological studies to control the immunity status of the vaccinated people, determining the level of collective immunity, i.e. assessment of the vulnerability to vaccine-preventable diseases in the population.

- Unification (universality) of the system of planning, implementing, recording and supervising the immunization, i.e. introduction of single software with database on immunization.
Challenges

- Intensive campaign by all relevant factors in the healthcare system related to the vaccination, which would limit and reduce the effect of emerging anti-vaccine lobby groups that threaten to compromise the regular vaccination.

- In urban areas, especially in the capital, there is a strong influence by anti-vaccine campaign, already reflected in the reduction of vaccination coverage, especially MRP vaccination coverage.