Health Council of the Netherlands

Vaccination against dengue in the Dutch Caribbean islands

Executive summary

Every year, an estimated 96 million people worldwide contract dengue, also known as breakbone fever. Dengue often presents asymptomatically or with mild symptoms such as fever, headache and muscle and joint pain. It can also cause severe symptoms, including bleeding and organ damage. Dengue is caused by a virus transmitted by the yellow fever mosquito and, to a lesser extent, the tiger mosquito. While there are no reports of dengue caused by these mosquitoes in the European Netherlands, they are known to transmit the virus in the Dutch Caribbean islands. The State Secretary for Youth, Prevention and Sport at the Ministry of Health, Welfare and Sport at the time asked the Health Council of the Netherlands for advice on programmatic dengue vaccination for residents of the BES (Bonaire, St Eustatius and Saba) and CAS (Curaçao, Aruba and St Maarten) islands. The Health Council's permanent committee on Vaccinations (the committee) has examined the request according to the assessment framework for vaccinations.

Disease burden

According to the committee, the burden of dengue provides grounds to consider vaccination. The dengue virus regularly circulates on the BES and CAS islands, causing epidemics every two to three years. Estimates of dengue infections during the 2024 outbreak range from 360 to 1,090 per 100,000 inhabitants. The number of registered hospital admissions was 24 per 100,000 inhabitants, and a total of three deaths were recorded. The committee also examined the disease burden in the French Antilles, where registration is more comprehensive. During the 2024 outbreak, between 3,000 and 4,000 dengue infections per 100,000 inhabitants were recorded in the French Antilles, and 180 to 380 severe cases per 100,000 inhabitants. While these data do not translate directly to the situation on the BES and CAS islands, the committee notes that they suggest the reported burden of dengue on those islands is likely an underestimate.

There are four distinct serotypes of the virus that could cause dengue. A second dengue infection with a different serotype increases the risk of severe dengue. This is due to *antibody-dependent enhancement* (ADE),

where antibodies from the first infection do not inhibit but instead enhance the uptake of another dengue virus serotype into immune cells.
The proportion of the population that has experienced a dengue infection with one of the four serotypes varies by island and age group. Many children on the BES and CAS islands likely have not had dengue infection yet. There are no recent data on how many adults on the BES and CAS islands have had dengue infection.

Efficacy and effectiveness

The committee has assessed whether vaccination can prevent severe dengue and death in children and adults (the goal of vaccination).
Vaccine efficacy has been studied in children aged 4 to 16 years. In individuals aged 17 to 60 years, the immune response after vaccination was not lower than in children.
Vaccine efficacy varies by denguevirus serotype and depends on whether someone has had a prior denguevirus infection (dengueexperienced) or not (dengue-naïve). Overall efficacy in children (across all serotypes and regardless of prior infection) was 61% against dengue and 84% against hospitalisation up to 4.5 years after vaccination. Efficacy was slightly lower (54%) in dengue-naïve children than in dengue-experienced children (64%). Vaccination was also more effective against serotypes 1 and 2 than against serotype 3. The efficacy against serotype 4 remains uncertain due to low circulation of that serotype during the efficacy studies, as does the efficacy against serotype 3 in dengue-naïve individuals. It is impossible to predict which serotypes will circulate and to what extent in the near future.
In addition to efficacy, vaccine effectiveness (how well the vaccine works in real-world practice) is also important. However, current data on vaccine effectiveness is limited.

Safety

The most common side effects after vaccination are pain at the injection site, headache, and muscle aches. These symptoms are usually mild and typically resolve on their own within one to three days.
There is uncertainty about the potential risk of ADE. This phenomenon — where a second denguevirus infection with a different serotype can lead to more severe dengue — can also occur after vaccination. The risk is greatest if the first denguevirus infection after vaccination is caused by serotype 3 or 4, as the vaccine may provide less protection against these serotypes.

Additional considerations

The WHO recommends a vaccination programme for children aged 6 to 16 only in areas with high levels of prior denguevirus infection (high sero-prevalence). On the BES and CAS islands, the proportion of dengue-experienced children is currently considered low.

Advice

The committee does not advise introducing programmatic dengue vaccination in the Dutch Caribbean at this time.

Based on the assessment of the framework for vaccinations and the currently available data, the committee concludes that it is unclear whether the benefits of vaccination outweigh the risks. The efficacy against serotype 4 is uncertain and specific among dengue-naïve individuals efficacy against serotype 3 is also uncertain. This means the potential health gains are uncertain for both children and adults. There is also uncertainty about the risk of more severe dengue in dengue-naïve patients who become infected with serotype 3 or 4 after vaccination. Because the proportion of dengue-experienced children is thought to be low on the BES and CAS islands, and there are no recent data on prior infections among adults, programmatic vaccination could potentially expose many people to this risk.

The committee recommends to assess properly the proportion of dengue-experienced children and adults on the BES and CAS islands, as well as the number of dengue infections, hospital admissions, and deaths. New data on these points may prompt to advise again. The same applies to new data on vaccine efficacy against serotypes 3 and 4 and on the potential risk of vaccineinduced ADE. The availability of a new dengue vaccine may also prompt to advise again on programmatic vaccination on the BES and CAS islands.

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