衞生防護中心
Centre for Health Protection

Centre for Health Protection
Scientific Committee on Vaccine Preventable Diseases

Recommendations on the Use of Pneumococcal Vaccines

Background

Invasive pneumococcal diseases (IPD), including septicaemia, meningitis and bacteraemic pneumonia, is caused by *Streptococcus pneumoniae*. In 2005, World Health Organization (WHO) estimated that the infection has been causing 1.6 million deaths annually, including 0.7–1 million children younger than 5 years of age mostly in developing countries. In developed world such as Europe and United States, the annual incidence rates of IPD range from 10 to 100 per 100,000 and are higher in the extremes of age, with up to 200 per 100,000 and around 20 to 80 per 100,000 in children younger than 2 years of age and elderly people aged 65 or above respectively.

2. There are currently two types of pneumococcal vaccine available in the market, namely a 23-valent pneumococcal polysaccharide vaccine (23vPPV) and a 7-valent pneumococcal conjugate vaccine (PCV7). PCV7 is registered for use in Hong Kong for children up to 9 years whereas 23vPPV for anyone 2 years or above. For young children, researchers have demonstrated that pneumococcal conjugate vaccines using several protein carriers are more immunogenic than 23vPPV. WHO published a position paper in March 2007 advising governments to consider inclusion of pneumococcal vaccination (PCV7) in national immunisation programme for children, particularly in countries where mortality among children aged less than 5 years is more than 50 per 1000 live births or where more than 50,000 children die annually. In Hong Kong, the local incidence of IPD appears lower as compared with most western countries. Based on laboratory results from the Hospital Authority, the average annual incidences among children

aged below 2 years and above 65 years were both 7.7 per 100,000 (95%CI = 2 to 13 per 100,000) during the period 2000 to 2004.

Recommendations

3. Having reviewed current scientific evidence and recommendations among the international communities, the Scientific Committee on Vaccine Preventable Diseases (SCVPD) recommended in October 2007 pneumococcal vaccination for personal protection for those at risk of severe IPD including (a) persons at extremes of age (children 6 weeks to 2 years of age and elders aged 65 years or above) and (b) persons aged 2 to 64 years who have history of clinical IPD, are immunocompromised, have underlying chronic illnesses, or have cochlear implants (Box 1).

4. In 2008, the SCVPD reviewed the potential benefits of introducing PCV7 in universal childhood immunisation based on updated scientific evidence including a local economic study commissioned by the Centre for Health Protection. Balancing the additional benefits and potential drawbacks, the SCVPD recommended incorporation of PCV7 in the Childhood Immunisation Programme (CIP) in October 2008.

5. The recommended vaccination schedule including the standard regimen and the catch up schedule for missed doses is summarised in Table 1. The standard regimen includes a 3-dose primary series at 2nd, 4th and 6th months of age with a booster dose at 12-15 months. For the catch up schedule, infants aged 6 months or below with missed doses, it is recommended to start the three-dose primary series any time with 4-8 weeks interval between doses, with a booster dose at 12 -15 months or 2 months after the last dose of the primary series, whichever is later. For infants who receive the first dose of PCV7 at the age of 7 months to less than 1 year, it is recommended to give a two-dose primary series with 4-8 weeks interval, followed by a booster dose at 12-15 months, with an interval of at least 2 months. In any case, if the primary series in an infant is not completed by the age of 1 year, then a single booster of PCV7 should be given at 12-15 months and at 2 months after the last dose to complete the standard pneumococcal vaccination. For those between 1 to less than 2 years of age, a single catch up dose of PCV7 is recommended.

6. The recommended use of 23vPPV and PCV7 in other risk groups for personal protection is summarised in Table 2. For toddlers between 2 to <5 years of age with at-risk conditions listed in Box 1, a single dose of PCV7 is recommended if they have not been given any PCV7 before, and to be followed by one dose of 23vPPV two months after PCV7. A single dose of 23vPPV is recommended for any persons between 5 to 65 years of age suffering from the at-risk conditions. For elders 65 years or above, a single dose of 23vPPV is recommended. Revaccination using 23vPPV may be considered five years after the first dose of 23vPPV for individuals with the at-risk conditions,

especially those suffering from conditions with an increased rate of decline in antibody levels (e.g. asplenia). Revaccination is also recommended for elders 65 years or above who have received one dose of 23vPPV before 65 years old and more than five years earlier. Revaccination for more than two doses is not recommended as the safety of three or more doses of the polysaccharide vaccine is not known.

7. Both 23vPPV and PCV7 have demonstrated good safety and side effect profiles. Slight swelling and tenderness at the injection site may occur shortly following injection. For 23vPPV, local reactions are more severe following a second dose but nearly all reactions resolve within a few days without treatment. Systemic reactions are rare for 23vPPV but transient fever of >39ºC has been reported up in up to 4.7% of PCV7 vaccinees. For both types of vaccines, severe allergic reaction to a vaccine component or following a prior dose is a contraindication to further doses of vaccine. Persons with moderate or severe acute illness should not be vaccinated until their condition improves. The safety of 23vPPV for pregnant women has not been confirmed. Women who are at high risk of pneumococcal disease should be vaccinated before pregnancy, if possible.

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Box 1: Risk groups in which pneumococcal vaccination is recommended for personal protection

1. Children below 2 years of age, with or without additional at-risk conditions
2. Persons age 65 years or above, with or without additional at-risk conditions
3. Persons age between 2 to 65 years and with the following at-risk conditions:
   - (a) History of invasive pneumococcal disease
   - (b) Immunocompromised states:
     1. Asplenia, HIV, primary immunodeficiency
     2. Immunodeficiencies related to malignancies and transplantation
     3. Immunodeficiencies related to use of immunosuppressive drugs / systemic steroid
   - (c) Chronic disease
     1. Chronic cardiac, pulmonary, liver or renal disease
     2. Diabetes mellitus or CSF leakage
   - (d) With cochlear implants

Table 1: Recommended vaccination schedule of PCV7 in Childhood Immunisation Programme (CIP)

Standard regimen	A standard 3-dose primary series at 2nd, 4th and 6th months of age with a booster dose at 12-15 months	
Catch up schedule for missed or delayed doses	Age 6 months or below	A 3-dose primary series at any time with 4-8 weeks' interval between doses; a booster dose at 12-15 months or 2 months after the last dose whichever is later (i.e. 3+1)
	Age 7 months to less than 1 year	A 2-dose primary series with an interval of 4-8 weeks but not later than the age of 1 year; a booster dose at 12-15 months with an interval of at 2 months after the last dose (i.e. 2+1) If the second dose of the primary series is not administered by the age of 1 year, a booster dose at 12-15 months with an interval of at least 2 months after the last dose (i.e. 1+1)
	Age 1 to less than 2 years	One single dose

Table 2: Recommended use of 23vPPV and PCV7 for personal protection in other risk groups without previous history of pneumococcal vaccination

Risk Groups	7-valent pneumococcal conjugate vaccine (PCV7)	23-valent pneumococcal polysaccharide vaccine (23vPPV)
Age below 2 years	Follow the schedule of CIP (Table 1)	*23vPPV NOT recommended*
High risk individuals age 2-<5 years	Single dose for those who have not received any pneumococcal vaccines previously	Single dose of 23vPPV for children with the at-risk conditions including those who have had at least one dose of PCV7 two months earlier
High risk individuals age 5-64 years	*PCV7 NOT recommended*	Single dose of 23vPPV recommended for those who have not received any 23vPPV pneumococcal vaccine before One-time revaccination may be considered 5 years after the first dose of 23vPPV.
Age 65 years or older	*PCV7 NOT recommended*	Single dose of 23vPPV recommended for those who have never received any 23vPPV pneumococcal vaccines before or have received one dose of 23vPPV pneumococcal vaccine before 65 years and more than 5 years earlier One-time revaccination may be considered 5 years after the first dose of 23vPPV for those with the at-risk conditions.