Summary of “Polio vaccines: WHO position paper, January 2014”

This updated position paper on polio vaccines published in the 28 February 2014 WHO Weekly Epidemiological Record (Vol. 89, 9), replaces the previous 2010 WHO polio position paper, and summarizes recent developments in the field. It integrates new information related to the addition of a dose of IPV for countries currently using exclusively OPV, in the context of the global switch from trivalent to bivalent OPV.

Poliomyelitis (polio) is an acute communicable disease of humans caused by poliovirus serotypes 1, 2 or 3. In the pre-vaccine era, (i.e. before 1960) virtually all children became infected. In <1% of those infected, virus replicates in anterior horn cells of the spinal cord resulting in acute flaccid paralysis (AFP), commonly with persistent sequelae. Case-fatality rates among paralytic cases range from 5% to 10% in children and from 15% to 30% in adolescents and adults, predominantly associated with bulbar involvement.

Two types of poliovirus vaccines are available, inactivated poliovirus vaccine (IPV) introduced in 1955 and the live attenuated oral poliovirus vaccine (OPV) introduced in the early 1960s. OPV became part of the Expanded Programme on Immunization (EPI) in 1974, and in 1988 the WHA resolved to eradicate poliomyelitis globally and the Global Polio Eradication Initiative (GPEI) was established.

Worldwide, sustained use of polio vaccines since 1988 has led to a precipitous drop in the global incidence of poliomyelitis by >99% and the number of countries with endemic polio from 125 to just 3. In 2012 and 2013, respectively 223 and 403 poliomyelitis cases were reported. Globally, the last case of poliomyelitis caused by naturally circulating wild-strain polio viruses type 2 (WPV2) occurred in India in 1999. No case due to wild-strain polio viruses type 3 (WPV3) has been detected since 10 November 2012. Despite the overall success of the GPEI, in 2014, Nigeria, Pakistan and Afghanistan remain endemic for transmission of WPV type 1 (WPV1). The Horn of Africa, Cameroon, and parts of the Middle East (Egypt, Israel, and Syria,) also reported WPV1 circulation associated with imported WPV1 in 2013, resulting in clinical cases following a period of elimination. Israel reported detection of WPV1 in sewage samples as from February 2013 but no clinical cases of paralytic poliomyelitis have been reported in Israel, the West Bank or Gaza (as of 31 December 2013).

The effectiveness of OPV in controlling poliomyelitis and eliminating the circulation of wild polioviruses is amply demonstrated by the sharp decline in the number of poliomyelitis cases following the introduction of OPV in both industrialized and developing countries. The only rare serious adverse events associated with OPV are the occurrence of vaccine-associated paralytic poliomyelitis (VAPP) and the emergence of vaccine-derived polioviruses (VDPVs). The incidence of VAPP has been estimated at 2–4 cases/million birth cohort per year in countries using OPV. VAPP occurs in both OPV recipients and their unimmunized contacts. OPV2 is the cause of 40% of cases of VAPP. Circulating vaccine-derived poliovirus (cVDPV) can cause polio cases and outbreaks. Chronic viral shedding of virulent OPV-derived viruses is reported in a few cases of rare immunodeficiencies (IVDPV).

IPV has been shown to be highly effective in stimulating circulating antibody responses to poliovirus in both high- and low-income country settings yet is less effective than OPV in inducing intestinal
mucosal immunity among previously unvaccinated individuals. IPV is considered very safe, whether given alone or in combination with other vaccines.

In the current position paper, WHO recommends that all children worldwide should be fully vaccinated against polio, and every country should seek to achieve and maintain high levels of coverage with polio vaccine in support of the global commitment to eradicate polio.

WHO no longer recommends an OPV-only vaccination schedule. For all countries currently using OPV only, at least 1 dose of IPV should be added to the schedule. In polio-endemic countries and in countries at high risk for importation and subsequent spread, WHO recommends an OPV birth dose (a zero dose) followed by a primary series of 3 OPV and at least 1 IPV doses.

The primary series consisting of 3 OPV doses plus 1 IPV dose can be initiated from the age of 6 weeks with a minimum interval of 4 weeks between the OPV doses. If 1 dose of IPV is used, it should be given from 14 weeks of age (when maternal antibodies have diminished and immunogenicity is significantly higher) and can be co-administered with an OPV dose. The primary series can administered according to the regular schedules of national immunization programmes, for example at 6, 10, and 14 weeks (OPV1, OPV2, OPV3+IPV), or at 2, 4, and 6 months (OPV1, OPV2+IPV, OPV3 or OPV1, OPV2, OPV3+IPV). Both OPV and IPV may be co-administered with other infant vaccines. For infants starting the routine immunization schedule late (age >3 months) the IPV dose should be administered at the first immunization contact.

In countries with high immunization coverage (e.g. 90%–95%) and low importation risk (neighbouring countries and connections with similarly high immunization coverage) an IPV–OPV sequential schedule can be used when VAPP is a significant concern. When using a sequential IPV–OPV schedule, the initial administration of 1 or 2 doses of IPV should be followed by ≥2 doses of OPV to ensure both sufficient levels of protection in the intestinal mucosa and a decrease in the burden of VAPP. For sequential IPV–OPV schedules, WHO recommends that IPV be given at 2 months of age (e.g. a 3-dose IPV-OPV-OPV schedule) or at 2 months and 3–4 months of age (e.g. a 4-dose IPV-IPV-OPV-OPV schedule) followed by at least 2 doses of OPV.

An IPV-only schedule may be considered in countries with both sustained high immunization coverage and the lowest risk of both WPV importation and transmission. A primary series of 3 doses of IPV should be administered beginning at 2 months of age. If the primary series begins earlier (e.g. with a 6, 10 and 14-week schedule) then a booster dose should be given after an interval of ≥6 months (for a 4-dose schedule).

To mitigate the risk of undetected transmission, WHO recommends that endemic countries and countries with a high risk of WPV importation should not switch to an IPV-only or a sequential IPV–OPV schedule at this time. The 3 OPV+1 IPV schedule as currently recommended should be adopted and supplemental immunization activities should continue to support intensive efforts to eliminate poliovirus transmission. A sequential IPV–OPV schedule or IPV-only schedule can be considered in order to minimize the risk of VAPP, but only after a thorough review of local epidemiology.