Yaşlılarda Bağışıklama

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Özel Sağlık Hastanesi

İnfeksiyon Hastalıkları ve Klinik Mikrobiyoloji

Yaşlılık Tanımı

- Bir çok gelişmiş ülke kronolojik olarak 65 yaşındaki insanı; yaşlı insan olarak tanımlamaktadır

- Bir başka tanım; kişinin emeklilik haklarını kullanmaya başladığı zamandır

- Birleşmiş milletler 60+ yaşı yaşlılık olarak kabul etmektedir

- Gelişmekte olan ülkelerde yaşlılık; hayata aktif olarak katılamama durumu olarak da tanımlanabilir

Yaşlılığın fizyolojik boyutu

- Primer yaşlanma: yaşın artması ile aynı tür ve populasyonda meydana gelen ve çevresel faktörlerden etkilenmeyen evrensel değişikliklerdir

- Sekonder yaşlanma: primer yaşlanma ile çevresel faktörler ve hastalık süreçlerinin etkileşimi ile ortaya çıkan değişikliklerdir

Yaşlılarda enfeksiyon için risk faktörleri

- Doğal immunite: doğal immun sistem infeksiyonlara karşı ilk savunma hattıdır

- Yaşlılıkta epitelyal yapının bozulması patojenler için giriş kapısı oluşturur

- Doğal immun sistemin hücresel üyeleri, PNL, makrofajlar, NK, dendritik hücreler ve T hücre aracılı immunite

Yaşlılarda enfeksiyon için risk faktörleri

- Nötrofiller:
  - yaşlanmada PNL sayısı normal kalır
  - kemotaksis, fagositoz, reaktif oksijen türlerinin meydana gelmesi fonksiyonlarının çoğu azalır

Yaşlılarda enfeksiyon için risk faktörleri

- Makrofajlar:
  - monosit prekürsörlerinden makrofaj oluşumunun yaşla etkilendiği gösterilememiş ancak yaşla kemik iliği selülaritesi azaldığı için makrofaj yüzdesinin azaldığı rapor edilmiş.

- Natural killer:
  - yaşla beraber artar
  - sitotoksisitesi azalmıştır
  - NK dan salınan sitokin profili Th-1' den Th-2'ye doğru kaymıştır

Yaşlılarda enfeksiyon için risk faktörleri

- Dendritik hücreler:
  - en etkili antijen sunan hücrelerdir
  - yaşla beraber plasmatoid DC ler sayısal ve fonksiyonel olarak azalır
  - myeloid DCler değişmez

Yaşlılarda enfeksiyon için risk faktörleri

- Adaptif immun sistem:
  - T hücre havuzundaki değişiklikler timusun involusyonu ile ilgilidir
  - naive T hücre outputunun belirleyicisi olan CD8 hücrelerinde yaşlanmayla beraber azalma görülür
  - naive T hücreleri uygun alana göç eder
  - farklı bir dizi T hücre reseptörünü ifade eder ve sitokin oluşumu gibi uygun cevap oluşturur

Yaşlılarda enfeksiyon için risk faktörleri

- Yaşlılarda enfeksiyona cevabın gecikmesi naive T hücre havuzunun azalmasıyla ilişkilidir

- S.pneumoniae gibi kapsüllü bakterilere karşı IgM tipi yanıt oluşturan memory B hücreleri de yaşa bağlı azalır

Yaşlılarda enfeksiyon için risk faktörleri

- Bazı araştırıcılar memory B hücrelerin bir belirleyicisi olan CD27+ B hücrelerin arttığını, naive B hücrelerin belirleyicisi CD27- B hücrelerin azaldığını göstermişlerdir

- IgD ve IgM seviyeleri yaşlılarda düşüktür

Yaşlılarda enfeksiyon için risk faktörleri

- Bakteriyemi için bağımsız risk faktörleri:
  - immun yaşlanma
  - komorbid hastalıklar
  - yeni invaziv işlemler veya enstrumantasyonlar

Yaşlılarda enfeksiyon için risk faktörleri

- Akciğer infeksiyonu için risk faktörleri:
  - nörolojik hastalıklar
  - yutma güçlükleri
  - azalan fonksiyonel durum
  - malnutrisyon
  - sedatif ilaçlar
  - KKY, DM, Akc CA, önceki pnömoni
  - immunsupresyon, bozulmuş mukosilier aktivite,
  - azalmış öksürük refleksi,KOAH, sigara

Yaşlılarda enfeksiyon için risk faktörleri

- İYE için risk faktörleri:
  - rezidüel idrar miktarında artma
  - detrüsör kasın yapısı ve fonksiyonunun bozulması
  - prostat hipertrofisi
  - sistosel, üreterosel, mesane divertikülü
  - üretral ve üreterik striktür
  - pelvik ligamanların östrojen azlığına bağlı gevşemesi
  - nörolojik hastalıklar, nörojenik mesane
  - kadınların üriner epitelinde mukopolisakkarit tabaka oluşması, artan vaginal pH

Yaşlılarda enfeksiyon için risk faktörleri

- Deri ve yumuşak doku infeksiyonları için risk faktörleri:

  - deride atrofi
  - elastisite- turgor ve perfüzyonda azalma
  - antijen sunumu için epidermal Langerhans hücrelerinin sayısı ve fonksiyonu azalır
  - kollagen sentezindeki azalma travmaya sekonder iyileşmeyi geciktirir
  - dermisteki kan damarlarının büyüklüğü azalır

Yaşlılarda enfeksiyon için risk faktörleri

- Gastrointestinal infeksiyonlar için risk faktörleri:
  - tükrük outputu azalır
  - antikandidal etkiye sahip histatinler azalır
  - dil gücü azalır ve yutma yavaşlar
  - oral kavite kolonizasyonunda bakım eksikliği nedeniyle artış

- İntestinal florada koruyucu bifidobacteria ve anaeroplar azalır, enterobacteriacea artar, bu durum enterik patojenlere karşı savunmayı azaltır.

Yaşlılarda aşılamaya yanıt

- Klasik olarak savunma sistemi doğal ve edinsel bağışıklık olarak ikiye ayrılır.

- Doğal direncin önemli yapıtaşlarından NK hücreleri veya makrofajlar salgıladıkları sitokinlerle edinsel bağışıklığa ait B ve T lenfositlerinin aktivasyonunda rol alırlar.

Yaşlılarda aşılamaya yanıt

- Genel anlamda immun sistem yapılanması:

- 1. doğal bağışıklık: bellek özelliği olmayan, etkene özgüllük göstermeyen ve erken savunma sistemini oluşturan yapıtaşları

Yaşlılarda aşılamaya yanıt

- İlk aşama bütünlüğü bozulmamış deri ve mukozalardır

- NK hücreler; enfekte hücre lizisi ve antiviral etkinliğe sahip sitokin salınımı(IFN-ɣ, TNF-α)üreterek de savunma da rol alır.(CMV, HSV, Influenza ya da Coxsackie virus gibi)

Yaşlılarda aşılamaya yanıt

- Doğal bağışıklık: Granülositler, NKT hücreleri, makrofajlar, dendritik hücreler salgıladıkları immunoregülatör sitokinler veya nitrik oksit gibi maddeler aracılığıyla antiviral yanıta katkıda bulunurlar

Yaşlılarda aşılamaya yanıt

- 2. doğal bağışıklığın yukarıda belirtilen çeşitli parametreleri viral enfeksiyonu alt etmede başarısız kalırsa devreye edinsel bağışık yanıt girecektir

- Bu yanıtın devreye girmesi için yardımcı CD+4 T hücrelerin aktive olmaları ve salgılayacakları sitokinler aracılığı ile humoral ve/veya hücresel yanıtı uyarmaları gerekir

Yaşlılarda aşılamaya yanıt

- DC ve makrofaj gibi profesyonel antijen sunan hücreler tarafından yabancı antijenin öğütülmesi daha sonra yüzeyindeki MHC-II oluğundan bu antijeni Th hücrelerine sunması ve onları aktive etmesi gerekir

Yaşlılarda aşılamaya yanıt

- Th hücrelerinden aldıkları uyarılarla CD+8 T hücreleri özelliğindeki Tc' lerin virüs üretim fabrikası gibi çalışan enfekte hücreleri lizise uğratmaları söz konusudur

- Tc ler hem sitotoksisite yaparak hem de TNF, IFN-Ɣ gibi sitokinler salgılayarak antiviral yanıta katkı sağlarlar

Yaşlılarda aşılamaya yanıt

- Edinsel bağışıklığın ikinci kolunu humoral yanıt oluşturur. Bu kez devrede aktif olarak antikor sentezleyen B lenfositleri vardır

- Th-2 grubu sitokinlerin katkısı ile antijen uyarısı sonunda B lenfositlerin bir bölümü antikor üreten plasmositlere dönüşür

Yaşlılarda aşılamaya yanıt

- Sonuçta sentezlenecek nötralizan antikorlar;virüslerin hücreye bağlanmalarını engeller, antikora bağımlı hücresel sitotoksisite veya opsonizasyon veya kompleman sisteminin aktivasyonu gibi roller üstlenirken dolaylı yoldan antiviral etkinlik gösterir

Yaşlılarda aşılamaya yanıt

- Yaşlanma sürecinde immun sistem:

- Doğal direnç paternleri: doğal direncin harekete geçmesi için gerekli olan TLR üzerinden sinyal iletim gücü, proinflamatuar sitokin ve kemokin moleküllerinin üretimleri yaşla azalır

Yaşlılarda aşılamaya yanıt

- Bu durum ilk savunma yanıtı yanında özgül bağışıklık (B ve T lenfosit) işlevlerinde güçsüzlüğe yol açar

- Bu arada naif B ve T hücrelerin üretim oranları ve bellekli hücrelerin işlevsel özellikleri zaman içinde azalmaktadır

Yaşlılarda aşılamaya yanıt

- Yaşla beraber NK hücrelerin hem sitotoksisite kapasitelerinin hem sitokin üretme özelliklerinin buna bağlı immunkompetan hücrelerin aktivasyonunda azalma vardır

Yaşlılarda aşılamaya yanıt

- İleri yaşlarda B lenfosit etkinliğinin azalma nedenleri:
  - intrensek faktörlerin ve mikroçevrenin değişimi
  - plasmosit üretiminde kantitatif azalma
  - germinal merkezlerin güçsüzleşmesi
  - immunglobulin üretiminin yavaşlaması
  - afinitelerin değiştiği saptanmıştır

Yaşlılarda aşı

- Yaşlı ve aşılanmış insanlarda infeksiyon daha sönük semptom ve bulgular

- İleri yaşlarda daha çok etki gösteren etkenler: influenza, pnömokok, herpes zoster gibi latent enfeksiyonlar, *Clostridium difficile* ve *Clostridium tetani* gibi toksin üretenler

- İnfluenza özellikle yaşlı toplumda tüm hastalık ve ölümlerin en önemli nedenlerinden

Yaşlılarda aşı

- Aşı ile influenzaya bağlı hastaneye yatış, pnömoni felç ve iskemik kalp hastalığı ile ilgili olay ve ölümleri azaltır

- 23 valent pnömokok polisakkarid aşısı bakteriyemi ve pnömoninin önlenmesinde maliyet etkin bulunmuştur

- Pnömokok aşısıyla tekrar aşılama eğer birey 65 yaşından önce aşılandıysa ve aşı üzerinde 5 sene geçtiyse önerilmektedir

Yaşlılarda aşı

- Yaşlılarda difteri toksoidi ile kombine tetanoz toksoidi (Td) önerilmektedir.
- Primer seriyi tamamlayanlar her on yılda bir Td ile aşılanmalı
- Herpes zoster enfeksiyonuna yakalananlar genelde 50 yaş üzeri kişilerdir ve postherpetik nevralji en sık bu yaşlarda görülür
- Herpes zoster aşısı 60 yaş ve üzerindekilere uygulanan canlı, attenue virüs aşısıdır. Aşı uygulanan bireylerde herpes zoster insidansı %51, sekel oranı % 61 azalmıştır

Türkiye' de Durum Ne?

- Türkiye' de 65 yaş üstü pnömokok bağışıklama oranı; %0.9
- İnfluenza için her yıl 7,5 milyon yaşlı ve diğer yaş grupları için Türkiye' ye girmesi gereken aşı miktarı: 23-24 milyon doz,
- Alınan influenza aşısı 2,5 milyon civarında

Türkiyede normal ve riskli gruplarda uygulanması önerilen aşı şeması

Aşı	18-49 yaş	50-64 yaş	>64 yaş
Tetanoz, difteri (Td)	Her on yılda bir rapel		
Kızamık/ kızamık,kızamıkçık, kabakulak	1 veya 2 doz aşı		
Hepatit B	3 doz aşı (0., 1. ve 6. aylarda)		
İnfluenza	Yılda bir kez tercihen kasım ayında		
Polisakkarit pnömokok	1-2 doz aşı		1 doz aşı
Hepatit A	2 doz aşı (0., 6.- 18. aylarda)		
Suçiçeği	2 doz aşı (0., 1. veya 2. aylarda)		
Meningokok	1 veya daha fazla doz aşı		

- Tetanoz profilaksisi için primer immunizasyonu tamamlamış kişilerdeki şemadır

- Suçiçeği, KKK; gebelikte kontrendikedir

- KKK; bir veya iki doz kızamık aşısı yapıldıysa bir doz KKK yapılır. İlk doz, KKK aşısı olarak yapıldıysa 2. doz kızamık aşısı olarak yapılır. İki doz KKK aşısı yapıldıysa tekrarına gerek yoktur

- Pnömokok aşısı risk gruplarına 5 yılda bir yapılır

- Meningokok aşısının koruyuculuk süresi 2 yıldır

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(updated 1 August 2013)

Table 1: Summary of WHO Position Papers - Recommendations for Routine Immunization

Antigen		Children (see Table 2 for details)		Adolescents	Adults	Considerations (see footnotes for details)
Recommendations for all						
BCG[1]		1 dose				Exceptions HIV
Hepatitis B[2]		3-4-doses (see footnote for schedule options)		3 doses (for high-risk groups if not previously immunized) (see footnote)		Birth dose Premature and low birth weight Co-administration and combination vaccine Definition high-risk
Polio[3]		3 doses, with DTP				OPV birth dose Transmission and importation risk criteria Type of vaccine
DTP[4]		3 doses	Booster (DTP) 1-6 years of age	Booster (Td) (see footnote)	Booster (Td) in early adulthood or pregnancy	Delayed/interrupted schedule Combination vaccine
***Haemophilus influenzae* type b**[5]		3 doses, with DTP				Single dose if 12-24 months of age Delayed/interrupted schedule Co-administration and combination vaccine
Pneumococcal (Conjugate)[6]	**Option 1**	3 doses, with DTP				Vaccine options Initiate before 6 months of age Co-administration HIV+ and preterm neonates booster
	Option 2	2 doses before 6 months of age, plus booster dose at 9-15 months of age				
Rotavirus[7]		Rotarix: 2 doses with DTP RotaTeq: 3 doses with DTP				Vaccine options Not recommended if > 24 months old
Measles[8]		2 doses				Combination vaccine; HIV early vaccination; Pregnancy
Rubella[9]		1 dose (see footnote)		1 dose (adolescent girls and/or child bearing aged women if not previously vaccinated; see footnote)		Achieve and sustain 80% coverage Combination vaccine and Co-administration Pregnancy
HPV[10]				3 doses (girls)		Vaccination of males for prevention of cervical cance is not recommended at this time

Refer to http://www.who.int/immunization/documents/positionpapers/ for most recent version of this table and position papers.

This table summarizes the WHO child vaccination recommendations. It is designed to assist the development of country specific schedules and is not intended for direct use by health care

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(updated 1 August 2013)

Table 1: Summary of WHO Position Papers - Recommendations for Routine Immunization

Antigen		Children (see Table 2 for details)	Adolescents	Adults	Considerations (see footnotes for details)
Recommendations for certain regions					
Japanese Encephalitis[11]		*Live attenuated vaccine*: 1 dose Booster after 1 year *Mouse brain-derived vaccine*: 2 doses Booster after 1 year then every 3 years	*Mouse brain-derived vaccine*: booster every 3 years up to 10-15 years of age		Vaccine options
Yellow Fever[12]		1 dose, with measles containing vaccine			
Tick-Borne Encephalitis[13]		3 doses (> 1 yr FSME-Immun and Encepur; > 3 yrs TBE-Moscow and EnceVir) with at least 1 booster dose (every 3 years for TBE-Moscow and EnceVir)			Definition of high-risk Vaccine options; Timing of booster
Recommendations for some high-risk populations					
Typhoid[14]		*Vi polysaccharide vaccine*: 1 dose; *Ty21a live oral vaccine*: 3-4 doses (see footnote). Booster dose 3-7 years after primary series			Definition of high-risk Vaccine options
Cholera[15]		*Dukoral (WC-rBS)*: 3 doses ≥ 2-5 yrs, booster every 6 months; 2 doses adults/children > 6 yrs, booster every 2nd year; *Shanchol & mORCVAX*: 2 doses ≥1 yrs, booster dose after 2 yrs			Minimum age Definition of high-risk
Meningococcal[16]	**MenA conjugate**	1 dose (1-29 years)			Definition of high-risk; Vaccine options
	MenC conjugate	2 doses (2-11 months) with booster 1 year after 1 dose (≥12 months)			
	Quadrivalent conjugate	2 doses (9-23 months) 1 dose (≥2 years)			
Hepatitis A[17]		At least 1 dose ≥ 1 year of age			Level of endemicity; Vaccine options; Definition of high risk groups
Rabies[18]		3 doses			Definition of high-risk; Booster
Recommendations for immunization programmes with certain characteristics					
Mumps[19]		2 doses, with measles containing vaccine			Coverage criteria > 80% Combination vaccine
Influenza (inactivated)[20]		First vaccine use: 2 doses Revaccinate annually: 1 dose only (see footnote)	1 dose from 9 yrs of age. Revaccinate annually (see footnote)		Priority targets Definition of high-risk Lower dosage for children

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Summary Table 1 - Notes

Refer to http://www.who.int/immunization/documents/positionpapers/ for the most recent version of the tables and position papers.

- The attached table summarizes the recommendations for vaccine administration found in the WHO position papers which are published in the Weekly Epidemiological Review. Its purpose is to assist planners to develop an appropriate immunization schedule. He... refer to their national immunization schedules. While vaccines are u... some children may have contraindications to particular vaccines.
- Vaccines can generally be co-administered (i.e. more than one ... sites during th... Recommendations that explicitly endorse ... are indicate... ...k of an explicit co-administration recommendation does not i... ...-administered; further, there are no recommendations agai...
- Doses a... ...y or may not contribute to a child's routine immunization schedule... ...and purpose of campaign (e.g. supplemental versus routine/pulse campai... for access reasons).
- For some antigens, recommendations for the age of initiation of primary immunization series and/or booster doses are not available. Instead, the criteria for age at first dose must be determined from local epidemiologic data.
- If a catch-up schedule for interrupted immunization is available, it is noted in the footnotes.
- Other vaccines, such as varicella and pneumococcal polysaccharide vaccines, may be of individual benefit but are not recommended for routine immunization. See the specific position papers for more details.
- For further background on immunization schedules refer to "Immunological Basis for Immunization" series which is available at http://www.who.int/immunization/documents/immunological_basis_series/en/index.html

Aşı kampanyaları rutin aşıları etkilemez

Birden fazla aşı aynı anda uygulanabilir

1 BCG

- Position paper reference: Weekly Epid. Record (2004, 79: 27-38) [pdf 468kb]
- Recommended for children living in co... ...n and for high-risk children living in countries with low-dise... ...details.
- While BCG vaccination is especially im... ...nt HIV prevalence, children who are HIV positive or unknown... ...tent with HIV should not be vaccinated. Reference: Weekly Epid. Record (2007, 82: 193-196) [pdf 167kb]

TBC endemik veya HIV endemik ülke çocuklarına rutin

2 Hepatitis B

- Position paper reference: Weekly Epid. Record (2009, 84: 405-420) [pdf 830kb]
- Since perinatal or early postnatal transmission is an important cause of chronic infections globally, all infants should receive their first dose of hepatitis B vaccine as soon as possible (<24 hours) after birth even in low-endemicity countries.
- The primary hepatitis B immunization series conventionally consists of 3 doses of vaccine (1 mono-valent birth dose followed by 2 monovalent or combined vaccine doses at the time of DTP1 and DTP3 vaccine doses). However, 4 doses may be given for programmatic reasons (e.g. 1 monovalent birth-dose followed by 3 monovalent or combined vaccine doses with DTP vaccine doses), according to the schedules of national routine immunization programmes.
- Premature low birth weight (<2000g) may not respond well to vaccination at birth. However, by 1 month of chronological age, premature infants, regardless of their initial weight or gestational age at birth, are likely to respond adequately. Therefore, doses given to infants <2000g should not be counted towards the primary series.

Kan ve kan ürünü ihtiyacı olanlar, mahkumlar, IV ilaç kullananlar, dializ hastaları, solid organ nakilliler… HBV ye bağışıklanmalı

- Addition... ...tion include people with risk factors for acquiring HBV infection... ...ntly require blood or blood products, dialysis patients, recipients of solid organ transplantations, people interned in prisons, injecting drug users, household and sexual contacts of people with chronic HBV infection, people with multiple sexual partners, as well as health-care workers and others who may be exposed to blood and blood products through their work.

3 Polio

Reference: Weekly Epid. Record (2010, 85: 213-228) [pdf 815.1kb]

- The primary series of 3 OPV vaccinations should be administered according to the respective national immunization schedule, for example at 6, 10 and 14 weeks, or 2, 4, and 6 months of age. The interval between doses should be at least 4 weeks.
- Where the potential for poliovirus importation is very high (i.e in countries bordering endemic countries or countries that have recurrent outbreaks) or high (i.e. country with a history of importation plus high traffic across the border), and the transmission potential high (e.g. <90% DTP3 coverage, low socio-economic status, majority of areas with open sewage) or moderate (e.g. <90% DTP3 coverage, all states/provinces with moderate socio-economic status, only secondary sewage treatment) an OPV birth dose should be given as soon as possible after birth.
- OPV alone, including a birth dose, is recommended in all polio-endemic countries and those at high risk for importation and subsequent spread. A birth dose is not considered necessary in countries where the risk of polio virus transmission is low, even if the potential for importation is high/very high.
- Where the risk of wild polio virus importation is high/very high, the transmission potential should be low (>90-95% DTP3 coverage, high socio-economic status, tertiary sewage treatment) before alternatives to OPV alone may be considered.
- In countries with very high risk of wild polio virus importation, a sequential IPV/OPV schedule should not be introduced unless immunization coverage is approximately 95%, or, with low importation risk, approximately 90%. Where sequential IPV/OPV is used, the initial administration of 1 or 2 doses of IPV should be followed by 2 or more doses of OPV to ensure both sufficient levels of protection in the intestinal mucosa and a decrease in the burden of vaccine -associated paralytic poliomyelitis (VAPP). For IPV/OPV sequential schedules WHO recommends that IPV be administered at 2 months of age (e.g. an IPV-OPV-OPV schedule) or at 2 months and 3-4 months of age (e.g. a 4-dose schedule of IPV-IPV-OPV-OPV). Each dose of the primary series, whether IPV or OPV, should be separated by an interval of 4-8 weeks, depending on the risk of exposure to polio in early childhood.
- IPV alone can be considered as an alternative to OPV alone (or an IPV/OPV sequential schedule) only in countries with the lowest risk of both wild polio importation and WPV transmission. IPV may be offered as a component of combination vaccines. A primary series of 3 IPV doses 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 administered with an interval of at least 6 months (4 - dose IPV schedule).
- Switching from OPV to IPV for routine vaccination during the pre-eradication era is not cost-effective based on the existing economic analyses and current IPV costs.

4 DTP (Diphtheria, Tetanus and Pertussis)

- Position paper reference: Diphtheria - Weekly Epid. Record (2006, 81: 24-32) [pdf 214kb]; Tetanus - Weekly Epid. Record (2006, 81: 198-208) [pdf 229kb]; Pertussis - Weekly Epid. Record (2010, 85: 385-400) [pdf 320kb]
- Recommended for three doses during the first year of life. In areas where pertussis is of particular risk to young infants, DTP should be started at 6 weeks with 2 subsequent doses at intervals of 4-8 weeks each. The last dose of the primary series should be completed by the

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age of 6 months.

- The duration of immunological protection will be extended in many instances if an additional booster is given later.
- Diphtheria booster - to compensate for the loss of natural diphtheria boosting in some areas, childhood boosters should be given. The optimal timing of and number of diphtheria-containing booster doses should be based on epidemiological surveillance as well as on immunological and programmatic considerations.
- Tetanus toxoid containing booster - A childhood tetanus immunization schedule of 5 doses is recommended. Boosters are ideally administered in early childhood and during adolescence e.g. 12-15 years. Tetanus booster doses may use either DTP or Td vaccines depending on the child's age. Td should be used for tetanus and diphtheria booster doses after the age of 7 years.
- Pertussis vaccine: Neo-natal immunization, and vaccination of pregnant women and household contacts ("cocooning") against pertussis is not recommended by WHO.
- Both acellular (aP) and whole cell pertussis (wP) containing vaccines have excellent safety records, and protection against severe pertussis in infancy and early childhood can be obtained with wP or aP vaccine. Changing among or within the wP and aP vaccine groups is unlikely to interfere with the safety or immunogenicity of these vaccines.
- Only aP-containing vaccines should be used for vaccination of those >6 years.
- Pertussis containing booster - A booster dose is recommended for children age 1-6 years, preferably during the second year of life. The booster should be given > 6 months after the last primary dose. Completion of this schedule (primary series plus booster) is expected to ensure protection against pertussis for > 6 years.
- Delayed or interrupted DTP series - Children 1-7 years or older who have not previously been immunized should receive three doses of wP or aP vaccine, with an interval of 2 months between the first and second dose and an interval of 6-12 months between the second and third. Children whose vaccination series has been interrupted should have their series resumed, without repeating previous doses. For unvaccinated individuals 7 years of age and older, Td combination vaccine can be administered, 2 doses 1-2 months apart and a third dose after 6-12 months can be used with subsequent boosters at least 1 year apart for a total of 5 appropriately spaced doses to obtain same long term protection. See position paper for details of interrupted immunization schedules.

5 *Haemophilus influenzae* type b (Hib)

- Position paper reference: Weekly Epid. Record (2006, 81: 210-220) [pdf 209kb]
- Immunization should start as early as possible after the age of 6 weeks.
- The 3-dose primary series is given at the same time as the DTP primary series often in combination vaccines.
- The vaccine is not generally offered to children aged >24 months owing to the limited burden of Hib disease among children older than that age.
- Delayed series- if a child 12-24 months of age has not received their primary vaccination series, a single dose of the vaccine is sufficient.
- Booster dose may be administered to children aged between 12 - 18 m… no WHO recommendation on this yet.

Doğurganlık çağdaki kadınlar için lisansı yok

6 Pneumococcal (Conjugate)

- Position paper reference: Weekly Epid. Record (2012, 87: 129-143) [pdf 1.04…]
- Pneumococcal conjugate vaccines (PCVs) are considered safe in all target groups for vaccination, also in immunocompromised individuals. The vaccines are not currently licensed for use in age groups that include wome… although theoretically highly unlikely to be harmful, there is no info… and PCV13 during pregnancy.

Vücut sıcaklığı >39C ise aşı ertelenir

- Except for very rare anap… low the administration of any medicine, there are no contraindicat… accines. However, it is advisable to defer vaccination until after an ac… emperature >39 °C.
- When injected at different sites, PCVs can be administered concurrently with any other vaccines in infant immunization programmes.
- When primary immunization is initiated with one of these vaccines, it is recommended that remaining doses are administered with the same product. Interchangeability between PCV10 and PCV13 has not yet been documented. However, if it is not possible to complete the series with the same type of vaccine, the other PCV product should be used.
- For infants, 3 primary doses (the 3p+0 schedule) or, as an alternative, 2 primary doses plus a booster (the 2p+1 schedule).
- In choosing between the 3p+0 and 2p+1 schedules, countries should consider locally relevant factors including the epidemiology of pneumococcal disease, the likely coverage, and the timeliness of the vaccine doses.
- If disease incidence peaks in young infants (<32 weeks of age), a 2p+1 schedule might not offer optimal individual protection for certain serotypes (e.g. 6B, 23F) compared to a 3p+0 schedule, particularly in the absence of herd protection.
- In contrast, higher antibody levels are induced by the third (booster) dose in a 2p+1 schedule compared to the third dose in a 3p+0 schedule. This may be important for duration of protection or effectiveness against some serotypes.
- If the 3p+0 schedule is used, vaccination can be initiated as early as 6 weeks of age with an interval between doses of 4–8 weeks, depending on programmatic convenience.
- If the 2p+1 schedule is selected, the 2 primary doses should ideally be completed by six months of age, starting as early as 6 weeks of age with a minimum interval of 8 weeks or more between the two doses (for infants aged ≥7 months a minimum interval of 4 weeks between doses is possible). One booster dose should be given between 9–15 months of age.
- Previously unvaccinated or incompletely vaccinated children (including those who had laboratory confirmed invasive pneumococcal disease) should be vaccinated using the recommended age-appropriate regimens. Interrupted schedules should be resumed without repeating the previous dose.
- HIV-positiv… onates who have received their 3 primary vaccine doses before… nefit from a booster dose in the second year of life.

>50 yaş için geniş aşılaması için yeterli veri yok

- Catc… n will accelerate herd protection and therefore the PCV in… mized protection at the time of introduction of PCV10 or PCV13 … 2 catch-up dose(s) at an interval of at least 8 weeks to unvaccinated children aged 12–24 … and to children aged 2–5 years who are at high risk of pneumococcal infection.
- Further data are needed from different epidemiological settings on the impact of large-scale PCV vaccination of individuals >50 years of age in order to establish the relative priority of immunization programmes in that age group. However, given the documented effects of herd protection in adult age groups following routine infant immunization with PCV7, higher priority should normally be given to introducing and maintaining high coverage of infants with PCVs.
- The use of pneumococcal vaccine should be seen as complementary to the use of other pneumonia control measures, such as appropriate case management, promotion of exclusive breastfeeding for first 6 months of life, and the reduction of known risk factors, such as indoor pollutants and tobacco smoke.
- For polysaccharide pneumococcal vaccine see position paper: Weekly Epid. Record (2008, 83: 373-384) [pdf 308kb]

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- In resource-limited settings where there are many competing health priorities, evidence does not support routine immunization of the elderly and high-risk populations with PPV23. Also, because of the low level of evidence for benefit, routine PPV23 vaccination of HIV-infected adults is not recommended in such settings. In countries that do not routinely administer PPV23 to high-risk populations, data are insufficient to recommend introducing this vaccine to reduce the morbidity and mortality associated with influenza.

7 Rotavirus

- Position paper reference: [Record (2013, 88: 49-64)] [pdf 950kb]
- Recommended to be include
- Early immunization is favo [stered from 6 weeks of age, howeve [e doses without age restricti [teritis (RVGE), rotavirus v
- Rotarix is administ [enta with an interval of
- RotaTeq vaccine is a [DTP2, and DTP3 contacts, wit
- Rotavirus vaccinations can b [s in the infant immunization programme.
- Apart from a low risk of intussusception (about 1-2 per 100 000 infants vaccinated) the current rotavirus vaccines are considered safe and well tolerated.
- Severe allergic reaction (e.g. anaphylaxis) after a previous dose, and severe immunodeficiency including severe combined immunodeficiency, are contraindications for rotavirus vaccination.
- Precautions are necessary if there is a history of intussusception or intestinal malformations, chronic gastrointestinal disease, and severe acute illness. Vaccination should be postponed in case of ongoing acute gastroenteritis or fever with moderate to severe illness.
- The use of rotavirus vaccines should be part of a comprehensive strategy to control diarrhoeal diseases with the scaling up of both prevention (exclusive breastfeeding for 6 months, vitamin A supplementation, safe drinking water, hygiene/handwashing with soap, and sanitation) and treatment (low-osmolarity ORS, zinc and continued feeding).

Kanıtlar daha öncelikli sorunlar varken; PPV23 ile riskli ve yaşlı grupların rutin aşılanmasını desteklemiyor. HIV enfekte erişkinler için rutin PPV23 önerilmiyor. Yüksek riskli gruplara PPV23' ü rutin uygulamayan ülkelerde; bu aşının influenzaya bağlı mortalite ve morbiditeyi azalttığına dair yeterli veri yok.

8 Measles

- Position paper reference: Weekly Epid. Record (2009, 84: 349-360) [pdf 724kb]
- Reaching all children with two doses of measles containing vaccine (MCV) should be the standard for all national immunization programmes.
- Delivery of the second dose (MCV2) may occur either at a scheduled age through routine services or periodically through mass campaigns, depending on which strategy achieves the higher coverage. A MCV2 dose may be added to the routine immunization schedule in countries that have achieved > 80% coverage of measles first dose (MCV1) at the national level for 3 consecutive years as determined by the most accurate means available (e.g. survey or WHO/UNICEF estimates). In general, countries that do not meet this criterion should prioritize improving MCV1 coverage and conducting high-quality follow-up SIAs, rather than adding MCV2 to their routine schedule.
- In countries with ongoing transmission in which the risk of measles mortality remains high, MCV1 should be given at age 9 months. MCV2 should be given between 15-18 months, as providing MCV2 in the 2nd year of life reduces the rate of accumulation of susceptible children and the risk of an outbreak.
- In countries with low rates of measles transmission (that is, those that are near elimination) and where there is a low risk of measles infection among infants, the first dose may be administered at age 12 months to take advantage of the higher seroconversion rates achieved at this age (>90% seroconversion). In these countries the optimal age for delivering a routine 2nd dose of measles is based on programmatic considerations that achieve the highest coverage and hence the highest population immunity. Administration of the second dose at age 15-18 months ensures early protection of the individual, slows accumulation of susceptible young children and may correspond with other routine immunizations [dose at school entry may be an effective strat [ks in schools.
- Combined vaccines (Measles and Rubell [inal for use in countries where vaccine coverage fo [cannot be achieved or maintained.
- Measles vaccination should be routinely admi [to potentially susceptible, asymptomatic HIV-positive children and adults. In areas w [ere is a high incidence of both HIV infection and measles, MCV1 may be offered as ear [age 6 months. Two additional doses of measles vaccine should be administered to th [e children according to the national immunization schedule.
- Mild, concurrent infections are not considered a contraindication to vaccination, but it should be avoided if the patient has a high fever or other signs of serious disease. Theoretically, measles vaccine - alone or in combination with other vaccines - should also be avoided by pregnant women. Furthermore, measles vaccination is contraindicated in people who are severely immunocompromised due to congenital disease; severe HIV infection; advanced leukaemia or lymphoma, etc.

Kızamık aşısı ciddi immunsupreselere (HIV, lenfoma, lösemi vb) veya gebe kadınlara kontrendike

9 Rubella

- Position paper reference: Weekly Epid. Record (2011, 86: 301-316) [pdf 413kb]
- All countries that have not yet introduced rubella vaccine, and are providing 2 doses of measles vaccine using routine immunization, or SIAs, or both, should consider including rubella containing vaccines (RCVs) in their immunization programme. Countries planning to introduce RCVs should review the epidemiology of rubella, including the susceptibility profile of the population; assess the burden of CRS; and establish rubella and CRS prevention as a public health priority.
- There are two general approaches to the use of rubella vaccine: (i) exclusive focus on reducing CRS by immunizing adolescent girls or women of childbearing age, or both groups, to provide individual protection; (ii) focus on interrupting transmission of rubella virus and eliminating rubella and CRS, by introducing rubella vaccination into the routine childhood immunization schedule combined with the vaccination of older age groups who are susceptible to rubella.
- Because rubella is not as highly infectious as measles and because the effectiveness of 1 dose of an RCV is > 95% even at 9 months of age, only 1 dose of rubella vaccine is required to achieve rubella elimination if high coverage is achieved. However, when combined with measles vaccination, it may be easier to implement a second dose of RCV's using the same combined MR vaccine or MMR vaccine for both doses.
- To avoid the potential of an increased risk of CRS, countries should achieve and maintain immunization coverage of 80% or greater with at least 1 dose of an RCV delivered through routine services or regular campaigns, or both.
- The first dose of RCV can be delivered at 9 or 12 months depending on the measles vaccination schedule.
- RCV's can be administered concurrently with inactivated vaccines. As a general rule, live vaccines should be given either simultaneously with RCV's, or at least 4 weeks apart. An exception to this is oral polio vaccine, which can be given at any time before or after RCV's without interfering in the response to either vaccine. Interference may occur between MMR and yellow fever vaccines if they are simultaneously administered to children < 2 years of age.
- Because of a theoretical, but never demonstrated, teratogenic risk rubella vaccination in

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pregnant women should be avoided in principle, and those planning a pregnancy are advised to avoid pregnancy for 1 month following vaccination.

- Administration of blood or blood products before or shortly after vaccination may interfere with vaccine efficacy. If using only rubella vaccines persons who received blood products should wait at least 3 months before vaccination and, if possible, blood products should be avoided for up to 2 weeks postvaccination. Vaccinated persons are not eligible to donate blood for 1 month after vaccination.

10 Human Papillomavirus (HPV)

- Position paper reference: Weekly Epid. Record (2009, 84: 118-131) [pdf 267kb]
- Two vaccines are currently available. Quadrivalent (HPV types 6,11,16 and 18) licensed for use in females as young as 9 years of age to prevent cervical precancers and cancers. In addition, the quadrivalent vaccine is licensed for prevention of vulvar and vaginal precancers and cancers as well as anogenital warts in females. In some countries, the vaccine is also licensed for the prevention of anogenital warts in males. Bilvalent (HPV types 16 and 18) has been licensed for use in females as young as 10 years of age to prevent cervical precancers and cancers.
- Both vaccines are intended for females before the onset of sexual activity, i.e. before first exposure to HPV infection. A three-dose schedule is recommended. The quadrivalent is given at baseline and after 2 and 6 months. A minimum interval of 4 weeks between the first and second dose, and a minimum interval between the second and third does of 12 weeks is recommended by the manufacturer. The bivalent vaccine is given at baseline and after 1 and 6 months. If flexibility in the schedule is necessary the manufacturer recommends that the second dose is administered between 1 and 2.5 months after the first dose.
- For both vaccines alternative schedules are being explored. Restarting the 3-dose series is not necessary if interrupted, but remaining doses should be administered as close to the schedule intervals as possible.
- Currently, the manufacturers do not recommend any booster dose following completion of the primary series.
- HPV vaccination of males for prevention of cervical cancer is not recommended at this time because vaccination strategies that achieve high coverage (>70%) in the primary target population of young adolescent girls are expected to be more cost-effective in reducing cervical

11 Japanese Encephalitis (JE)

- Position paper reference: Weekly Epid. Record (2006, 81: 331-340) [pdf 192kb]
- JE vaccine should be given in all areas where JE constitutes a public health problem.
- Vaccine options - Three types of vaccines are available: (1) a cell culture-based live attenuated, (2) a cell culture-based inactivated and (3) an inactivated mouse brain-derived. The WHO position paper provides recommendations for the mouse brain-derived and live attenuated vaccines.
- Booster - If administering cell-culture based live-attenuated vaccine, a booster dose is currently recommended after an interval of one year, even though observational studies suggest long-term protection after a single dose. If using mouse brain-derived vaccine, a booster dose should be administered after an interval of one year then every 3 years until 10-15 years of age.

12 Yellow Fever

- Position paper reference: Weekly Epid. Record (2013, 88: 269-284) [pdf 1.24mb]
- WHO recommends that all endemic countries should introduce YF vaccine into their routine immunization programmes.
- A single dose of YF vaccine is sufficient to confer sustained life-long protective immunity against YF disease; a booster dose is not necessary.
- It is recommended that YF vaccine be given to children at age 9-12 months at the same time as the measles vaccine.
- The vaccine is contraindicated in children aged <6 months and is not recommended for those aged 6-8 months, except during epidemics when the risk of infection with the YF virus is very high. Other contraindications for YF vaccination are severe hyper-sensitivity to egg antigens and severe immunodeficiency.
- Preventive mass vaccination campaigns are recommended for inhabitants of areas at risk of YF where there is low vaccination coverage. Vaccination should be provided to everyone aged ≥ 9 months, in any area with reported cases. Noting that YF is a live vaccine, a risk-benefit assessment should be undertaken for all pregnant and lactating women.
- Vaccine should be offered to all unvaccinated travelers aged ≥ 9 months, travelling to and from at-risk areas, unless they belong to the group of individuals for whom YF vaccination is contraindicated.
- YF vaccine may be administered simultaneously with other vaccines.

13 Tick-Borne Encephalitis (TBE)

- Position paper reference: Weekly Epid. Record (2011, 86: 241-256) [pdf 318kb]
- Since the incidence of tick-borne encephalitis may vary considerably between and even within geographical regions, public immunization strategies should be based on risk assessments conducted at country, regional or district level, and they should be appropriate to the local endemic situation. Therefore, establishing case reporting of the disease is essential before deciding on the most appropriate preventive measures to be taken.
- In areas where the disease is highly endemic (that is, where the average prevaccination incidence of clinical disease is ≥5 cases/100 000 population per year), implying that there is a high individual risk of infection, WHO recommends that vaccination be offered to all age groups, including children.
- Because the disease tends to be more serious in individuals aged >50–60 years this age group constitutes an important target for immunization.
- Where the prevaccination incidence of the disease is moderate or low (that is, the annual average during a 5-year period is <5/100 000) or is limited to particular geographical locations or certain outdoor activities, immunization should target individuals in the most severely affected cohorts.
- People travelling from non-endemic areas to endemic areas should be offered vaccination if their visits will include extensive outdoor activities.
- Vaccination against the disease requires a primary series of 3 doses; those who will continue to be at risk should probably have ≥1 booster doses.
- Within the considerable range of acceptable dose intervals, the relevant national authorities should select the most rational primary schedule for their national, regional or district immunization programmes.
- Although there is a strong indication that the spacing of boosters could be expanded considerably from the intervals currently recommended by the manufacturers (every 3-5 years), the evidence is still insufficient for a definitive recommendation on the optimal frequency and number of booster doses. Countries should therefore continue to recommend the use of vaccines in accordance with local disease epidemiology and current schedules until more definitive information becomes available.
- For the vaccines manufactured in Austria and Germany (FSME-Immun and Encepur) that can be given starting from > 1year of age an interval of 1–3 months is recommended between the first 2 doses, and 5–12 months between the second and third doses. When rapid protection is required, for example for people who will be travelling to endemic areas, the interval between the first 2 doses may be reduced to 1–2 weeks.
- With the vaccines manufactured in the Russian Federation (TBE-Moscow and EnceVir) the

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recommended intervals are 1–7 months between the first 2 doses, and 12 months between the second and third doses. Booster doses are recommended every 3 years for those at continued risk of exposure.

- The currently recommended booster interval should be maintained until more data have been obtained on the duration of protection induced by the Russian vaccines.
- Regardless of the duration of the delay, interrupted schedules should be resumed without repeating previous doses.

14 Typhoid

- Position paper reference: Weekly Epid. Record (2008, 83: 49-59) [pdf 297kb]
- Recommended for school-age and/or preschool-age children in areas where typhoid fever in these age groups is shown to be a significant public health problem, particularly where antibiotic-resistant *S. Typhi* is prevalent.
- Vaccine options - Vi polysaccharide typhoid vaccine requires one parenterally administered dose which may be given after the age of 2 years; the liquid form of Ty21a live oral vaccine (for use in individuals from the age of 2 years) is no longer available; the capsule form of Ty21a (for use in individuals from the age of 5 years) requires 3 or 4 orally administered doses. See position paper for further details.
- Booster - In most endemic settings, a booster dose of the concerned vaccine 3 to 7 years after the primary immunization seems appropriate.

15 Cholera

- Position paper reference: Weekly Epid. Record (2010, 85, 117-128) [pdf 283kb]
- In cholera-endemic countries, vaccinating the entire population is not warranted. Rather, vaccination should be targeted at high-risk areas and population groups. The primary targets for cholera vaccination in many endemic areas are preschool-aged and school aged children. Other groups that are especially vulnerable to severe disease and for which the vaccines are not contraindicated may also be targeted, such as pregnant women and HIV-infected individuals. Consider vaccinating older age groups if funding is available.
- Two types of oral cholera vaccines are available: (i) Dukoral (WC-rBS) and (ii) Sanchol and mORCVAX. The live attenuated single-dose vaccine (CVD 103-HgR) is no longer produced. The injectable vaccine is still manufactured in a few countries but its use is not recommended mainly because of its limited efficacy and short duration of protection.
- Dukoral is not licensed for children < 2 years. Children aged 2-5 years should receive 3 doses ≥7 days apart (but not more than 6 weeks). Intake of food and drink should be avoided for 1 hour before and after vaccination. If the interval between doses is delayed >6 weeks, primary vaccination should be restarted. One booster dose is recommended every 6 months, and if the interval between primary immunization, and the booster is >6 months, primary immunization must be restarted.
- Adults and children ≥6 years should receive 2 doses of Dukoral ≥ 7 days apart (but not more than 6 weeks). Intake of food and drink should be avoided for 1 hour before and after vaccination. If the interval between doses is delayed >6 weeks, primary vaccination should be restarted. A booster dose every 2 years is recommended. If the interval between the primary series and booster immunization is > 2 years, primary immunization must be repeated.
- Shanchol and mORCVAX: two liquid doses orally 14 days apart for individuals ≥1 year. A booster dose is recommended after 2 years.

16 Meningococcal

- Position paper reference: Weekly Epid Record (2011, 86: 521-540) [pdf 1.1Mb] (Note: Updated position paper will be available in 2011).
- Conjugate vaccines are preferred over polysaccharide vaccines due to their potential for herd protection and their increased immunogenicity, particularly in children <2 years of age.
- Both conjugate and polysaccharide vaccines are efficacious and safe when used in pregnant women.
- Monovalent MenA conjugate vaccine should be given as a single intramuscular dose to individuals 1-29 years of age. The positi...
- • For monovalent MenC conju... for children aged >12 months, t... administered at an interval of a least ... series is interrupted, vaccination should be resu... ed ses primary ...evious dose.

Polisakkarid aşı >2 yaş tüm bireylere tek doz olarak uygulanabilir, yüksek riske sahiplere 3-5 yılda bir

- • Quadrivalent conjugate vaccines (A,C,W135,Y-D and A,C,W135,Y-CRM) should be administered as one single intramuscular dose to individuals > 2 years. A,C,W135,Y-D is also licensed for children 9-23 months of age, and given as a 2-dose series, 3 months apart beginning at age 9 months. If the primary series is interrupted, vaccination should be resumed without repeating the previous dose.
- • Meningococcal polysaccharide vaccines are less, or not, immunogenic in children under 2 years of age.
- Meningococcal polysaccharide vaccines can be used for those > 2 years of age to control outbreaks in countries where limited economic resources or insufficient supply restrict the use of meningococcal conjugate vaccines. Polysaccharide vaccines should be administered to individuals > 2 years old as one single dose. One booster 3-5 years after the primary dose may be given to persons considered to be a continued high risk of exposure, including some health workers. See position paper for details.

17 Hepatitis A

- Position paper reference: Weekly Epid. Record (2012, 87: 261-276) [pdf 1.24 Mb]
- Hepatitis A vaccination is recommended for inclusion in the national immunization schedule for children ≥ 1 year if indicated on the basis of incidence of acute hepatitis A, change in the endemicity from high to intermediate, and consideration of cost-effectiveness.
- In highly endemic countries almost all persons are asymptomatically infected with HAV in childhood, which effectively prevents clinical hepatitis A in adolescents and adults. In these countries, large-scale vaccination programmes are not recommended.
- Countries with improving socioeconomic status may rapidly move from high to intermediate endemicity. In these countries, a relatively large proportion of the adult population is susceptible to HAV and large-scale hepatitis A vaccination is likely to be cost-effective and therefore is encouraged.
- For individual health benefit targeted vaccination of high-risk groups should be considered in low and very low endemicity settings. Those at increased risk of hepatitis A include travelers to areas of intermediate or high endemicity, those requiring life-long treatment with blood products, men who have sex with men, workers in contact with non-human primates, and injection drug users. In addition, patients with chronic liver disease are at increased risk for fulminant hepatitis A and should be vaccinated.
- Inactivated HAV vaccine is licensed for intramuscular administration in a 2-dose schedule with the first dose given at the age of 1 year or older. The interval between the first and second dose is flexible (from 6 months up to 4-5 years) but is usually 6-18 months. Countries may consider a 1-dose schedule as this option seems comparable in terms of effectiveness, and is less expensive and easier to implement. However, in individuals at substantial risk of contracting hepatitis A and in immunocompromised individuals, a 2-dose schedule is preferred. Inactivated HAV vaccines produced by different manufacturers, including combined hepatitis A vaccines, are interchangeable. Apart from severe allergic reaction to the previous dose, there is no

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contraindication to their use. These vaccines can be co-administered simultaneously with other routine childhood vaccines, and should be considered for use in pregnant women at definite risk of HAV infection.

- Live attenuated HAV vaccine is administered as a single subcutaneous dose to those ≥ 1 year of age. Severe allergy to components included in the live attenuated hepatitis A vaccine is a contraindication to their use. As a rule, live vaccines should not be used in pregnancy or in severely immunocompromised patients. There is no information available on co-administration of live attenuated hepatitis A vaccines with other routinely used vaccines.
- Vaccination against hepatitis A should be part of a comprehensive plan for the prevention and control of viral hepatitis, including measures to improve hygiene and sanitation and measures for outbreak control.

18 Rabies

- Position paper reference: Weekly Epid. Record (2010, 85: 309-320) [pdf 370]
- Production and use of nerve-tissue rabies vaccines should be discontinued and replaced with cell-culture-based vaccines (CCVs).
- Recommended for anyone who will be at continual, frequent or increased risk of exposure to the rabies virus, either as a result of their residence or occupation. Travellers with extensive outdoor exposure in rural high-risk areas where immediate access to appropriate medical care may be limited should also be vaccinated regardless of the duration of stay. Where canine rabies is a public health problem, WHO encourages studies on the feasibility, cost-effectiveness, and long-term impact of incorporating rabies vaccination into the immunization programme for infants and children.
- The series is given by intramuscular or intradermal injection at 0, 7 and 21 or 28 days.
- Intramuscular administration: For adults and children aged ≥2 years, the vaccine should always be administered in the deltoid area of the arm; for children aged < 2 years, the anterolateral area of the thigh is recommended. Rabies vaccine should not be administered in the gluteal area, as the induction of an adequate immune response may be less reliable.
- Booster doses of rabies vaccines are not required for individuals living in or travelling to high-risk areas who have received a complete primary series of pre-exposure or post-exposure prophylaxis with a cell-culture-based rabies vaccine (CCV).
- Periodic booster injections are recommended only for people whose occupation puts them at continual or frequent risk of exposure. If available, antibody monitoring is preferred to the administration of routine boosters.
- Because vaccine-induced immunity persists in most cases for years, a booster is recommended only if rabies-virus neutralizing antibody titres fall to <0.5 IU/ml.
- Antibody testing should be done every 6 months for people at risk of laboratory exposure to high concentrations of live rabies virus, and every 2 years for professionals who are not at continual risk of exposure through their activities, such as certain categories of veterinarians and animal health officers.

19 Mumps

- Position paper reference: Weekly Epid. Record (2007, 82: 49-60) [pdf 311kb]
- Recommended for use in high performing immunization programs with the capacity to maintain coverage over 80% and where mumps reduction is a public health priority.
- If implemented, a combination vaccine of measles, mumps and rubella is recommended.

20 Seasonal Influenza (Inactivated Vaccine)

- Position paper reference: Weekly Epid. Record (2005, 33: 279-287) [pdf 220kb]
- The World Health Assembly recommended increased immunization coverage of high-risk groups including the elderly, in those countries where influenza vaccination policies exist (Reference: WHA56.19, 2003). See position paper for detailed description of high-risk groups.
- Dose- If a child under 9 years of age requires vaccination and has not previously received influenza vaccine, a two-dose series with doses one-month apart should be administered. Annual re-vaccination in all individuals and initial vaccination in individuals 9 years of age or older require only a single dose. Children aged 6-36 months should receive half the adult dose.