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Measles containing vaccines indicator

Benefits of the intervention

Serogroup or serotype coverage by vaccines considered (for serogroup- or serotype-specific vaccines)

Most live attenuated measles vaccines originate from the Edmonston strain of measles virus. Well known vaccine strains derived from the original Edmonston isolate include the Schwarz, Edmonston–Zagreb, AIK-C and Moraten strains, all in use since the 1960s. Nucleotide sequence analysis of selected genes has shown minimal (<0.6%) differences among these strains.[1]

Rubella virus has a single serotype. Most currently licensed rubella vaccines are based on the live attenuated RA 27/3 strain, which protects against circulating rubella.[2]

Currently available licensed mumps vaccines are not selected according to serotype or circulating genotype as evidence supports broad cross-protection.[3] There is some evidence of breakthrough infections caused by antigenic differences between genotypes.[4] Therefore, mumps containing vaccines use various strains of the virus for vaccine development. To date, 12 strains have been used for vaccine development but only three are WHO prequalified.[3]

Please consult the relevant position papers for intervention benefit for varicella.

Efficacy and effectiveness estimates (e.g. against infection, disease, hospitalization, death), including in different populations

WHO considers neutralizing antibody measured using the plaque reduction neutralization test (PRNT) the most reliable serological correlate of protection for measles. A level around 120 mIU/mL has been associated with protection against clinical measles and is often used as a surrogate to estimate vaccine efficacy.

A single dose of measles vaccine administered at 8-9 months of age elicits protective antibody levels in 89.6% (IQR 82–95%) of subjects. Following a second dose at 15-18 months of age, a median of 97% (IQR 87–100%) of primary non-responders develop protective levels of antibody.[5]

In a review of field studies the vaccine effectiveness of a single dose of MCV administered at 9–11 months of age was 84% (IQR 72–95%); when administered at 12 months of age or later, the median vaccine effectiveness was 92.5% (IQR, 84.8–97%).[1, 6]

Meta-analyses show 99% seroconversion (95% CI: 98–99%) after a single dose of rubella-containing vaccine in children aged 9–18 months. After two doses, 100% (95% CI: 99–100%) of children were seropositive. Pooled vaccine effectiveness was 97% (95% CI: 92–99%) against rubella infection.[7]

Meta-analyses show very high seroconversion after a single dose of mumps vaccine for all three WHO prequalified products (Jeryl–Lynn: 94% [95% CI: 90–97%]; RIT 4385: 93% [95% CI: 88–97%]; Leningrad–Zagreb: 97% [95% CI: 92–100%]).[8]

Among WHO-prequalified mumps vaccine strains, the most extensive effectiveness evidence is available for Jeryl–Lynn vaccine strains. One-dose effectiveness against clinical mumps was approximately 76% (RR 0.24, 95% CI: 0.08–0.76; 6 cohort studies, 9,915 participants), and two-dose effectiveness was approximately 86% (RR 0.12, 95% CI: 0.04–0.35; five cohort studies, 7 792 participants). Separate pooled clinical-effectiveness estimates are not available for RIT 4385 as it is derived from the Jeryl-Lynn vaccine and is expected to provide similar protection. Historical studies of Leningrad-Zagreb also reported efficacy up to 97–100%.[8, 9]

Please consult the relevant position papers for varicella.

Duration of protection and waning of immunity in general and risk groups

Although the duration of protection following measles vaccination is more variable than following wild-type virus infection, evidence indicates that a single dose of correctly administered measles vaccine which elicits a protective antibody response will provide lifelong protection for most healthy individuals. While secondary vaccine failures are reported, declining immunity does not appear to play a major role in measles virus transmission.[10]

Protection from rubella-containing-vaccine is long-lasting. Evidence from five RCTs and nine observational studies showed 88–100% seropositivity maintained 1–20 years after one or two doses. Following two doses, detectable antibodies persisted for up to 20 years.[11]

Vaccine-induced duration of protection against mumps is long-lasting after one or two doses and has been shown to persist for up to 10 years.[12] However, a positive mumps-specific IgG result may not consistently confirm protection. Yet, a negative IgG can rule out protection. Individuals who received two doses were less likely to experience severe and complicated cases of mumps during outbreaks.[13] The mechanisms of waning protection of mumps-containing vaccines are still unclear. A third dose may be considered during outbreaks in populations identified as being at increased risk of mumps.[13]

Please consult the relevant position papers for intervention benefit for varicella.

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