Key statements of IAPCOI and IAP Immunization Timetable for year 2012

Vipin M. Vashishtha*

ABSTRACT

Vaccinology today is a rapidly changing specialty of medical science where new developments are regularly taking place at short intervals. There is a need to review/revise recommendations about existing vaccines in light of recent information. Following an IAPCOI meeting in December 2011, a draft statement was prepared and circulated among the meeting participants to arrive at a consensus.

Objectives: To review and issue recommendations on the recent contentious issues pertaining to rotavirus, Hib, and pneumococcal conjugate vaccines and to revise recommendations for 2012 Immunization timetable for pediatricians in office practice.

Recommendations: IAPCOI abolished the earlier categorization of vaccines in four categories. On rotavirus, the committee stresses the need of having more data on disease burden in India. Further, there is a need to optimize use of rotavirus vaccines in India to achieve higher yields in term of protective efficacy. In the want of adequate data, the committee is not able to issue any specific recommendation on the suitability of a particular rotavirus vaccine (monovalent Vs multivalent) for the country. The committee also acknowledges a small risk of acute intussusceptions following use of current generation of rotavirus vaccines and recommends inclusion of the history of intussusception in the past as an absolute contraindication. The committee concludes there is no safety concerns of Hib vaccines as reported frequently in lay media. On the disease burden of pneumococcal diseases (PD), the committee concludes that there is need of conducting more community based studies to gather more evidence. Similarly, the data on prevalence of different pneumococcal serotypes in the country is sparse and limited to few hospital based studies. There is need of establishing real-time multi-site pneumococcal disease surveillance in the country. Due to scarcity of data on the prevalence of pneumococcal serotypes and non-typeable hemophilus influenzae (NTHi) in India, it is difficult to comment on the superiority of one pneumococcal conjugate vaccine over other. The committee also revised the recommendations for the year 2012.

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Keywords: India, Indian Academy of Pediatrics, Committee on Immunization, Recommendations

ROTA VIRUS VACCINE

Efficacy of current rotavirus vaccines in India

There are no efficacy trials of the licensed rotavirus vaccines available in India. The data from other developing countries shows efficacy ranging from 17.6% (in Mali) to 61.2% (in South Africa and Malawi).1–5 There is definite gradient in the efficacies of these vaccines when different regions of the world are compared — highest in US and Europe, moderate in Latin America, and low in Africa and Asia.1–8 IAPCOI still believes that in developing
countries with high rotavirus disease incidence, even moderate to low vaccine efficacy translates into significant numbers of severe rotavirus gastroenteritis cases prevented and into significant public health impact. More rotavirus disease burden may be prevented in developing countries despite lower vaccine efficacy than in countries with low rotavirus disease burden and higher vaccine efficacy. However, considering that oral vaccines elicit diminished immune responses or have lower efficacy in developing countries than in developed countries, and since India is having history of poor performance of other oral vaccines, notably OPV in recent past, it would not be prudent to extrapolate data from other countries having comparable epidemiologic, economic, and demographic indices.

**Administration schedule of rotavirus vaccines in India**

In a recent community-based study from Vellore, it was noted that rotavirus infection generally occurred early in life, levels of re-infection were high and even three natural infections were able to provide only 79% protection against moderate or severe disease, with no evidence of homotypic protection as believed so far. Therefore, there may be

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### IAP Recommended immunization schedule for children aged 0-6 years (with range), 2012

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<tr>
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<th><strong>Birth</strong></th>
<th><strong>6 wk</strong></th>
<th><strong>10 wk</strong></th>
<th><strong>14 wk</strong></th>
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<table>
<thead>
<tr>
<th><strong>Range of recommended ages for all children</strong></th>
<th><strong>Range of recommended ages for certain high-risk groups</strong></th>
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</table>

(This schedule includes recommendations in effect as of April 2012. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines.)
1. Hepatitis B (HepB) vaccine
- Minimum age: birth
- Administer monovalent HepB vaccine to all newborns before hospital discharge.
- Monovalent HepB vaccine should be used for doses administered before age 6 weeks.
- Administration of a total of 4 doses of HepB vaccine is permissible when a combination vaccine containing HepB is administered after the birth dose.
- Infants who did not receive a birth dose should receive 3 doses of a HepB containing vaccine starting as soon as feasible.
- The ideal interval between dose 1 and dose 2 is 4 weeks, and between dose 2 and 3 is 5 weeks.
- Ideally, the final (third or fourth) dose in the HepB vaccine series should be administered no earlier than age 24 weeks and at least 16 weeks after the first dose.
- HepB vaccine may also be given in any of the following schedules: Birth, 1 & 6 mo; Birth, 6 and 14 weeks; Birth, 6 weeks, 10 weeks, 14 weeks, etc.

2. Poliovirus vaccine*
- OPV is in use of IPV if IPV is unavailable/more expensive, minimum 3 doses (all 3 ages). Additional doses of OPV on all 5ths.
- IPV: 2 instead of 3 doses can be used if primary series started at 8 weeks and the interval between the doses is kept 8 weeks.
- IPV catch-up schedule: 2 doses at 2 months apart followed by a booster after 6 months.

3. Diphtheria and tetanus toxoids and pertussis (DTP) vaccine.
- Minimum age: 6 weeks.
- The first booster (4th dose) may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose.

4. Haemophilus influenzae type b (Hib) conjugate vaccine
- Minimum age: 6 weeks.
- Catch up at 12 months; 2 doses 1 month apart and 1 booster; 12-15 months: 1 primary and 1 booster; above 15 months single dose.

5. Pneumococcal vaccines
- Minimum age: 6 weeks
- Catch up at 12 months; 2 doses 1 month apart and 1 booster; 12-15 months: 1 primary and 1 booster; above 15 months single dose.

6. Measles vaccine
- Minimum age: At completed months/270 completed days.
- Catch up vaccination beyond 12 months should be MMR vaccine.
- Measles vaccine can be administered to infants aged 6 through 11 months during outbreaks. These children should be revaccinated with 2 doses of measles containing vaccines, the first at ages 12 through 15 months and at least 4 weeks after the previous dose, and the second at ages 4 through 6 years.

7. Varicella vaccine.
- Minimum age: 12 months.
- The second dose may be administered before age 4 years, provided at least 4 weeks have elapsed since the first dose.

8. Hepatitis A (HepA) vaccine.
- Minimum age: 12 months.
- Two doses of both killed and live HepA vaccines.
- Administer the second (final) dose 6 to 18 months after the first.

9. Typhoid vaccine.
- Only Vi-P5 (polysaccharide) vaccine is recommended.
- Minimum age: 2 years; Revaccination every 3 years.
- Vi-P5 conjugate vaccine: data not sufficient to recommend for routine use of currently available vaccine.
- DTwP/DTaP/Tdaps/Td: Catch up below 7 years: DTwP/DTaP at 0, 1, and 6 months.
- Catch up above 7 years: Tdap, Td at 0, 1, and 6 months.

10. Influenza vaccine.
- Minimum age: 6 months for trivalent inactivated influenza vaccine.
- First time vaccination: 6 months to below 9 years: two doses 1 month apart; 9 years and above single dose; Annual revaccination with single dose.
- For children aged 6 months to below 9 years: For the 2012 season, administer 2 doses (separated by at least 4 weeks) to those who did not receive at least 1 dose of the 2010–11 vaccine. Those who received at least 1 dose of the 2010–11 vaccine require 1 dose for the 2011–12 season.
- Best time to vaccinate: as soon as the new vaccine is released and available in the market & just before the onset of rainy season.

11. Meningococcal vaccine.
- Only meningococcal polysaccharide vaccine (MPSV) is available.
- Minimum age: 2 years.
- Revaccination only once after 3 years in those at continued high risk.

12. Cholera Vaccine.
- Minimum age: one year (killed whole cell vibrio cholera (Shanchol)).
- Two doses 2 weeks apart >1 year old.

- Recommended in endemic areas only.
- Live attenuated, cell culture derived SA-14-14-2 vaccine is preferred.
- Minimum age: 8 months; can be co-administered with measles vaccine at 9 months; single dose.
- Catch up vaccination: all susceptible children up to 15 yrs should be administered during disease outbreak/ahead of anticipated outbreak in campaigns.
a need for modification of the rotavirus vaccination strategy in India, by increasing the dose or increasing the number of doses or delaying the doses or even considering neonatal immunization. These considerations were further supported by the immunogenicity study of another live attenuated human oral rotavirus vaccine 116E in Indian infants, where administration of higher (1 × 10^4 ffu vs 1 × 10^5 ffu) and more frequent (2 vs 3) doses resulted in more robust immune responses. Consequently, the ongoing phase III efficacy trial with this strain is conducted with higher dose (10^5 ffu) and a 3-dose schedule (6, 10 and 14 weeks). It can be argued that one study in South Africa and Malawi with monovalent rotavirus vaccine (RV1, marketed as Rotarix) did not detect significant differences in vaccine immunogenicity or efficacy on pooled analysis between the cohort receiving two vaccine doses and the cohort receiving three doses. However, there was a slight but non-significant trend toward higher seroconversion rates and vaccine efficacy with the three-dose schedule, and these differences were more marked in South Africa (81.5 (55.1–93.7) vs 72.2 (40.4–88.3)) than in Malawi (49.7 (11.3–72.2) vs 49.2 (11.1–71.7)). The two-dose schedule used in this trial was 10 and 14 weeks instead of 6 and 10 weeks.

Administering rotavirus vaccines at younger ages could further lower the immunogenicity of the vaccines, because of the potential for greater interference of maternal antibody and enhanced replication of the oral poliovirus vaccine. In the above African study with RV1, the researchers accepted that the study was not powered to detect differences in dose schedule. Furthermore, there have been
low seroconversion rates (58.3%; 95% CI: 48.7; 67.4) with two doses of RV1 in comparison with three-dose schedule of RV5 (82.4% (CI; 75; 90%) and 116E (89.7% (42.4; 80.6%)) in immunogenicity studies in India.15–17 In the RV1 trial, the first dose was administered between 8 and 10 weeks (mean age = 8.7 weeks) and the second dose between 12 and 16 weeks (mean age = 13.4 weeks).16 Hence, there is no immunogenicity data for 6 and 10 weeks administration or data on interference with simultaneous OPV administration from India. It is important when examining immunogenicity data to point out that although seroconversion is not a direct proxy for efficacy, it does demonstrate that the virus is able to colonize the infant gut and induce a robust immune response.
According to the WHO Ad-hoc Group of Experts on rotavirus vaccines,18 most countries with high rotavirus disease incidence or high under-5 mortality rates (where children would particularly benefit from robust protection from rotavirus infection) have 6, 10, 14 week EPI schedules. If rotavirus vaccines are to be co-administered with OPV in a setting with an EPI vaccination schedule beginning at 6 weeks of age, the second dose of RV1 may not be sufficient to provide adequate immunity against severe rotavirus disease.18 A 2-dose schedule at 10 and 14 weeks is also assumed to be programmatically problematic, since this would likely result in a failure in administration of the full course of vaccines to children in developing countries due to the restrictive upper age limit for rotavirus vaccine administration, resulting from the approach of attempting to avoid administration of rotavirus vaccines during the ages when there is a heightened risk of intussusceptions.18 After debating intensely, the committee thinks that there is a need to seriously relook at the proper administration schedule of rotavirus vaccines in India in order to achieve higher yields in term of protective efficacy.

Safety of rotavirus vaccines and post-marketing surveillance data on acute intussusceptions in India

The committee reviewed the emerging data on intussusception related to current rotavirus vaccines following large-scale use of these vaccines in Mexico, Brazil, Australia and US.19–22 The post-marketing surveillance (PMS) data from India by the manufacturers of two rotavirus vaccines licensed in India was also reviewed.

Based on PMS data, the current rotavirus vaccines have been associated with an increased risk of intussusceptions (about 1–2/100,000 infants vaccinated) for a short period after administration of the first dose in some populations.19 This risk is 5–10 times lower than that observed with the previously licensed vaccine (1 case per 10,000 doses). There are no published reports on incidence/rates of acute intussusception following rotavirus vaccination in India. However, the PMS data (unpublished) of Indian manufacturers revealed 13 cases of acute intussusceptions associated (causality not yet proved) with rotavirus vaccines administration since the launch of RV1 in India till December 2011, and two cases following RV5 during a five-month surveillance period (May–September 2011) in India.

There is limited information on the incidence of intussusception and its risk factors in India. No large-scale trials of rotavirus vaccines have been conducted in the country to assess whether there is an increased risk of intussusception associated with the vaccination. Data on background rates of intussusception in developing countries are required to facilitate informed decision making about use of new rotavirus vaccines. These background rates are also needed for estimation of the sample size needed for studies to demonstrate safety both before and after licensure of new rotavirus vaccines. Such population-based data are not available in most developing countries, including India. However, a recent study from Delhi found the incidence of intussusception requiring hospitalization was 17.7 cases per 100,000 infant-years of follow-up (95% CI: 5.9–41.4 cases per 100,000 infant-years).23 The study also concluded that natural rotavirus infection did not appear to be a major cause of intussusception in Indian infants. This incidence appears to be lower than that reported in other middle-and high-income countries. Another retrospective study from a tertiary-care hospital from south India identified 31 children with definite intussusception during the study period of 1 January 2001–30 June 2004.24

After reviewing recent data, the committee concludes that there is definite albeit a small risk of acute intussusceptions following use of current generation of rotavirus vaccines. However, the benefits of rotavirus vaccination against severe diarrhea and death from rotavirus infection far exceed the miniscule risk of intussusceptions. It urges the manufacturers to actively monitor the risk of intussusceptions as the usage of these vaccines is bound to go up. This will also require strengthening of AEFI surveillance in the country. Information about the possible risk of intussusceptions associated with rotavirus vaccination needs to be communicated clearly to the national decision-makers, healthcare providers, and parents. The committee also stresses the need of strictly adhering to the set upper age limits of these vaccines, i.e. the first dose of either RV1 or RV5 should be administered between the ages of 6 weeks and 14 weeks and 6 days, and that the maximum age for administering the last dose of either vaccine should be 32 weeks25 of these vaccines while prescribing them in office practice. The committee has recommended inclusion of the history of intussusception in the past as an absolute contraindication for rotavirus vaccine (RV1 and RV5) administration.

PNEUMOCOCCAL CONJUGATE VACCINES

Suitability of PCV13 vs PCV10 for Indian children

The committee studied the recent data on PCV13 and PCV10. The committee also reviewed the reports of PCV13 studies done worldwide on immune responses (IgG – GMC, OPA – GMT) and boostability for the serotype 3 capsular antigen,26 and the immune responses following post-primary and post-booster series against
s.


The committee also reviewed available data on the efficacy of the new serotypes in the PCV13. In England and Wales,13 vaccine effectiveness (VE) for the new serotypes for 2 doses under a year was 78% (95% CI: −18 to 96%) and 77% (CI: 38–91%) for one dose over a year. VE for 7F and 19A was 76% (CI: 21–93%) and 70% (CI: 10–90%), respectively for ≥ one dose, for serotypes 1 and 3 was 62% and 66%, respectively although confidence intervals spanned zero. IPD due to PCV13-only serotypes halved in children under 2 years in the study period.31

The committee believes that the direct protection rendered by the serotype included in a vaccine formulation is definitely superior to any cross protection offered by the unrelated serotypes even of the same group in a PCV formulation. However, the committee still not convinced about the clinical efficacy of serotype 3 contained in PCV13 despite multiple studies showing good functional immune responses after the infant series29 and reasonably good effectiveness.31 There has been no consistent PCV13 impact on serotype 3 IPD or carriage reported so far.

Similarly, the committee still thinks that despite using a different conjugation method (cyanylation vs reductive amination),32 PCV10 is yet to demonstrate a better clinical efficacy (cross protection) against serotype 19A than shown by PCV7. Though current seroprevalence of type 19A in India is not known, but its presence is confirmed by almost all the recent studies.33–35 Since this serotype is increasing in many other Asian countries and has got higher antimicrobial resistance characteristics than other serotypes,34,35 the committee believes that protection against 19A will be critical to determine which vaccine is appropriate to use in the country. Recent data has now shown that PCV13 provides protection against 19A,31 while it is unknown if the presence of ‘novel’ 19F in PCV10 will provide cross protection against 19A.36 On the other hand, the committee is concerned about the adequate cross protection rendered by serotype 6B–6A based on performance of PCV7 in many European countries and US in decreasing IPDs caused by 6A. However, the exact role and significance of 6C which is clearly emerging as replacement serotype is yet to be determined.

The committee thinks that though NTHi, a co-pathogen plays some role in the pathogenesis of mucosal disease with Streptococcal pneumoniae, its role in childhood pneumonia is still not proven.

After appraising in detail all the available relevant data, the committee concludes that since there is scarcity of data on the prevalence of pneumococcal serotypes including serotypes 3, 6A and 19A, and non-typeable Haemophilus influenzae (NTHi) in India, it is almost impossible to comment on the exact superiority of one product over other. Further, in the absence of head to head trials it is difficult to determine if either vaccine has a clear advantage over other. Although recent publications37 state that the same few serotypes are responsible for a large proportion of PD in all geographic regions and new PCVs cover almost 70% of serotypes prevailing in India, the committee believes that it is critical to know what percentage of pneumonia, meningitis and other IPDs are caused by the pneumococcal serotypes not included in existing formulations.

**Recommendations for premature and low birth weight infants**

The committee has now stressed the need of treating prematurity (PT) and very-low birth weight (VLBW) infants as another high-risk category for pneumococcal vaccination. These infants have up to 9-fold higher incidence of invasive pneumococcal diseases (IPD) in (VLBW babies) as compared to full size babies.38 The risk ratio for LBW infants compared with normal birth weight infants was 2.6, and for premature infants compared with full-term (FT) infants was 1.6. PCV must be offered to these babies on priority basis. PCV was as immunogenic in LBW and PT as in NBW and FT infants; the vaccine efficacy for both groups was found 100%.38

**Recommendations for IAP Immunization Timetable, 2012**

IAP Immunization Timetable, 2012

**Major changes**

- Polio: sequential IPV-OPV schedule is recommended for primary polio immunization in place of combined OPV + IPV schedule.
- Hepatitis-B: ‘Birth–6 weeks—6 mo’ is recommended as most preferred schedule instead of earlier ‘0–6 weeks—14 weeks’ schedule.
- Rotavirus: history of intussusception in the past is added as an absolute contraindication for RV vaccine administration.
- Pneumococcal: prematurity and very-low birth weight are added as another high-risk category for pneumococcal vaccination.
- Influenza: guidelines are provided for influenza vaccination.
The IAPCOI has issued recommendations for the IAP Immunization Timetable for the year 2012 that includes the following major changes from last year:

**Poliovirus immunization**

In the light of remarkable achievement in the field of polio eradication in India over the last one year, the committee has now decided to adopt a sequential IPV-OPV schedule. This will pave the way to ultimate adoption of all-IPV schedule in future considering the inevitable cessation of OPV from immunization schedules owing to its safety issues (VAPP and cVDPVs). This policy is in accordance with the recent decision taken by GPEI where phased removal of Sabin viruses, beginning with highest-risk (type 2) would be undertaken. This will result in elimination of VDPV type 2 in ‘parallel’ with eradication of last wild polioviruses by switching from tOPV to bOPV for routine EPI and campaigns. This switch will result in much early introduction of IPV than anticipated, at least in high-risk areas for VDPVs, to provide type 2 protection.

Why changes in polio immunization schedule became inevitable?
- India is polio free for >1 year!!
- Type 2 WPV eradicated in 1999
- cVDPVs especially type 2 is a concern
- VAPP cannot be overlooked anymore!
- New ‘end game strategy’ announced in November 2011
- No preparations for approaching ‘end game’

There is considerable evidence to show that sequential schedules that provide IPV first, followed by OPV, can prevent VAPP while maintaining the critical benefits conferred by OPV (i.e. high levels of gut immunity). Data from several studies show that sequential schedules considerably decrease the risk of VAPP. There is moderate level of scientific evidence that sequential immunization schedules starting with two or more doses of IPV and followed by two or more doses of OPV (at an interval of 4–8 weeks) induce protective immunological responses to all three poliovirus serotypes in ≥90% of vaccinees. However, the committee has retained the birth dose of OPV as recommended earlier. Providing the first OPV dose at a time when the infant is still protected by maternally-derived antibodies may, at least theoretically, also prevent VAPP. A birth dose of OPV is considered necessary in countries where the risk of poliovirus transmission is high.

**The primary schedule**
The committee recommends birth dose of OPV, three primary doses of IPV at 6, 10 and 14 weeks, followed by two doses of OPV at 6 and 9 months, another dose (booster) of IPV at 15–18 months and OPV at 5 years. Alternatively, two doses of IPV can be used for primary series at 8 and 16 weeks, though this schedule is immunologically superior to EPI schedule and the number of IPV doses is reduced, but will be more cumbersome due to extra visits and incompatibility with combination formulations. Further, the child would be susceptible to WPV infection for the first two months of life considering the epidemiology of WPV in India till quite recently.

Since IPV administered to infants in EPI schedule (i.e. 6 weeks, 10 weeks and 14 weeks) results in suboptimal seroconversion, hence, a supplementary dose of IPV is recommended at 15–18 months. IPV should be given intramuscularly (preferably) or subcutaneously and may be offered as a component of fixed combinations of vaccines. However, the committee recommends that if IPV is unaffordable or unavailable, the primary series must be completed with three doses of OPV given at 6, 10, and 14 weeks. No child should be left without adequate protection against wild poliovirus (i.e. three doses of either vaccine). All OPV doses (mono-, bi- or trivalent) offered through supplementary immunization activities (SIAs), should also be provided.

**Catch-up schedule**
IPV may be offered as ‘catch up vaccination’ for children less than 5 years of age who have completed primary immunization with OPV. IPV can be given as three doses; two doses at two months interval followed by a third dose after 6 months. This schedule will ensure a long lasting protection against poliovirus disease.

New poliovirus vaccination schedule

The primary schedule:
- OPV (birth dose) + 3 doses of IPV at 6, 10 and 14 weeks + 2 doses of OPV at 6 & 9 months + IPV at 15–18 months (booster) + OPV at 5 years

The alternative schedule:
- OPV at birth + 2 doses of IPV at 8 and 16 weeks (i.e. 2 & 4 mo) + OPV at 6 & 9 mo + IPV at 15–18 mo + OPV at 5 years

Catch-up schedule (IPV up to 5 years of age):
- IPV can be given as 3 doses; 2 doses at 2 months interval followed by a 3rd dose after 6 months
### ‘IAP Immunization Timetable 2012’

#### I. IAP recommended vaccines for routine use

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<th>Age (completed weeks/months/years)</th>
<th>Vaccines</th>
<th>Comments</th>
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<td><strong>Birth</strong></td>
<td>BCG</td>
<td><strong>Hepatitis-B</strong>: Administer Hep-B vaccine to all newborns before hospital discharge</td>
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<tr>
<td></td>
<td>Hep-B 1</td>
<td></td>
</tr>
<tr>
<td><strong>6 weeks</strong></td>
<td>DTwP 1/DTaP 1 IPV 1</td>
<td>Polio:</td>
</tr>
<tr>
<td></td>
<td>Hep-B 2</td>
<td>• All doses of IPV may be replaced with OPV if former is unaffordable/unavailable</td>
</tr>
<tr>
<td></td>
<td>Hib 1</td>
<td>• Additional doses of OPV on all supplementary immunization activities (SIAs)</td>
</tr>
<tr>
<td></td>
<td>Rotavirus 1 PCV 1</td>
<td>• Two doses IPV instead of 3 for primary series if started at 8 weeks, and 8 weeks interval between the doses</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Rotavirus</strong>: 2 doses of RV-1 and 3 doses of RV-5</td>
</tr>
<tr>
<td><strong>10 weeks</strong></td>
<td>DTwP 2/DTaP 2 IPV 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hib 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rotavirus 2 PCV 2</td>
<td></td>
</tr>
<tr>
<td><strong>14 weeks</strong></td>
<td>DTwP 3/DTaP 3 IPV 3</td>
<td><strong>Rotavirus</strong>: Only 2 doses of RV1 are recommended at present.</td>
</tr>
<tr>
<td></td>
<td>Hib 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rotavirus 3 PCV 3</td>
<td></td>
</tr>
<tr>
<td><strong>6 months</strong></td>
<td>OPV 1</td>
<td><strong>Hepatitis-B</strong>: The final (third or fourth) dose in the HepB vaccine series should be administered no earlier than age 24 weeks and at least 16 weeks after the first dose.</td>
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<tr>
<td></td>
<td>Hep-B 3</td>
<td></td>
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<tr>
<td><strong>9 months</strong></td>
<td>OPV 2</td>
<td><strong>Measles</strong>: For both killed and live hepatitis-A vaccines, 2 doses are recommended</td>
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<td></td>
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<tr>
<td><strong>12 months</strong></td>
<td>Hep-A 1</td>
<td><strong>Hepatitis A</strong>: For both killed and live hepatitis-A vaccines, 2 doses are recommended</td>
</tr>
<tr>
<td><strong>15 months</strong></td>
<td>MMR 1</td>
<td><strong>Varicella</strong>: The risk of breakthrough varicella is lower if given 15 months onwards.</td>
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<tr>
<td></td>
<td>Varicella 1</td>
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<tr>
<td></td>
<td>PCV booster</td>
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<tr>
<td><strong>16 to 18 months</strong></td>
<td>DTwP B1/DTaP B1 IPV B1</td>
<td>The first booster (4th dose) may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose.</td>
</tr>
<tr>
<td></td>
<td>Hib B1</td>
<td></td>
</tr>
<tr>
<td><strong>18 months</strong></td>
<td>Hep-A 2</td>
<td><strong>Hepatitis A</strong>: For both killed and live hepatitis-A vaccines 2 doses are recommended</td>
</tr>
<tr>
<td><strong>2 years</strong></td>
<td>Typhoid 1</td>
<td><strong>Typhoid</strong>: Typhoid revaccination every 3 years, if Vi-polysaccharide vaccine is used.</td>
</tr>
<tr>
<td><strong>4½ to 5 years</strong></td>
<td>DTwP B3/DTaP B2 OPV 3</td>
<td><strong>MMR</strong>: the 2nd dose can be given at anytime 4-8 weeks after the 1st dose.</td>
</tr>
<tr>
<td></td>
<td>MMR 2</td>
<td><strong>Varicella</strong>: the 2nd dose can be given at anytime 3 months after the 1st dose.</td>
</tr>
<tr>
<td></td>
<td>Varicella 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Typhoid 2</td>
<td></td>
</tr>
<tr>
<td><strong>10 to 12 years</strong></td>
<td>Tdap/Td</td>
<td><strong>Tdap</strong>: is preferred to Td followed by Td every 10 years.</td>
</tr>
<tr>
<td></td>
<td>HPV</td>
<td><strong>HPV</strong>: Only for females, 3 doses at 0, 1-2 (depending on brands) and 6 months.</td>
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Hepatitis-B immunization

The committee has now recommended the following schedule for routine Hepatitis-B vaccination in office practice for children: the first dose of a three-dose schedule should be administered at birth, second dose at 6 weeks, and third dose at 6 months (i.e., 0 to 6 weeks to 6 month). This schedule is not only more closely to immunologically ideal and most widely used 0 to 6 month schedule, but also conforms to latest ACIP recommendations wherein the final (third or fourth) dose in the Hepatitis-B vaccine series should be administered no earlier than age 24 weeks and at least 16 weeks after the first dose.\(^47\) It will replace the existing schedule of 0 to 6 week to 14-week. However, the Hepatitis-B vaccine may be given through other schedules, considering the programmatic implications and logistic issues. The committee stresses the significance and need of birth dose.

Influenza vaccination

The committee reviewed the WHO recommendations regarding composition of flu vaccines for the southern and northern hemisphere for use in the 2012–2013 influenza seasons.\(^48,49\) For the northern hemisphere, it will contain the following strains: an A/California/7/2009 (H1N1) pdm09-like virus; an A/Victoria/361/2011 (H3N2)-like virus; and a B/Wisconsin/1/2010-like virus.\(^48\) The last two strains will be different from the last year’s vaccine for the region however; there will be no change in the composition of influenza vaccines for the southern hemisphere for 2012.\(^49\) Last year, the strains were similar for both the hemispheres. This will have impact on the types of vaccines to be used in coming season.

As far as the influenza virus circulation in India is concerned, the data since 2004 suggests a clear peaking of circulation during the rainy season across the country — ‘June—August’ in north (Delhi), west (Pune) and east (Kolkata), and ‘October—December’ in south (Chennai).\(^50\) This data is also consistent with the WHO circulation patterns for 2010 and 2011 for India which also shows a clear peak coinciding with the rainy season across the country. These data illustrate the difficulty in having effective uniform vaccination timing for a vast country like India and have implications when formulating vaccination policies. The evidence of antigenic drifts of circulating influenza viruses in India, together with the temporal peaks in seasonality of influenza in different parts of the country; illustrate the need for a staggered approach in vaccination timing. Hence, the best time for offering vaccine for individuals residing in southern states would be just before the onset of rainy season, i.e., before October while for rest of the country, it should be before June. Though, the committee acknowledges that this issue is still contentious and unresolved.

This is to be noted that WHO convenes two meetings to provide recommendations for the usage of influenza vaccine in February and September each year. The vaccine for the February recommendations (Northern hemisphere) and September recommendations (Southern hemisphere) becomes available after 6 months of each recommendation. With the above background the vaccine that shall be available in March—April 2012 (Southern hemisphere) this year is based on the recommendation made in September 2011 which took into account the data from the past year i.e.
August 2010—Sept 2011 (thus covering India’s rainy season peak last year from June to August 2011). Whereas the vaccine that shall be available in August 2012 (Northern hemisphere, with the 2 new strains) shall be based on the recommendation made in February 2012 which took into account the data from the past year i.e. March 2011—Feb 2012 which means that by the time it is available in August 2012, the most of the country barring southern states may have already passed the peak influenza activity.

In addition to this, WHO classifies India under the ‘South Asia’ transmission zone of influenza circulation. This along with summary review of the 2011 southern hemisphere winter influenza season strongly points India’s alignment with the availability of Southern hemisphere vaccine (March—April) to ensure we have the latest available strains for early vaccination to prevent the peak of circulation of Influenza in the rainy season across the country.


CONFLICTS OF INTEREST

The author has none to declare.

REFERENCES


44. Modlin JF, Halsey NA, Thoms ML, Meschievitz CK, Patriarca PA. Humoral and mucosal immunity in infants induced by three sequential inactivated poliovirus vaccine-live attenuated oral poliovirus vaccine immunization


