Adult Immunisation in India

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Introduction

- **The immunization of an adult depends on the previous immunization received in childhood. Unlike the Paediatric Immunization Guidelines, given by the Indian Academy of Pediatrics and the National Immunization Programs, the guidelines for vaccination in healthy adults vary from region to region.**

The major guidelines are:

- **The Advisory Committee on Immunization Practices (ACIP) guidelines from Centers for Disease Control and Prevention**
- **WHO guidelines**
- **Association of Physicians of India – Expert panel guidelines**

Introduction

- **Vaccination is one of the most cost effective strategies available in public health today. In addition to protecting the vaccinated individual from developing a potentially serious disease, vaccines help protect the community by reducing the spread of infectious diseases.**
- **It is highly fitting that one of the most dramatic successes in the history of public health, the eradication of small pox served as a definitive conclusion to the story of smallpox vaccination by Edward Jenner.**

Introduction

- **More than three decades have passed since India adopted the WHO EPI schedule in January 1978. India has responded with an unhesitating commitment of leadership and resources to expand immunization efforts.**
- **The Universal Immunization Programme (UIP) was launched in 1985 to progressively cover the country. The UIP aimed to reduce mortality and morbidity from the six vaccine preventable diseases (measles vaccine was added in 1985).**
- **Vitamin A supplementation was included in 1990. Many advances have been made in increasing vaccine coverage amongst infants for the diseases covered under the EPI (tuberculosis, tetanus, diphtheria, pertusis. polio and measles) although the coverage remains variable in different parts of the country.**

Importance of vaccination

- **At present our public health system has reached a stage where basic infrastructure for immunization programme, system for vaccine delivery, cold chain and vaccine production capacity are in place.**
- **A potential exists where the immunization programme can expand its immunization activities beyond infancy to accommodate newer vaccines for adolescents and adults, depending on disease burden and cost-effectiveness of the intervention.**

Do adults need vaccination?

- **Adults too need vaccinations to boost efficacy of childhood vaccines, aid immunity for newer comorbidities and afford protection when immunity is suppressed due to acquired illnesses.**
- **Pointing out at low awareness about adult vaccines in India, a survey conducted by Ipsos MORI, a market research organisation, and sponsored by GlaxoSmithKline Plc (GSK), a British pharmaceutical company, found that 31% of adults surveyed have received any vaccination in the past five years.**

Survey- outcome

- **The survey conducted among 2,002 adults across six cities in India (Delhi, Kolkata, Mumbai, Bengaluru, Hyderabad and Chennai) in September 2017, found that for over 42% of adults ranked staying in good physical health as the primary priority in life, staying up-to-date with vaccinations is typically less important compared with other ways of staying healthy such as eating healthy, keeping active and not smoking, particularly among males.**

- **Interestingly, around 34% believe vaccinations are required only for travel purposes, 38% believe vaccinations are for children and/or babies only and 26% believe vaccinations are not required if one is fit and healthy.**

Bottle necks

- **Inspite of the heavier burden of diseases, vaccines recommended for adults are not widely used.There are several reasons for this such as:**
- **There is a limited perception on part of the health care providers and beneficiaries that adult vaccine preventable diseases are significant health problems.**
- **There are doubts in the minds of some heath care providers and public about the efficacy and safety of several of the vaccines used for adults.**
- **Adult immunization is selective not universal, different vaccines have different target group.**
- **Healthy adults are harder to reach through public health system and hence vaccination of this age group becomes difficult.**

Table 1 Recommended Adult Immunization Schedule by Age Group United States, 2019

Vaccine	19–21 years	22–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV) or Influenza recombinant (RIV)	1 dose annually				
or					
Influenza live attenuated (LAIV)			1 dose annually		
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap, then Td booster every 10 yrs				
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)				
Varicella (VAR)	2 doses (if born in 1980 or later)				
Zoster recombinant (RZV) (*preferred*)				2 doses	
or					
Zoster live (ZVL)					1 dose
Human papillomavirus (HPV) Female	2 or 3 doses depending on age at initial vaccination				
Human papillomavirus (HPV) Male	2 or 3 doses depending on age at initial vaccination				
Pneumococcal conjugate (PCV13)	1 dose				
Pneumococcal polysaccharide (PPSV23)	1 or 2 doses depending on indication				1 dose
Hepatitis A (HepA)	2 or 3 doses depending on vaccine				
Hepatitis B (HepB)	2 or 3 doses depending on vaccine				
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, then booster every 5 yrs if risk remains				
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication				
Haemophilus influenzae type b (Hib)	1 or 3 doses depending on indication				

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended vaccination for adults with an additional risk factor or another indication

No recommendation

Recommended Adult Immunization Schedule
for ages 19 years or older

UNITED STATES
2019

How to use the adult immunization schedule

1 Determine recommended vaccinations by age (Table 1)

2 Assess need for additional recommended vaccinations by medical condition and other indications (Table 2)

3 Review vaccine types, frequencies, and intervals and considerations for special situations (Notes)

Vaccines in the Adult Immunization Schedule*

Vaccines	Abbreviations	Trade names
Haemophilus influenzae type b vaccine	Hib	ActHIB Hiberix
Hepatitis A vaccine	HepA	Havrix Vaqta
Hepatitis A and hepatitis B vaccine	HepA-HepB	Twinrix
Hepatitis B vaccine	HepB	Engerix-B Recombivax HB Heplisav-B
Human papillomavirus vaccine	HPV vaccine	Gardasil 9
Influenza vaccine, inactivated	IIV	Many brands
Influenza vaccine, live attenuated	LAIV	FluMist Quadrivalent
Influenza vaccine, recombinant	RIV	Flublok Quadrivalent
Measles, mumps, and rubella vaccine	MMR	M-M-R II
Meningococcal serogroups A, C, W, Y vaccine	MenACWY	Menactra Menveo
Meningococcal serogroup B vaccine	MenB-4C MenB-FHbp	Bexsero Trumenba
Pneumococcal 13-valent conjugate vaccine	PCV13	Prevnar 13
Pneumococcal 23-valent polysaccharide vaccine	PPSV23	Pneumovax
Tetanus and diphtheria toxoids	Td	Tenivac Td vaccine
Tetanus and diphtheria toxoids and acellular pertussis vaccine	Tdap	Adacel Boostrix
Varicella vaccine	VAR	Varivax
Zoster vaccine, recombinant	RZV	Shingrix
Zoster vaccine live	ZVL	Zostavax

*Administer recommended vaccines if vaccination history is incomplete or unknown. Do not restart or add doses to vaccine series for extended intervals between doses. The use of trade names is for identification purposes only and does not imply endorsement by the ACIP or CDC.

Recommended by the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/acip) and approved by the Centers for Disease Control and Prevention (www.cdc.gov), American College of Physicians (www.acponline.org), American Academy of Family Physicians (www.aafp.org), American College of Obstetricians and Gynecologists (www.acog.org), and American College of Nurse-Midwives (www.midwife.org).

Report

- Suspected cases of reportable vaccine-preventable diseases or outbreaks to the local or state health department
- Clinically significant post-vaccination reactions to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or 800-822-7967

Injury claims

All vaccines included in the adult immunization schedule except pneumococcal 23-valent polysaccharide and zoster vaccines are covered by the Vaccine Injury Compensation Program. Information on how to file a vaccine injury claim is available at www.hrsa.gov/vaccinecompensation or 800-338-2382.

Questions or comments

Contact CDC at www.cdc.gov/cdc-info or 800-CDC-INFO (800-232-4636), in English or Spanish, 8 a.m.–8 p.m. ET, Monday through Friday, excluding holidays.

Download the CDC Vaccine Schedules App for providers at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html

Helpful information

- Complete ACIP recommendations: www.cdc.gov/vaccines/hcp/acip-recs/index.html
- General Best Practice Guidelines for Immunization: www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html
- Vaccine Information Statements: www.cdc.gov/vaccines/hcp/vis/index.html
- Manual for the Surveillance of Vaccine-Preventable Diseases (including case identification and outbreak response): www.cdc.gov/vaccines/pubs/surv-manual
- Travel vaccine recommendations: www.cdc.gov/travel
- Recommended Child and Adolescent Immunization Schedule, United States, 2019: www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

ADULT IMMUNISATION: CATEGORIES

- **Boost protection acquired by immunization earlier in life in the absence of "natural" boosting from exposure to the infectious agent.**
- **Accelerate control or elimination efforts: Disease control initiatives frequently aim at increasing herd immunity, interrupting transmission and covering the non-immune cohorts.**
- **Counter specific risks such as travel, high risk behaviour and immuno-compromised state.**

Influenza vaccine

- **The available vaccine in India is a killed virus vaccine to be given intramuscularly.Other vaccines include nasal spray vaccines (containing live attenuated virus). As the influenza virus constantly mutates, a new batch is prepared every year.The vaccine becomes effective against influenza virus 2 weeks after administration. Since the peak influenza season begins in October and lasts till May, October-November are the best times to receive vaccination.**
- **A single dose of inactivated flu vaccine in dose of 0.5 ml is given intramuscularly into the deltoid muscle.**

Influenza vaccine

- **Vaccination is indicated in high-risk subjects, e.g., those with COPD, CKD, cardiac or lung diseases, hepatic, metabolic diseases (diabetes), hematological diseases, pregnancy, nursing homes, health care personnel, household contacts of children <5 years or adults >50 years, diseases which impair respiratory functions, and immunosuppressed individuals.**
- **Side effects include allergic reactions, Guillain Barre syndrome. High-risk individuals (see above) should not receive nasal spray live flu vaccine. The vaccine provides adequate protection against HINI infection. Antibody monitoring is not required.**

Influenza vaccine- Indications

- **pregnant women at any stage of pregnancy**
- **• children aged 6 months to 5 years**
- **• elderly individuals (≥65 years of age)**
- **• individuals with chronic medical conditions (disorders of the cardiovascular or pulmonary systems, including asthma; chronic metabolic diseases, including diabetes mellitus; renal or hepatic dysfunction, hemoglobinopathies, or the immunocompromised • health-care workers**
- **The TIV is administered by an annual, single intramuscular dose of 0.5 ml. The LAIV is administered by the intranasal route. The vaccine is contraindicated for persons who had severe reaction to the initial dose and for persons having egg allergy. A quadrivalent vaccine having two strains of influenza A and two of influenza B is available since 2019.**

Tdap / Td/ DPT

- **DIPHTHERIA, TETANUS, (TD) AND ACELLULAR PERTUSSIS 31 (TDAP) VACCINE**
- **Adults who have completed their primary vaccination series should receive a Td vaccine every 10 years till the age of 65 years; one dose of Tdap vaccine may be administered in place of Td vaccine at any time**

Tetanus, diphtheria, and pertussis vaccine

- **Full dose diphtheria, tetanus, and pertussis are used in children (DPT). Acellular pertussis vaccine (DTaP) should be used for older children instead of whole cell vaccine (DTwP) because it is associated with less neurological complications. Two new tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccines (Tdap) are available for use in those who are more than 10 years of age.[**
- **The vaccination schedule varies with status of primary immunization. The dose is 0.5 ml given IM preferably in deltoid. DTaP (acellular pertussis) or DTwP (whole cell pertussis) vaccine should be used for first booster at 18 months while Tdap (low dose diphtheria and acellular pertussis) may be used for the second booster at 5 years and 10-15 years.**

Indications

- **For adults between 18 and 64 years who have completed their primary vaccination schedule, a booster dose of Td vaccine is indicated once every 10 years till the age of 65; one dose of Tdap vaccine may be administered in place of Td vaccine.**
- **For adults >18 years who have not received prior vaccination against diphtheria, pertussis and tetanus, three doses of Td vaccine are indicated; two doses are administered at least 4 weeks apart, and the third dose is given 6-12 months after the second dose. The Tdap vaccine can substitute any one of the Td doses.**

Indications

- **Health care personnel, especially those in direct contact with the patients, who have not received Tdap vaccine should receive a single dose of Tdap vaccine if 2 years or more have elapsed since the last dose of Td vaccination. Women planning pregnancy should receive one dose of Tdap vaccine if they did not receive it previously. Pregnant women who have received the Td vaccination more than 10 years ago should receive one dose of Tdap.**

Pregnancy

- **Td vaccine in the second or third trimester of pregnancy. Pregnant women who have received Td vaccination during the preceding 10 years should receive one dose of Tdap in the immediate postpartum period if the last dose of Td was administered more than 2 years ago.**
- **For pregnant women who have never received previous vaccination, three doses of Td vaccine are indicated; in the second or third trimester of pregnancy, two doses are administered at least 4 weeks apart, and the third dose is given 6-12 months after the second dose.**
- **Following minor trauma in non immunized individual or those immunized more than 10 years if major wound both Td/Tdap and TIG should be given; if immunized >5 years and <10 years ago only Td/Tdap is given and TIG is not required. Modified dose vaccine is not effective post transplant and full dose is needed.**

Precautions

- **Tdap/Td vaccines are contraindicated for persons with a history of anaphylaxis to any component. The Tdap vaccine is contraindicated in adults with a history of encephalopathy not attributable to an identifiable cause within 7 days of administration of a vaccine with pertussis component; these persons should receive Td vaccine.**
- **In adults with moderate or severe acute illness and those with unstable neurologic conditions (e.g., stroke, acute encephalopathies), Tdap vaccination is to be deferred until the acute illness resolves.**
- **In adults with a history of Arthus reaction with the previous dose of tetanus/diphtheria containing vaccine, Tdap/Td is administered only after 10 years since the last dose.**

HERPES ZOSTER VACCINE

- **Herpes zoster vaccine (Zostavax) is a lyophilized preparation of the Oka strain of live, attenuated varicella zoster virus (VZV). Each 0.65 ml dose contains a minimum of 19,400 plaque-forming units [PFU].**
- **A single dose of zoster vaccine is recommended for adults aged 60 years and older regardless of whether they report a prior episode of herpes zoster.**

HUMAN PAPILLOMAVIRUS (HPV) VACCINE:

- **Two HPV vaccines are commercially available. These include a quadrivalent (HPV4) vaccine containing the HPV virus L1 protein like particles of HPV 6, 11, 16, and 18 and a bivalent (HPV2) vaccine containing L1 VLPs of HPV 16, 18.**
- **HPV vaccination is recommended at age 11 or 12 years with catch up vaccination at ages 13 through 26 years. Ideally, vaccine should be administered before potential exposure to HPV through sexual activity.**
- **A complete series for HPV4 3 doses are administered as 0.5 ml intramuscular injection at 0, 2, and 6 months.**

PNEUMOCOCCAL VACCINATION

- **There are two types of pneumococcal vaccine, a conjugate vaccine containing 13 serotypes and a polysaccharide vaccine containing 23 serotypes. A combination of these two serially is recommended in adults with certain comorbidities**

Types of vaccine

- **Pneumococcal vaccine is available in two forms:**
- **Polysaccharide vaccine consisting of polysaccharides from 23 serotypes. This vaccine is less immunogenic, does not affect carrier rates, promote herd immunity, or protect from respiratory tract infections as there is no mucosal immunity**
- **Conjugated Vaccine with 13 serotypes consists of capsular polysaccharides covalently bound to diphtheria toxoid, which is highly immunogenic but nontoxic. This combination results in mucosal immunity and lifelong immunity.**

Indications :

- **PCV13 is approved in several countries worldwide, including the US, EU, and India, for use in adults aged >50 years for the prevention of pneumonia and/or invasive disease caused by *Streptococcus pneumonia* serotypes included in the vaccine. In immunocompetent adults, PPSV23 is indicated in those over the age of 65. The vaccine is also indicated for those with CKD, chronic obstructive pulmonary disease (COPD), cirrhosis, diabetes, HIV, lupus, cancer and those on chemotherapy or radiotherapy, long-term steroid, asplenia, or splenectomy.**
- **A single dose PPSV23 is recommended in immunocompetent adults. In those who have received primary immunization, vaccination is done with PPSV23 0.5 ml single dose IM. In those who have not received primary vaccination, PCV13 can be given followed by PPSV23 after a minimum interval of 8 weeks. If PPSV23 has been given earlier PCV13 can be given after 1 year.**

Vaccine	Advantages	Disadvantages
PPSV23	Long experience (licensed in 1983) Not expensive At present, relatively high serotype coverage for IPD in elderly (60-70%) Considerable efficacy proven against IPD (50-70%) in immunocompetent elderly Cost-effective proven for elderly people even if it only prevents IPD	T-cell-independent immune response (IgM antibody produced, response declines in 3-5 years and no anamnestic response at revaccination) Decrease in memory B cell frequency after PPV23 Weak immunogenicity in some individuals Unclear (null to small) efficacy against nonbacteremic pneumococcal pneumonia No effect on nasopharyngeal carriage No efficacy demonstrated in reducing nasopharyngeal carriage No impact proven in reducing overall pneumococcal disease burden
PCV13	T cell-dependent immune response (larger duration and boosting effect at revaccination) High efficacy (80-90%) against vaccine type IPD proven in children Significant efficacy against pneumococcal pneumonia (CAPiTA study) Potential efficacy in reducing nasopharyngeal carriage Considerable impact in reducing all pneumococcal disease burden shown by prior PCV7	Short experience (approved in 2011) Expensive At present, relatively small serotype coverage for IPD in the elderly (30-40%) Future reduction of vaccination impact in adults/elderly (because of probable indirect effects from PCV13 pediatric use)

PPSV: Pneumococcal polysaccharide vaccine, PCV: Pneumococcal conjugate vaccine, IPD: Invasive pneumococcal disease

Indications	Indications
Pneumococcal vaccine-naïve persons	One dose PCV13 followed by a dose of PPSV23
Adults aged ≥65 years who have not previously received pneumococcal vaccine or whose previous vaccination history is unknown	PPSV23 should be given 6-12 months after PCV13 If PPSV23 cannot be given during this time window, the dose of PPSV23 should be given during the next visit The two vaccines should not be co-administered, and the minimum acceptable interval between PCV13 and PPSV23 is 8 weeks
Previous vaccination with PPSV23	Should receive a dose of PCV13 if they have not yet received it
Adults aged ≥65 years who have previously received ≥1 doses of PPV23	A dose of PCV13 should be given ≥1 year after PPSV23 For those for whom an additional dose of PPSV23 is indicated, it should be given 6-12 months after PCV13 and ≥5 years after the most recent dose of PPSV23

PPSV: Pneumococcal polysaccharide vaccine, PCV: Pneumococcal conjugate vaccine

HEPATITIS A (HEP A) VACCINE

- **Vaccines available for immunization against hepatitis A virus (HAV) include inactivated vaccines such as single antigen (HAV antigen) vaccines, or combination vaccines containing both HAV and HBV antigens.**
- **Vaccination is advised for persons with any of the following indications and any person seeking protection from hepatitisA virus (HAV) infection.**

Indications

- **Persons with chronic liver disease**
- **Men who have sex with men and persons who use illegal drugs**
- **Persons infected with other hepatitis virus**
- **Persons who receive clotting factor concentrates.**
- **Persons who have received, or are awaiting a liver transplant**
- **Food handlers**

Single-antigen vaccine formulations should be administered in a 2-dose schedule at either 0 and 6–12 months (Havrix®). If the combined hepatitis A and hepatitis B vaccine(Twinrix®) is used, administer 3 doses at 0, 1, and 6 months; alternatively, a 4-dose schedule, administered on days 0, 7, and 21 to 30 followed by a booster dose at month 12 may be used.

Hepatitis B vaccine

- **Hepatitis B vaccine is a recombinant vaccine.**
- **Primary immunization at birth: In normal individuals, the dose is 10 µg in children given intramuscularly at 0, 1, and 6 months and a booster after 5 years. In adults, the dose is 20 µg.**

Indications of hepatitis B vaccine in Indian adults

- **Adults at high risk, e.g., patients with percutaneous or mucosal exposure to blood and patients with sexual exposure should be vaccinated if not immunized in childhood.**
- **Percutaneous or mucosal exposure can occur in intravenous drug users; household contacts of persons with chronic hepatitis B virus (HBV) infection;**
- **inmates and staff of institutions for developmentally disabled persons in long-term care facilities;**
- **persons at risk for occupational exposure to HBV (such as dialysis staff, laboratory staff dealing with blood samples, blood bank staff, nurses working in intensive care units, operation theaters, and surgeons and other doctors at high-risk**

High risk groups

- **Patients who are human immunodeficiency virus (HIV)-seropositive, patients with chronic liver disease (CLD), chronic kidney disease (CKD);**
- **and diseases where blood products or multiple blood transfusions are required such as hemophilia, aplastic anemia, leukemia, hemoglobinopathies, and patients awaiting major surgeries.**
- **Sexual exposure is a risk factor for HBV infection in patients presenting to sexually transmitted disease clinics, homosexuals; promiscuous heterosexuals; commercial sex workers; and sex partners of hepatitis B surface antigen (HBsAg)-positive persons.**

Screening - vaccination

- **Prevaccination screening in general population has not been found to be cost-effective in India.**
- **If the vaccination schedule is interrupted after the first dose, the second dose should be administered as soon as possible and the second and third doses should be separated by an interval of at least 8 weeks. If only the third dose has been delayed, it should be administered as soon as possible.**
- **Postexposure screening is not indicated for most adults, except in immunocompromised persons, sex partners of HBsAg-positive persons, and health care workers at high risk for continued percutaneous or mucosal exposure to blood or body fluids. When indicated, postexposure screening should be performed 1–2 months after administration of the last dose of the vaccine series. The anti-HBs titer should be maintained above 10 mIU/ml in all healthy adults.**

Non responders

- **Nonresponders who are HBsAg and anti-HBc-negative should receive a further full course of vaccination as fourth, fifth, and sixth doses. Retesting should be done 1–2 months after the last dose. If there is no response, 40 μg of recombinant vaccine is administered at 0, 1, and 6 months. Retesting should be done 1–2 months after the last dose. If the person remains a nonresponder, alternative strategies for protection must be explored.**
- **Booster doses of HBV vaccine are not indicated in persons with normal immune status. A booster dose may be administered when anti-HBs levels decline to <10 mIU ml and >65 years.**

Combined hepatitis A-B

- **If the combined hepatitis A and hepatitis B vaccine is used, administer 3 doses at 0, 1, and 6 months; alternatively, a 4-dose schedule, administered on days 0, 7, and 21 to 30 followed by a booster dose at month 12 may be used.**
- **Adult patients receiving hemodialysis or with other immunocompromised conditions should receive 1 dose of 40 µg/mL administered on a 3-dose schedule or 2 doses of 20 µg/mL administered simultaneously on a 4-dose schedule at 0, 1, 2 and 6 months.**

Meningococcal vaccine

- **The quadrivalent vaccines contain 50 µg of each of the antigens A, C, Y, and W135 whereas the bivalent vaccine has only A and C antigens. Two types of quadrivalent vaccines are available. The meningococcal polysaccharide vaccine (MPSV4) does not induce herd immunity, has no effect on nasopharyngeal carriage, and can be used only in those >2 years age.**
- **The meningococcal conjugate vaccine (MCV4) provides herd immunity, reduces nasopharyngeal carriage, provides long-lasting immunity after 28 days of vaccination, but cannot be used for people >55 years.**

Indications

- **These vaccines do not protect against Meningococcus groups B or meningitis due to other organisms. MCV4 (conjugated) is preferred for adults who are aged 55 years or younger as well as for adults aged 56 years or older who (a) are vaccinated previously with MCV4 and are recommended for revaccination, or (b) for whom multiple doses are anticipated. MPSV4 is preferred for adults aged 56 years or older who have not received MCV4 previously and who require a single dose only (e.g., travelers).**

Indications

- **Vaccination is indicated in specific situations, such as during an outbreak. A single dose of vaccine (A + C) may be given to health care workers, laboratory workers, and close contacts of cases. Vaccination may be given to personnel living in dormitories, military recruits, jail inmates, immunocompromised individuals, such as those suffering from terminal complement component deficiency, splenectomy, active and passive smokers, systemic lupus erythematosus, HIV, and multiple myeloma (2 doses separated by 2 months for adult <55 years).**
- **For travelers, a single dose is recommended 10-14 days before the scheduled visit depending on the prevalent serotype in the visiting country. As a national policy, the National Institute of Communicable Diseases, New Delhi, administers quadrivalent polysaccharide vaccine to the Haj pilgrims to fulfill the requirements of the Government of Saudi Arabia.**

Typhoid vaccine

- The available vaccines for typhoid fever include inactivated whole cell vaccine, live oral Ty21a vaccine, injectable Vi polysaccharide vaccine, and Vi-rEPA vaccine. The lyophilized oral Ty21a vaccine is available in two formulations: A liquid suspension (in sachets) or enteric coated capsules. The Vi polysaccharide vaccine is a subunit vaccine composed of purified Vi capsular polysaccharide.
- Three doses of Ty21a capsules/sachets are administered on alternate days. This series should be repeated once in every 3 years as a booster dose. The capsule formulation should be taken orally with safe water. The sachet should be given with 100 ml of safe water with buffer to protect the B-subunit against gastric acidity. The Vi vaccine is given as a single subcutaneous or intramuscular dose of 0.5 ml, with revaccination every 3 years. Typbar conjugate vaccine is now recommended between 9 and 12 months.

Typhoid vaccine

- **Entire community at risk should be vaccinated during an outbreak. If immunization of the entire community is not possible, individuals aged 2-19 years should be specifically targeted. Ty21a should not be used during pregnancy. Live oral typhoid is contraindicated in transplant recipient.**

Travel vaccines

Category	Vaccine
Routine	Diphtheria/tetanus/pertussis (DTaP) Hapatitis B virus (HBV) Measles, mumps, rubelia (MMR) Inactivated poliomyelitis (IPV)
Recommended	Influenza Hepatitis A virus (HAV) Japanese encephalitis Meningococcal meningitis Pneumococcal disease Rabies Tick-borne encephalitis Typhoid fever Yellow fever (for individual protection) Cholera
Required (mandatory)	Yellow fever (for protection of vulnerable countries) Meningococcal meningitis (for Hajj, Umrah)

Travel vaccines

- The Ministry of Health in the Kingdom of Saudi Arabia issued this document to address the health requirements and recommendations for visitors traveling to Saudi Arabia for the purposes of Umrah, Hajj, or seasonal works in Hajj and Umrah areas

Travelers to Hajj

- Infectious Diseases of Importance during Hajj and Umrah
  The Ministry of Health in the Kingdom of Saudi Arabia requires that all travellers arriving from countries or areas at risk of yellow fever transmission (must present a valid yellow fever vaccination certificate).

Table 3: Vaccine recommendations for Hajj pilgrims	
Vaccine recommendations	**Comments**
Meningococcal	Mandatory
Influenza	Recommended
Polio	< 15 years, endemic countries
Yellow fever	Endemic countries
Pneumococcal	Recommended for > 65 years
Hepatitis A	Recommended
Hepatitis B	Recommended

VACCINES FOR HEALTH CARE WORKERS

- **The following vaccines are advised for all susceptible health care workers**
- **• Hepatitis B • Influenza • MMR • Varicella • Tdap**

VACCINES FOR PREGNANT WOMEN

- **Pregnant women are recommended to have one dose of Tdap and influenza vaccine after the 26 week unless the risk of flu is high, as in epidemics, when the flu vaccine can be given earlier during pregnancy**

Figure 1 Recommended adult immunization schedule, by vaccine and age group

Vaccine	19-26 yrs	27-49 yrs	50-59 yrs	60-64 yrs	>=65 yrs
Tetanus, diphtheria, pertusis	✓ (Tdap should replace one time dose of Td)				✓ (Td booster every 10 yrs)
Human Pipillomavirus	✓✓ (3 doses females)	x	x	x	x
Varicella	✓✓ (2 doses)				
Zoster	x	x	x	✓✓ (1 dose)	
Measles, mumps, rubella	✓✓ (1 or 2 doses)	✓ (1 dose)			
Influenza	✓	✓✓ (1 dose annually)			
Pneumococcal	✓ (1 or 2 doses)				✓✓ (1 dose)
Hepatitis A	✓ (2 doses)				
Hepatitis B	✓ (3 doses)				
Meningococcal	✓ (1 or more doses)				

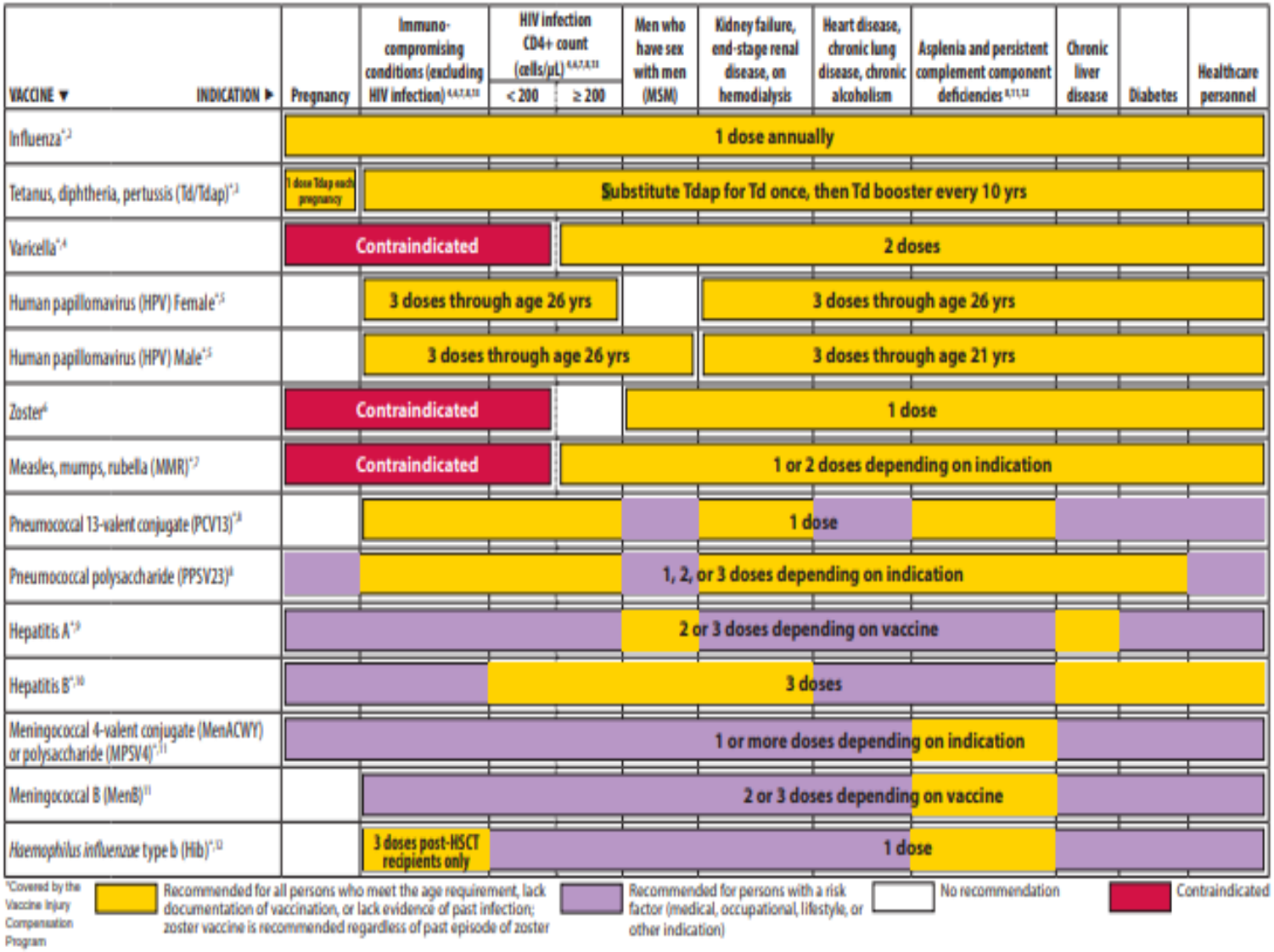

Fig. 2: Vaccine that might be indicated for adults aged 19 years or older based on medical and other indications[1]

Concluding remarks

- Adult vaccines are an integral part of the approach to comprehensive well-being. It is high time that practicing physicians in India resort to this safe and effective intervention for all their patients to ensure that their patients stay healthier and happier.
- The disease burden in India is increasing for both communicable and non-communicable diseases. But, rolling out a policy for adult immunisation needs infrastructure, strategy, funds and massive awareness campaign. Pulling people for immunisation remains a challenge.

Concluding remarks

- The significance lies in the fact that more than 25% of mortality in India is due to infectious diseases. Vaccines for adults are required for diseases such as tetanus, diphtheria, pertussis, Hepatitis A, hepatitis B, human papilloma virus, Japanese Encephalitis, measles, mumps, rubella, meningococcus, pneumococcus, typhoid, influenza and chickenpox.
- Though there is much impetus on childhood vaccination, the government has not focussed on adult immunisation, though public health experts recommend immunisation throughout life for preventing illnesses due to infectious diseases.