
Executive summary

Health Council of the Netherlands. Vaccination against pertussis: aims and strategy. The Hague: Health Council of the Netherlands, 2015; publication no. 2015/29

Pertussis is dangerous for infants and young children

Pertussis (whooping cough) is a dangerous disease for infants and young children. The younger the child, the more often residual symptoms occur and hospital admission is required. At the start of the twentieth century, pertussis was still responsible for about 1000 deaths each year in the Netherlands. At the start of the 1950s, prior to the introduction of vaccination, this had declined to well over one hundred deaths per annum. Then the first vaccination campaigns took place in the Netherlands. Since the very beginning (in 1957), vaccination against pertussis has been part of the National Immunisation Programme. Vaccination has been very successful in reducing the number of cases of pertussis, which remained very low until the mid 1990s.

Epidemic in the Netherlands, increasingly less a typical childhood disease everywhere else

In 1996, the incidence of pertussis in the Netherlands suddenly turned into an epidemic, due a reduction in the effectiveness of the vaccine then in use. In response to this epidemic, various measures have been taken to restore protection. In 2005, this culminated in the switch to a new vaccine. However, the above measures have failed to prevent ongoing epidemic upsurges of pertussis every two to four years. Occasionally, this even results in deaths.

At international level, too, pertussis once again requires increasing attention. Pertussis is traditionally a childhood disease. However, several Western countries have seen an increased incidence of pertussis among older children and adults in recent years. In some countries, the number of cases of pertussis among young infants is also increasing again.

What should be the aims vaccination against pertussis and how could these best be achieved?

The persistent epidemic upsurges of pertussis and potentially increased risk for young infants have led the Minister of Health, Welfare and Sport to request advice from the Health Council on its control. Are we seeing a general resurgence of pertussis? What should be the aim of pertussis vaccination and what target groups need to be identified? Are additional measures useful and necessary in order to protect young infants? Is it advisable to vaccinate older children and adults, as occurs in some other countries? As far as possible at the present time, the Minister has asked the Health Council to answer these questions from the perspective of a proposed vaccine assessment agency (Beoordelingskamer Vaccinaties, BKV), which will in due course see the Health Council join forces with the National Health Care Institute (ZIN).

No general resurgence of pertussis

The Vaccinations' Committee of the Health Council that prepared the present advisory report concludes there is no evidence of a general worldwide resurgence of pertussis among infants and young children. The epidemiological pattern of pertussis in a particular country is defined by a multiplicity of factors, including the previous vaccination programmes, the vaccines that were used, vaccination schedules adopted and the vaccination coverage achieved. In countries where incidence among these age groups is increasing there are therefore likely to be various explanatory factors.

Measures after the 1990s epidemic were successful

The measures adopted after the 1990s epidemic of pertussis in the Netherlands proved effective. They resulted in a gradual fall in the number of reported cases and hospital admissions among infants and children aged five and under. Estimates indicate that the vaccine was highly effective over a number of years.

However, the Dutch data show that the protection conferred by vaccination with acellular vaccine is of limited duration, as is the case elsewhere.

Current strategy is insufficient to protect young infants

The primary aim of public vaccination against pertussis is to protect infants and young children. The currently available vaccines are effective, but direct protection – whereby the child's own immune system is activated – only occurs in the weeks after the first dose of vaccine has been administered, at around two months of age. This protection is further enhanced by the subsequent doses. Thus protection is still inadequate in the first few months of life. This is also evident from the fact that the number of clinical cases and hospital admissions among infants over a prolonged period is more or less constant and in some countries even rises again. Consequently several countries are seeking additional measures to protect young infants.

In the Netherlands too there is a persistent disease burden among infants too young to be (fully) protected by vaccination. In the period from 2005-2014, 1,711 cases of pertussis (1,279 among children aged 5 months and under), 1,126 hospital admissions (1,020 among children aged ≤ 5 months) and 5 mortalities were reported among infants.

Seven options for additional protection of young infants

What additional protective measures might potentially be effective and advisable for young infants? Based on the scientific literature, the committee identified seven options for improving direct or indirect protection in this vulnerable group:

- 1 Passive immunisation of newborns (administration of antibodies)
- 2 Early active immunisation (neonatal pertussis vaccination)
- 3 Vaccination of the expectant mother during pregnancy
- 4 Preconception examination and vaccination of the mother-to-be, i.e. prior to pregnancy
- 5 Vaccination of family members and carers
- 6 Intensive education and early diagnosis, allowing for earlier and more effective treatment of pertussis in the infant
- 7 Vaccination of older children and adults.

The committee that produced this advisory report has compared the seven options with the seven criteria governing eligibility for vaccination within a public programme. It found that insufficient scientific evidence is available for

the large majority of these options. Efficacy data are only available for vaccination of the expectant mother during pregnancy (option 3) and for intensive education and early diagnosis, allowing for earlier and more effective treatment of pertussis in the infant (option 6). Only in the case of vaccination of the expectant mother during pregnancy are all seven criteria fulfilled to a significant extent. The committee therefore regards option 3 as the recommended approach for additional protection of young infants.

Vaccination of pregnant women should become part of pertussis control

Vaccination during pregnancy is a logical, effective and safe adjunct to the existing infant vaccination programme. A model developed on the basis of recent insights and data indicates that vaccination of pregnant women can potentially reduce the number of cases of pertussis among infants aged five months and under (a large number of whom require hospitalisation) from an average of 128 per year without the intervention to an average of 26 per year with the intervention. A further decline in the mortality rate, which is already low, can also be expected to result from the vaccination of pregnant women. The committee that produced this advisory report therefore recommends that vaccination against pertussis should be made available to pregnant women. This vaccination will then supplement the public measures taken to protect infants. This requires programmed implementation together with close monitoring of efficacy and safety.

Implementation of vaccination of pregnant women to be guided by research

At the present time, no pregnant women are vaccinated against pertussis within the standard vaccination programme. The committee considers it extremely important that research should be conducted into the determining factors in acceptance of the intervention. Data from such research are needed in order to determine how education and public communication can best be organised. Monitoring is also important as it can provide a basis for assessment of the extent to which the intended effects on the incidence of pertussis among young infants are actually achieved.

Vaccination of older children and adults not a task for government

Under the present circumstances, the serious forms of pertussis that require hospitalisation and can sometimes even prove fatal occur almost exclusively in infants who have not yet been vaccinated, or at least not fully. It is therefore appropriate that children aged 0 to 5 years should continue to be regarded as the target group for public efforts to provide protection against pertussis. Among children over 5 and adults the disease is not sufficiently serious to warrant inclusion in a public vaccination programme.

No good grounds for collective funding of pertussis vaccination among older children and adults

Insufficient data are currently available to justify the designation of vaccination of older children and adults as essential care. Collective funding of such vaccination does not seem necessary. The committee does recommend, however, that more targeted research should be conducted into the burden of disease from pertussis and, in particular, that consideration should be given to the possibility of increased vulnerability among the elderly.

Public education and availability for use at peoples' own expense

In older children and adults pertussis can be (highly) unpleasant. Accordingly, individuals can benefit from getting themselves vaccinated against pertussis at their own expense. Physicians are responsible for administering the vaccine, based on medical practice guidelines drawn up by the profession itself. The Government monitors quality by means of regulatory frameworks and safety monitoring (registration of adverse effects). As the Health Council has previously noted, however, in the Netherlands virtually no use is made of vaccines that have not been included in programmes. The Government also has a responsibility to educate the public (including those who use vaccines at their own expense), so that stakeholders are able to make informed choices. The Government should also promote the actual availability of the vaccine through doctors and pharmacies.