PREVENTION IN PRIMARY HEALTH CARE

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- Health as defined by the WHO: “ not merely the absence of disease or infirmity but a state of complete physical, mental and social well-being”
- The real aim of preventive medicine is to achieve this absence of disease
- Preventive medicine can be practiced by governmental agencies, primary care physicians and the individual himself
- The present challenge of preventive medicine is to motivate the individual to practice his own prevention
- In comparison with the curative contract, the preventive contract does not always respond to the patient’s demand and almost never has to do with real and present suffering but with the possible and future one.

Clinical Prevention

Four major types of clinical preventive care:

- Immunization
- Screening
- Behavioral counseling (lifestyle changes)
- Chemoprevention

Levels of Prevention

Primary prevention

Secondary prevention

Tertiary prevention

Quaternary prevention

Primary Prevention

- Keeps disease from occurring at all by removing its causes.
- The most common clinical primary care preventive activities involve:
  - *Immunizations to prevent communicable diseases.*
  - *Drugs*
  - *Behavioral counseling.*
  - *Prophylactic surgery has become more common e.g. ovariectomy and mastectomy to prevent ovarian and breast cancer in women with certain genetic mutations.*

Secondary Prevention

- Detects early disease when it is asymptomatic and when treatment can stop it from progressing.
- It is a two-step process:
  - *A screening test and*
  - *Follow-up diagnosis and treatment for those with the condition of interest.*

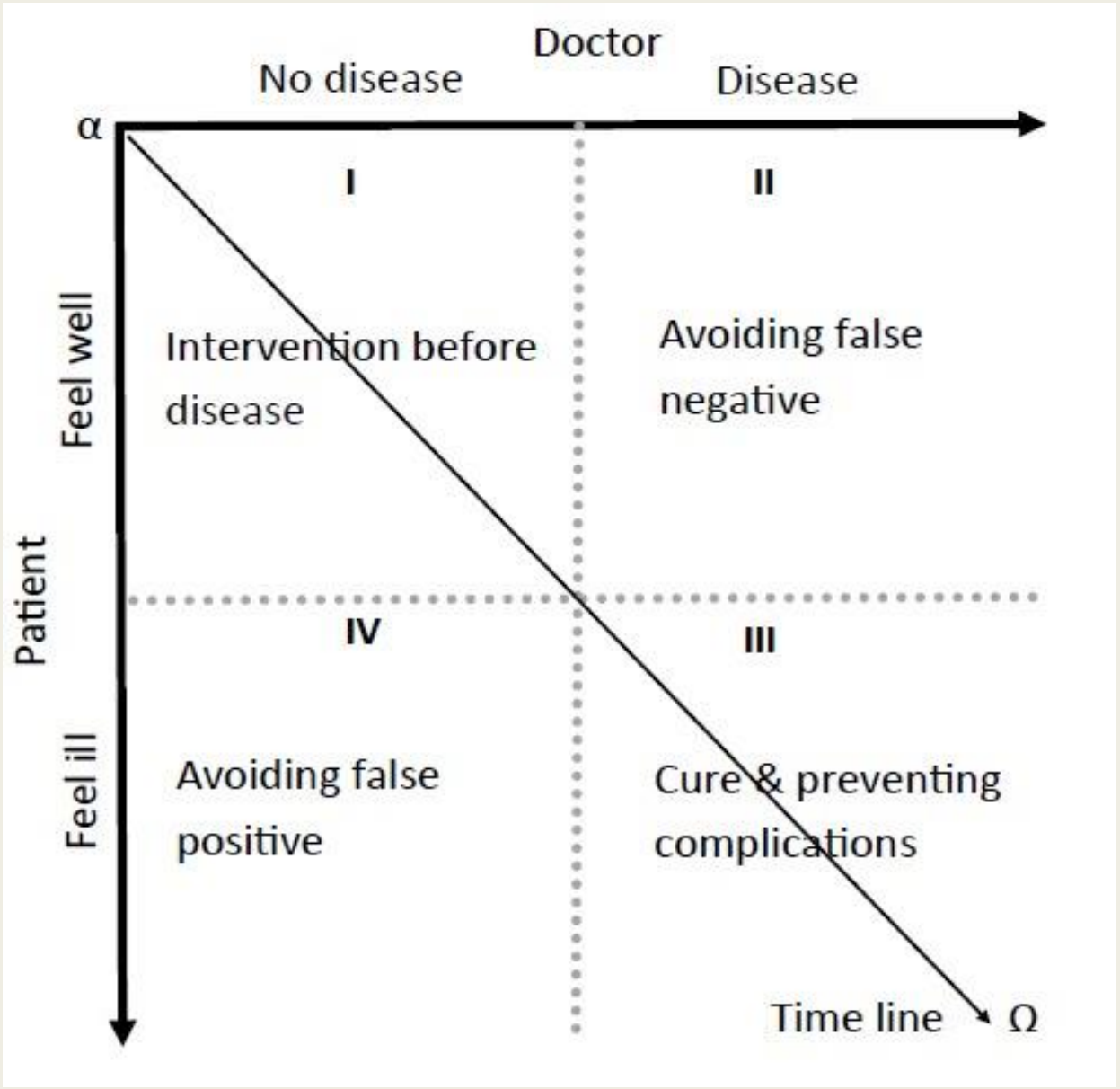
Tertiary Prevention

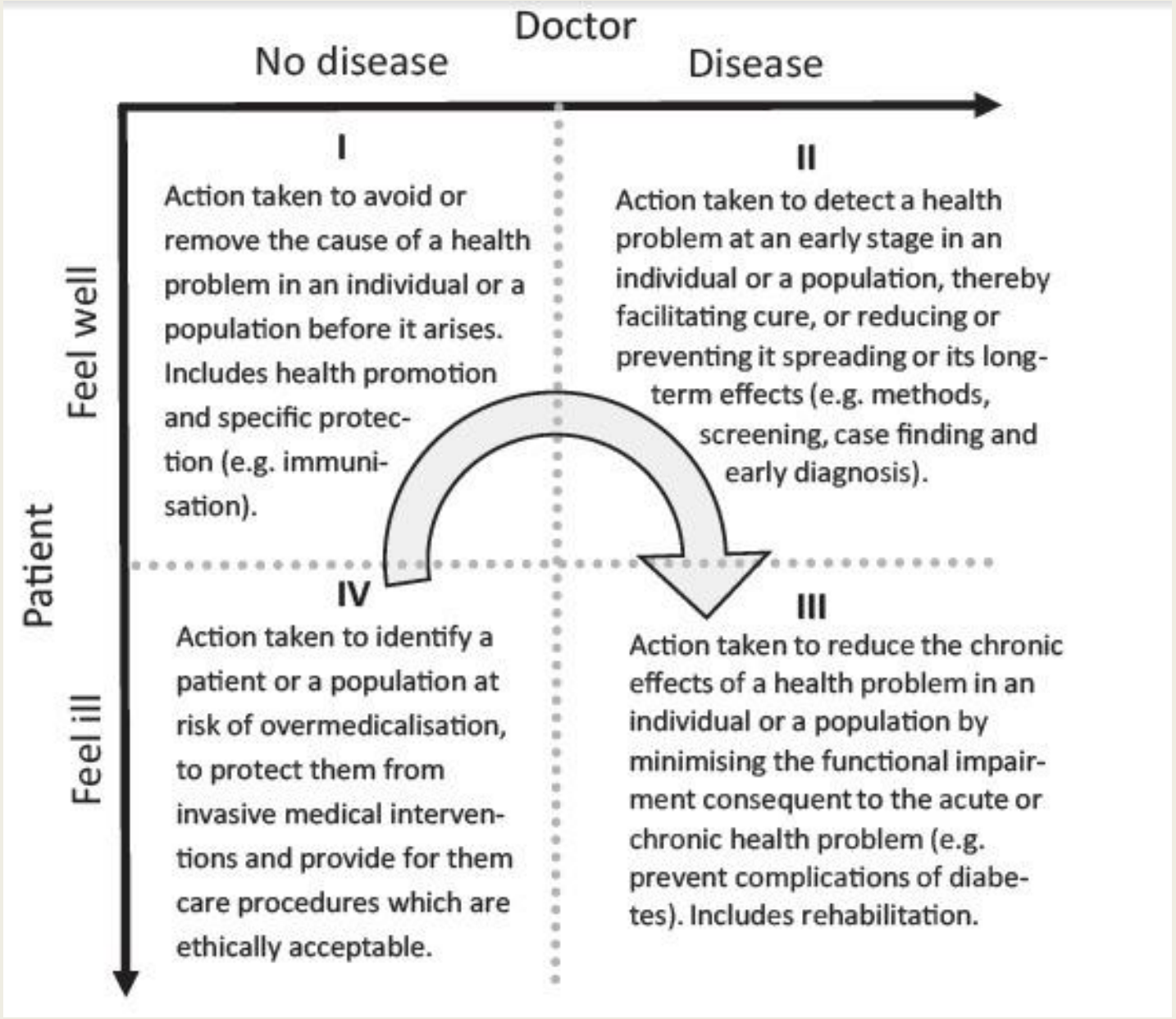
- Clinical activities that prevent deterioration or reduce complications after a disease has declared itself.
- It is another term for treatment, but treatment focused on health effects occurring not so much in hours and days but months and years.

- Examples:
  - Diabetic patients need regular ophthalmologic examinations for detecting early diabetic retinopathy, routine foot care, and monitoring for urinary protein to guide use of ACE-I to prevent renal failure.
  - *Use of beta-blockers to decrease the risk of death in patients who have recovered from MI.*

Quaternary Prevention, P4

- The concept has been introduced in 1986 by a Belgium family doctor **to describe 'an action taken to identify a patient or a population at risk of overmedicalization, to protect them from invasive medical interventions and provide for them care procedures which are ethically acceptable.**
- Essentially, it is a process that explicitly considers and thus enables **avoidance of iatrogenic harm**.
- Quaternary prevention involves the need for **close monitoring by the doctor himself**, a sort of permanent quality control on behalf of the consciousness of the harm they could, even unintentionally, do to their patients.


Doctor
No disease
Disease
α
I
II
Feel well
Intervention before disease
Avoiding false negative
Patient
IV
III
Feel ill
Avoiding false positive
Cure & preventing complications
Time line
Ω


Doctor
No disease
Disease
Patient
Feel well
Feel ill
I
Action taken to avoid or remove the cause of a health problem in an individual or a population before it arises. Includes health promotion and specific protection (e.g. immunisation).
II
Action taken to detect a health problem at an early stage in an individual or a population, thereby facilitating cure, or reducing or preventing it spreading or its long-term effects (e.g. methods, screening, case finding and early diagnosis).
IV
Action taken to identify a patient or a population at risk of overmedicalisation, to protect them from invasive medical interventions and provide for them care procedures which are ethically acceptable.
III
Action taken to reduce the chronic effects of a health problem in an individual or a population by minimising the functional impairment consequent to the acute or chronic health problem (e.g. prevent complications of diabetes). Includes rehabilitation.

- Three criteria are important when judging whether a condition should be included in preventive care :
  - *The burden of suffering caused by the condition*
  - *The performance of the screening test*
  - *The effectiveness, safety, and cost of the preventive intervention or treatment*

Criteria for deciding whether a medical condition should be included in preventive care

1. How great is the burden of suffering caused by the condition in terms of:
Death
Disease
Disability
Discomfort
Dissatisfaction
Destitution
2. How good is the screening test, if one is to be performed, in terms of:
Sensitivity
Specificity
Simplicity
Cost
Safety
Acceptability
3. A. For primary and tertiary prevention, how good is the therapeutic intervention in terms of:
Effectiveness
Safety
Cost-effectiveness
Or
3. B. For secondary prevention, if the condition is found, how good is the ensuing treatment in terms of:
Effectiveness
Safety
Early treatment after screening being more effective than later treatment without screening, when the patient becomes symptomatic
Cost-effectiveness

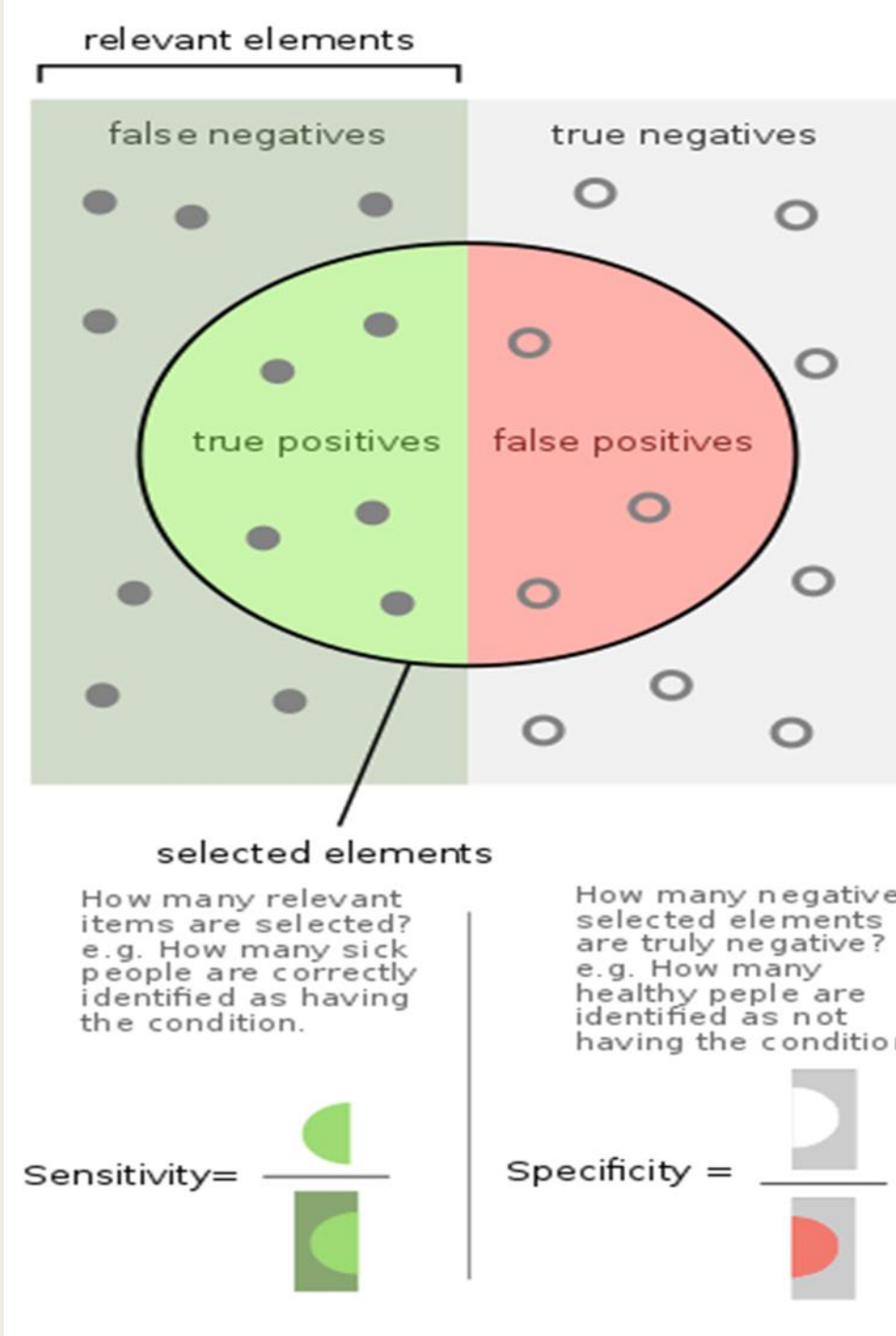
Burden of Suffering

- How much suffering (in terms of 6 Ds)
  - *Mortality rates*
  - *Frequency of hospitalization*
  - *Amount of health care utilization*
- The frequency of that medical condition
  - *Looking for the incidence of what is to be prevented*
  - *Targeting the higher-risk groups based on age, sex and other risk characteristics.*

PERFORMANCE OF SCREENING TESTS

- Sensitivity: The number of patients with a positive test who have a disease divided by all patients who have the disease

- Specificity: The number of patients who have a negative test and do not have the disease divided by the number of patients who do not have the disease.



Performance

- A good screening test must have a high sensitivity
  - *It does not miss the few cases of disease present.*
  - *It must also be sensitive early in the disease, when the subsequent course can still be altered.*

- A screening test should also have a high specificity
  - *To reduce the number of people with false-positive results who require diagnostic evaluation.*

Effectiveness Of Treatment

- Randomized controlled trials are the strongest scientific evidence for establishing the effectiveness of treatments.
- It should be both efficacious and effective
- Treatment of early, asymptomatic disease must be superior to treatment of the disease when it would have been diagnosed in the usual course of events, when a patient seeks medical care for symptoms

Safety

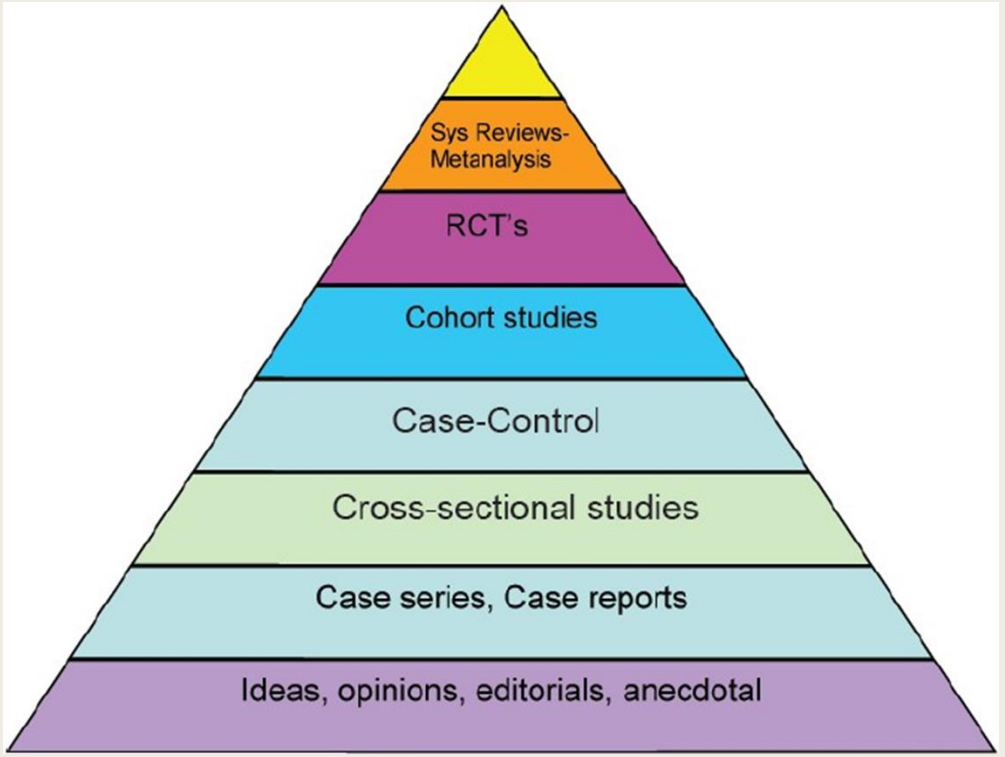
- It is reasonable and ethical to accept a certain risk for diagnostic tests applied to sick patients seeking help for specific complaints.
- It is quite another matter to subject apparently healthy people to risks. In such circumstances, the procedure should be especially safe.

USPSTF Strength of Recommendation

Grade	Definition	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer or provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.	Offer or provide this service.
C	The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.	Offer or provide this service for selected patients depending on individual circumstances.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I Statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	Read the clinical considerations section of USPSTF Recommendation Statement. If the service is offered, patients should understand the uncertainty about the balance of benefits and harms.

Quality of Evidence

- Depends on
  - *Study Design (randomized vs observational trials)*
  - *Study quality (detailed study methods and execution*)
  - *Consistency (the similarity of estimates of effect across studies*)
  - *Directness (the extent to which the people, interventions, and outcome measures are similar to those of interest, e.g. there may be uncertainty about the directness of the evidence if the people of interest are older, sicker, or have more comorbidity than those in the studies)*


Sys Reviews-
Metanalysis
RCT's
Cohort studies
Case-Control
Cross-sectional studies
Case series, Case reports
Ideas, opinions, editorials, anecdotal

Harms of screening

- Anxiety produced by false-positive screening tests
- Harms associated with diagnostic testing after a positive screening test
- Overdiagnosis of conditions that may be treated but would never have become clinically apparent
- Cost

Periodic Check-Ups

- The Periodic Health Evaluation is an opportunity to :
  - *Identify risk factors through updating the patient profile*
  - *Perform evidence-based preventive maneuvers*
  - *Counsel patients on lifestyle issues*
  - *Update vaccinations*
- Every 3 years for adult patients ≤49 years without chronic conditions.
- Annually for adults ≥50 years.

Evaluation for CV disease

Patients aged ≥20 yr should undergo CV risk evaluation every 3-5 years with

- *Risk factor evaluation*
- *Lipid profile measurement*
- *Formal estimation of CVD risk for patients aged 40-79 years without established CVD or diabetes.*

Commonly used tools:

The Framingham risk score

- *www.mdcalc.com/framingham-coronary-heart-disease-risk-score*
- *Estimates the 10-yr risk of CHD*
- *For individuals 30-74 years old without CVD*

The AHA/ACC risk score

- *www.cvriskcalculator.com*
- *Estimates the 10-year risk of heart disease or stroke using the ASCVD algorithm published in 2013.*
- *For individuals 40-79 years old without CVD*

CVD risk factors

Hypertension

Cigarette smoking

Diabetes mellitus

Premature FHx of CVD (atherosclerotic CVD or death from CVD in a first-degree relative (ie, parent or sibling) prior to age 55 (males) or 65 (females).

Chronic kidney disease

Obesity : the USPSTF recommends to offer or refer adults with a BMI of 30 or higher to intensive, multicomponent behavioral interventions.

Primary Prevention

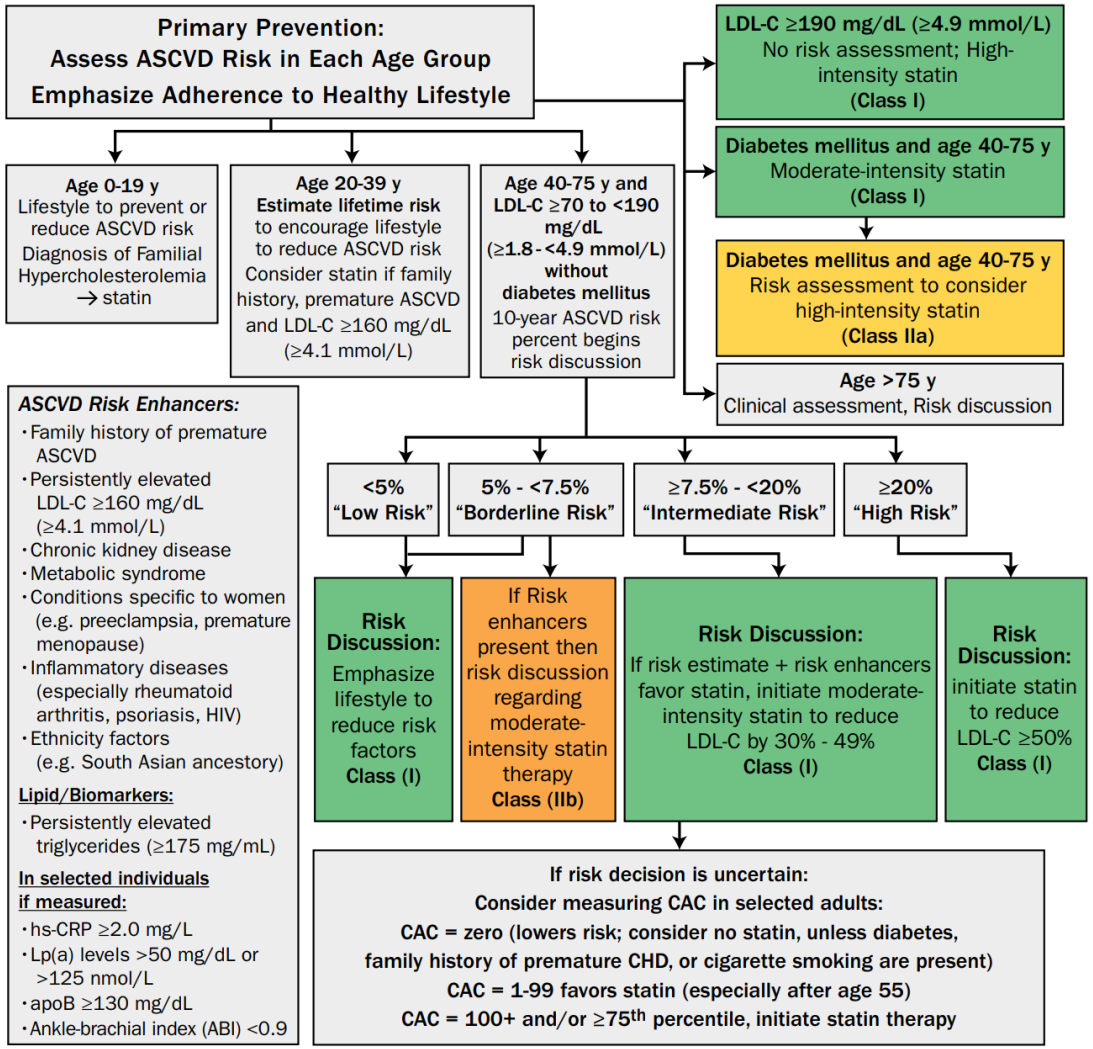
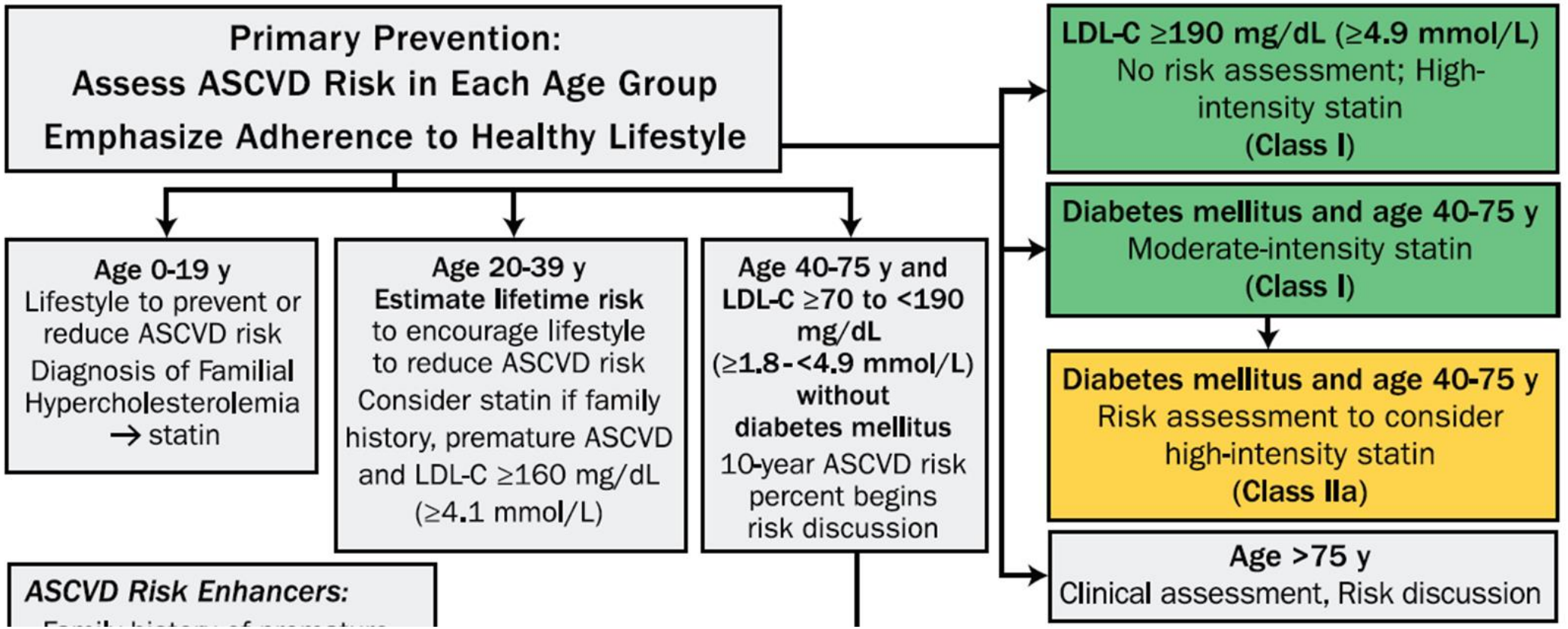
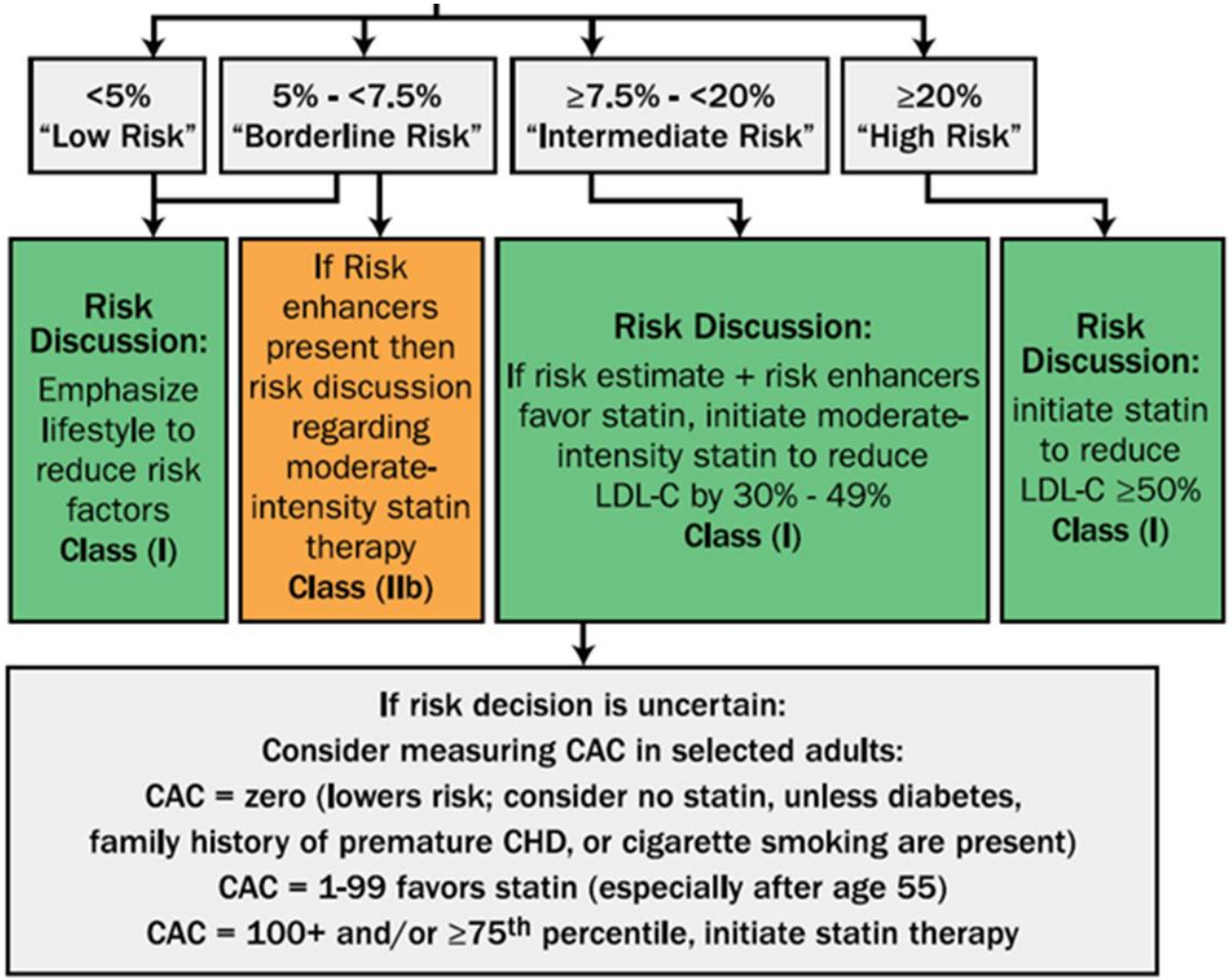


Figure 2

AMERICAN COLLEGE of CARDIOLOGY

Primary Prevention




<5%
"Low Risk"
5% - <7.5%
"Borderline Risk"
≥7.5% - <20%
"Intermediate Risk"
≥20%
"High Risk"
Risk Discussion:
Emphasize lifestyle to reduce risk factors
Class (I)
If Risk enhancers present then risk discussion regarding moderate-intensity statin therapy
Class (IIb)
Risk Discussion:
If risk estimate + risk enhancers favor statin, initiate moderate-intensity statin to reduce LDL-C by 30% - 49%
Class (I)
Risk Discussion:
initiate statin to reduce LDL-C ≥50%
Class (I)
If risk decision is uncertain:
Consider measuring CAC in selected adults:
CAC = zero (lowers risk; consider no statin, unless diabetes, family history of premature CHD, or cigarette smoking are present)
CAC = 1-99 favors statin (especially after age 55)
CAC = 100+ and/or ≥75th percentile, initiate statin therapy

ASCVD Risk Enhancers:

- Family history of premature ASCVD
- Persistently elevated LDL-C ≥160 mg/dL (≥4.1 mmol/L)
- Chronic kidney disease
- Metabolic syndrome
- Conditions specific to women (e.g. preeclampsia, premature menopause)
- Inflammatory diseases (especially rheumatoid arthritis, psoriasis, HIV)
- Ethnicity factors (e.g. South Asian ancestory)

Lipid/Biomarkers:

- Persistently elevated triglycerides (≥175 mg/mL)

In selected individuals if measured:

- hs-CRP ≥2.0 mg/L
- Lp(a) levels >50 mg/dL or >125 nmol/L
- apoB ≥130 mg/dL
- Ankle-brachial index (ABI) <0.9

Hyperlipidemia

Universal screening FLP in all individuals 40-75-year-old (USPSTF, B Grade)

Screening in younger adults is an area of significant uncertainty.

There are recommendations from some organizations to perform screening for dyslipidemia in all children before puberty (age 9 to 11) and after puberty (age 17 to 21)

Repeat measurement **every 5 years** for patients with clearly lower values than the threshold for treatment, **and every 3 years** for patients near a threshold for treatment.

Lipid Disorders in Children and Adolescents: Screening

August 09, 2016

Recommendation Summary

Population	Recommendation	Grade
Children and adolescents 20 years or younger	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for lipid disorders in children and adolescents 20 years or younger.	I

Hypertension

USPSTF Recommends screening all adults ≥18 years of age

At a minimum, the frequency of screening should be as follows:

Adults with normal BP should have reassessment of their BP every year.

Adults should be screened at least semiannually (every 6 months) :

- If they have risk factors for HTN (eg, obesity)
- If their previously measured systolic BP was 120-129 (elevated BP)

Diabetes Mellitus

Screen for prediabetes and type 2 DM in adults aged 35-70 years who have overweight or obesity.(USPSTF, Grade B)

The ADA recommends testing:

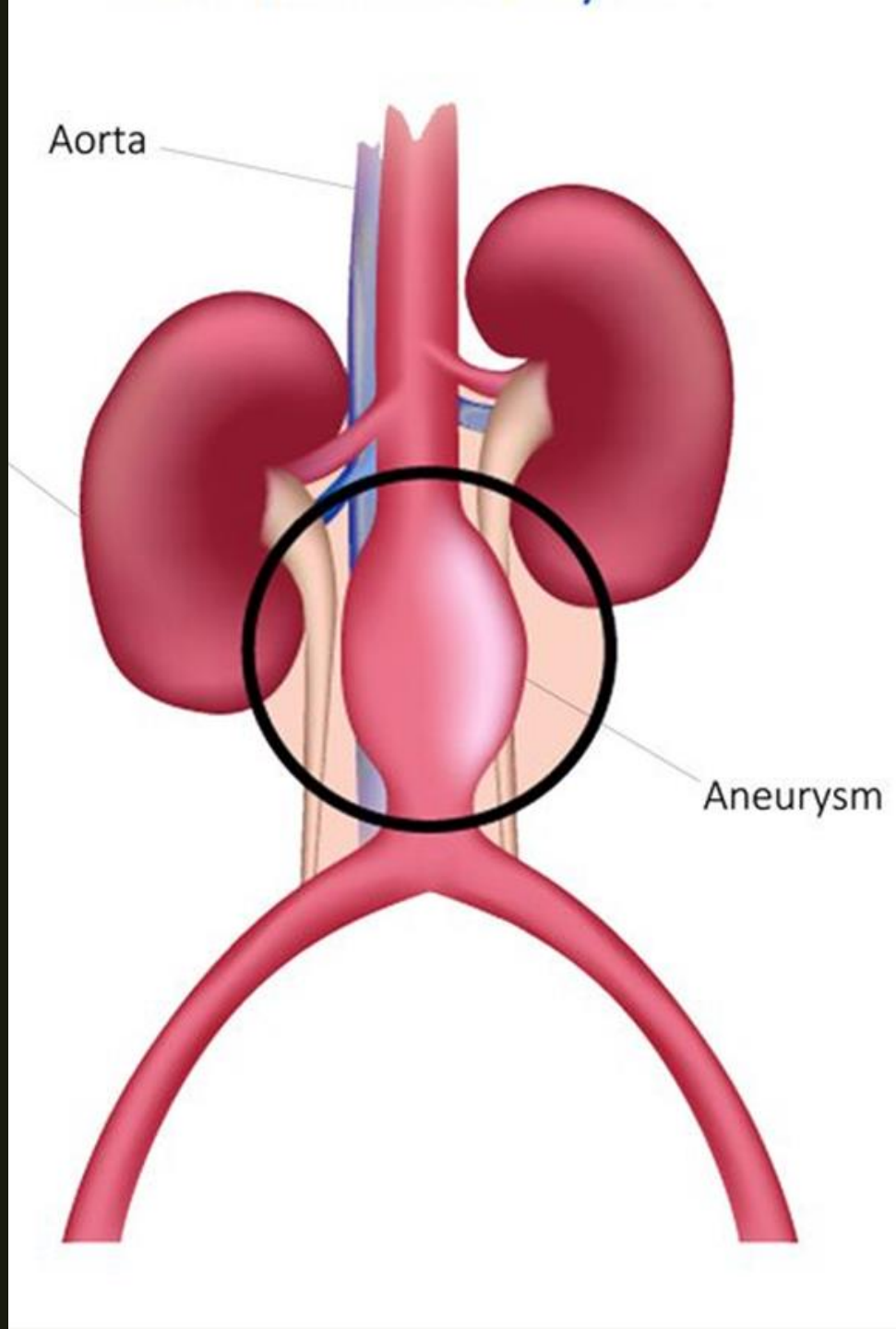
- *All adults with BMI ≥25 kg/m2 and 1 or more additional risk factors for diabetes.*
- *Begin at **age of 45** in individuals without risk factors.*
- Risk-based screening for prediabetes and/or type 2 diabetes should be considered after the onset of puberty or after 10 years of age, whichever occurs earlier, in children and adolescents with overweight (BMI ≥85th percentile) or obesity (BMI ≥95th percentile) and who have one or more risk factor for diabetes

Use either FPG, A1C or two-hour OGTT for screening.

If the screening test is negative, repeat testing every 3 years is reasonable.

Abdominal Aortic Aneurysm

- One-time screening for AAA by US in men ages 65-75 years who:
  - *Have ever smoked (Grade B)*
  - *Have never smoked but who have a first-degree relative who required repair of an AAA or died from a ruptured AAA (Grade C)*



Recommendation Summary for AAA screening

Population	Recommendation	Grade
Men aged 65 to 75 years who have ever smoked	The USPSTF recommends 1-time screening for abdominal aortic aneurysm (AAA) with ultrasonography in men aged 65 to 75 years who have ever smoked.	B
Men aged 65 to 75 years who have never smoked	The USPSTF recommends that clinicians selectively offer screening for AAA with ultrasonography in men aged 65 to 75 years who have never smoked rather than routinely screening all men in this group. Evidence indicates that the net benefit of screening all men in this group is small. In determining whether this service is appropriate in individual cases, patients and clinicians should consider the balance of benefits and harms on the basis of evidence relevant to the patient's medical history, family history, other risk factors, and personal values.	C
Women who have never smoked	The USPSTF recommends against routine screening for AAA with ultrasonography in women who have never smoked and have no family history of AAA.	D
Women aged 65 to 75 years who have ever smoked	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for AAA with ultrasonography in women aged 65 to 75 years who have ever smoked or have a family history of AAA.	I

Aspirin

- Aspirin preventive medication for the primary prevention of cardiovascular disease and colorectal cancer in adults:
  - *Aged 50-59 years (B Recommendation), or aged 60-69 (C Recommendation) who have a 10% or greater 10-year CVD risk*
  - *Are not at increased risk for bleeding,*
  - *Have a life expectancy of at least 10 years,*
  - *and are willing to take low-dose aspirin daily for at least 10 years*

AHA Guidelines

Recommendations for Aspirin Use

COR	LOE	Recommendations
IIb	A	1. Low-dose aspirin (75-100 mg orally daily) might be considered for the primary prevention of ASCVD among select adults 40 to 70 years of age who are at higher ASCVD risk but not at increased bleeding risk.
III: Harm	B-R	2. Low-dose aspirin (75-100 mg orally daily) should not be administered on a routine basis for the primary prevention of ASCVD among adults >70 years of age.
III: Harm	C-LD	3. Low-dose aspirin (75-100 mg orally daily) should not be administered for the primary prevention of ASCVD among adults of any age who are at increased risk of bleeding.

Statins for Primary Prevention

- Adults **without** a history of CVD recommended to use statin for the primary prevention of CVD events and mortality when **all** the following criteria are met:
  - *They are ages 40-75 years and* LDL-C between **70-189** mg/dL.
  - *They have a calculated 10-year risk of a CVD of 7.5-10% or greater.*

  (The AHA recommends that it is reasonable to start statin also with CVD risk 5-7.5%, especially in the presence of risk-enhancing factors)

- *2018-2019 updates from the AHA/ACC*
  - *All diabetic patients aged 40-75 who have LDL>70mg/dl should be on moderate-intensity statin regardless of their calculated CVD risk*
  - *Individuals aged 20-39: consider statin if family history of premature ASCVD and LDL>160 mg/dl*
  - *If risk decision is uncertain consider measuring CAC (Coronary Artery Calcium) in selected adults*

Statins for Primary Prevention

Statin Therapy to lower LDL-C is recommended in individuals with an LDL-C >190 mg/dl in individuals 20-75 years of age, independent of their overall risk (Many of these patients will have heterozygous familial hypercholesterolemia).

For this primary prevention, it is recommended to use a moderate dose of a statin such as: atorvastatin10- 20 mg or 40 mg of (lovastatin, pravastatin or simvastatin) or 5-10 mg of rosuvastatin)

Measure LDL-C response at 6 weeks after initiating therapy and every 12 months thereafter.

Statins for Tertiary Prevention

- Patients with established CVD include those with:
  - *Stable or unstable CAD*
  - *Ischemic stroke*
  - *TIAs*
  - *PAD.*
- These patients should be recommended lifestyle modifications along with a lifelong statin **independent** of baseline LDL-C.
- The LDL goal in such patients should be < 70 mg/dl.
- For these patients it is recommended to use a high-intensity statin therapy (atorvastatin 40-80 mg or rosuvastatin 20-40 mg)
- Monitor LDL level 6 weeks after the initiation or change of treatment and every 6-12 months thereafter.

CANCER PREVENTION

- Avoidance of tobacco
- Being physically active
- Maintaining a healthy weight
- Eating a diet rich in fruits, vegetables, and whole grains, and low in saturated/trans fat
- Limiting alcohol consumption
- Protecting against STI
- Avoiding excess sun
- Getting regular screening for breast, cervical, and colorectal cancer

Breast cancer (*Grade B*)

Patients with personal or family history of breast, ovarian, tubal, or peritoneal cancer or who have an ancestry associated with breast cancer susceptibility 1 and 2 (BRCA1/2) gene mutations should be assessed with an appropriate brief familial risk assessment tool.

Women with a positive result on the risk assessment tool should receive genetic counseling and, if indicated after counseling, genetic testing.

For women who are at increased risk for breast cancer and at low risk for adverse medication effects, clinicians should offer to prescribe risk-reducing medications, such as tamoxifen or raloxifene.

Screening mammography, with or without clinical breast examination, every 1-2 years for women aged 40 years and older.

Cervical cancer

HPV Immunization for females up to age 26 years who have not been previously vaccinated (at 11-12 years), given as 3 doses (0,1-2 mo, 6 mo).

Pap smear in women ages 21-65 years every 3 years.*(Grade A)*

Testing with high-risk HPV alone or in combination with Pap smear every 5 years are other options for women ages 30- 65 years.(*Grade A*)

Women ≥65 years who have had adequate negative prior screening and are not at increased risk do not need to be screened.

Older women who have not been adequately screened should be screened until age 70 to 75 years.

Women who have had a total hysterectomy for reasons other than cervical cancer or high-grade cervical cancer precursors need not be screened.

Colorectal cancer

Start at age 50 years and continue until age 75 years. (*Grade A*)

screening options:

Colonoscopy every 10 years	Fecal immunochemical testing (FIT) for occult blood annually on a single sample	Sigmoidoscopy every 10 years plus FIT annually	CT colonography (CTC) every 5 years	Multitargeted fecal DNA (FIT-DNA) every 3 years on a single sample	Guaiac-based fecal occult blood testing (gFOBT) annually on 3 samples	Sigmoidoscopy alone every 5 years

Lung cancer

Smoking cessation is the most effective intervention to reduce the risk of lung cancer.

Annual screening with **low-dose helical CT** for patients (aged 50-80 years) at risk for lung cancer *(Grade B):*

At least 20 pack-years	If a former smoker, had quit within the previous 15 years

Prostate Cancer

Prostate cancer often grows so slowly that most men die of other causes before the disease becomes clinically advanced.

The guidelines recommend supporting men to make informed decisions about screening that reflect their personal preferences and values.

Discussions about the screening begin at age 50 in average-risk men.

Discussions begin at age 40-45 in men at high risk for prostate cancer:

- Black men
- FHx of prostate cancer, particularly in relatives younger than age 65
- Men who are known or likely to have the BRCA1 or BRCA2 mutations.

Prostate cancer, cont'd

When a decision is made to screen perform PSA tests every **2-4years**.

Do not perform DRE as part of screening.

For men with a PSA level 4-7 ng/mL undergo repeat PSA testing several weeks later.

Men with a repeat PSA level above 4 ng/mL should be referred to a urologist who can evaluate them for a prostate biopsy.

Prostate Cancer Recommendations

Population	Recommendation	Grade
Men aged 55 to 69 years	For men aged 55 to 69 years, the decision to undergo periodic prostate-specific antigen (PSA)-based screening for prostate cancer should be an individual one. Before deciding whether to be screened, men should have an opportunity to discuss the potential benefits and harms of screening with their clinician and to incorporate their values and preferences in the decision. Screening offers a small potential benefit of reducing the chance of death from prostate cancer in some men. However, many men will experience potential harms of screening, including false-positive results that require additional testing and possible prostate biopsy; overdiagnosis and overtreatment; and treatment complications, such as incontinence and erectile dysfunction. In determining whether this service is appropriate in individual cases, patients and clinicians should consider the balance of benefits and harms on the basis of family history, race/ethnicity, comorbid medical conditions, patient values about the benefits and harms of screening and treatment-specific outcomes, and other health needs. Clinicians should not screen men who do not express a preference for screening.	C
Men 70 years and older	The USPSTF recommends against PSA-based screening for prostate cancer in men 70 years and older.	D

Melanoma

Individuals at high risk should be counseled about:

- having a periodic full body skin examination
- self-skin examination regularly and notify their clinicians if moles change.

Individuals at high risk

- History suggesting a familial melanoma syndrome
- Multiple atypical nevi
- White men over 50 years,
- Individuals with a history of significant sunburn, or multiple moles

For patients without identified increased risk, USPSTF recommends that clinicians remain vigilant for any suspicious lesions identified in the course of a routine or sick visit and make appropriate referrals for further evaluation of all such lesions.

OSTEOPOROSIS

Postmenopausal women <65 years with risk factors for osteoporosis. *(Grade B)*

Men with

- Clinical manifestation of low bone mass
- History of low trauma fracture
- Risk factors for fracture:
  - Androgen deprivation therapy for prostate cancer
  - Hypogonadism
  - Primary hyperparathyroidism
  - Intestinal disorders.

All women ≥65 years.*(Grade B)*

Prevention in pregnancy

- All women who are planning or capable of pregnancy recommended to take a daily supplement containing 0.4-0.8 mg (400 to 800 µg) of folic acid.
- Screening for asymptomatic bacteriuria with urine culture at 12-16 wk or at the first prenatal visit, if later.
- Screening for HBV infection in pregnant women at their first prenatal visit.
- Screening for HIV.
- Interventions during pregnancy and after birth to support breastfeeding.
- Screening for gestational DM in asymptomatic pregnant women after 24 weeks of gestation.

- Screening for preeclampsia with BP measurements throughout pregnancy.
- The use of low-dose aspirin (81 mg/d) as preventive medication after 12 weeks of gestation in women who are at high risk for preeclampsia.
- Rh (D) blood typing and antibody testing for all pregnant women
  - *During their first visit for pregnancy-related care.*
  - *Repeated Rh (D) antibody testing for all unsensitized Rh (D)-negative women at 24 to 28 weeks' gestation, unless the biological father is known to be Rh (D)-negative.*
- Asking about tobacco use ,advising and providing behavioral interventions for cessation.
- Screening all pregnant women for syphilis infection.
- Provide or refer pregnant and postpartum persons who are at increased risk of perinatal depression to counseling interventions.

Immunization

General rules:

- Preterm infants
- Administration of IG or blood products
- Administration of prophylactic analgesic/antipyretic
- Simultaneous administration of vaccines
- Contraindications to vaccination

Adult immunization

Pediatric immunization

Preterm infants	The routine immunization schedule, dose, intervals, and contraindications/precautions are the same for preterm infants and infants born >37 weeks, except for HepB vaccine .
	For infants who weigh <2 kg at birth and are born to women who are HBsAg negative, the 1st dose of HepB vaccine is postponed until hospital discharge or 30 days of age, whichever is earlier.

Administration of IG or blood products

MMR and varicella vaccines should be postponed for several months (3-11 mo depending on the type and dose of the IG) after IG or blood products .

- IG and blood products contain antibodies, which can interfere with the vaccine response.

If IG or blood products must be given within 14 days after administration of MMR or varicella vaccine

- Another dose of the vaccine should be administered after the suggested interval.

If a vaccine and immune globulin preparation are administered at the same visit (eg, hepatitis B vaccine and hepatitis B IG; tetanus-containing vaccine and tetanus IG)

- Different limbs should be used for each injection

Antipyretics

It is recommended by WHO & CDC not to administer prophylactic antipyretic/analgesic agents at the time of or within 4 hours after immunization .

Rather it is suggested to use therapeutic antipyretic/analgesic agents (eg, acetaminophen, ibuprofen) for infants and children who develop fever or painful local or systemic reaction following immunizations.

Simultaneous Administration

MMR and varicella-containing vaccines can be administered on the same day.

If not administered on the same day, these vaccines should be separated by at least 28 days

Contraindications for vaccinations (CDC)

Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component.

For DTaP: Encephalopathy (e.g., coma, decreased level of consciousness, prolonged seizures), not attributable to another identifiable cause, within 7 days of administration of previous dose of DTP or DTaP.

For HBV: Hypersensitivity to yeast

For HiB: Age < 6 weeks

For live attenuated vaccines (MMR, Varicella, Zoster) :

Pregnancy

Known severe immunodeficiency

Family history of altered immunocompetence

For Rotavirus: History of intussusception, SCID (Severe Combined Immunodeficiency)

For LAIV:

Concomitant use of aspirin or aspirin-containing medication in children and adolescents

Persons who have taken influenza antiviral medications within the previous 48 hours

Precautions should be paid for patients with moderate to severe acute illness with or without fever.

ADULT IMMUNIZATION

The CDC recommendations for immunizations in adults :

Influenza vaccine annually for all adults (IIV, LAIV, RIV)

Td/Tdap :

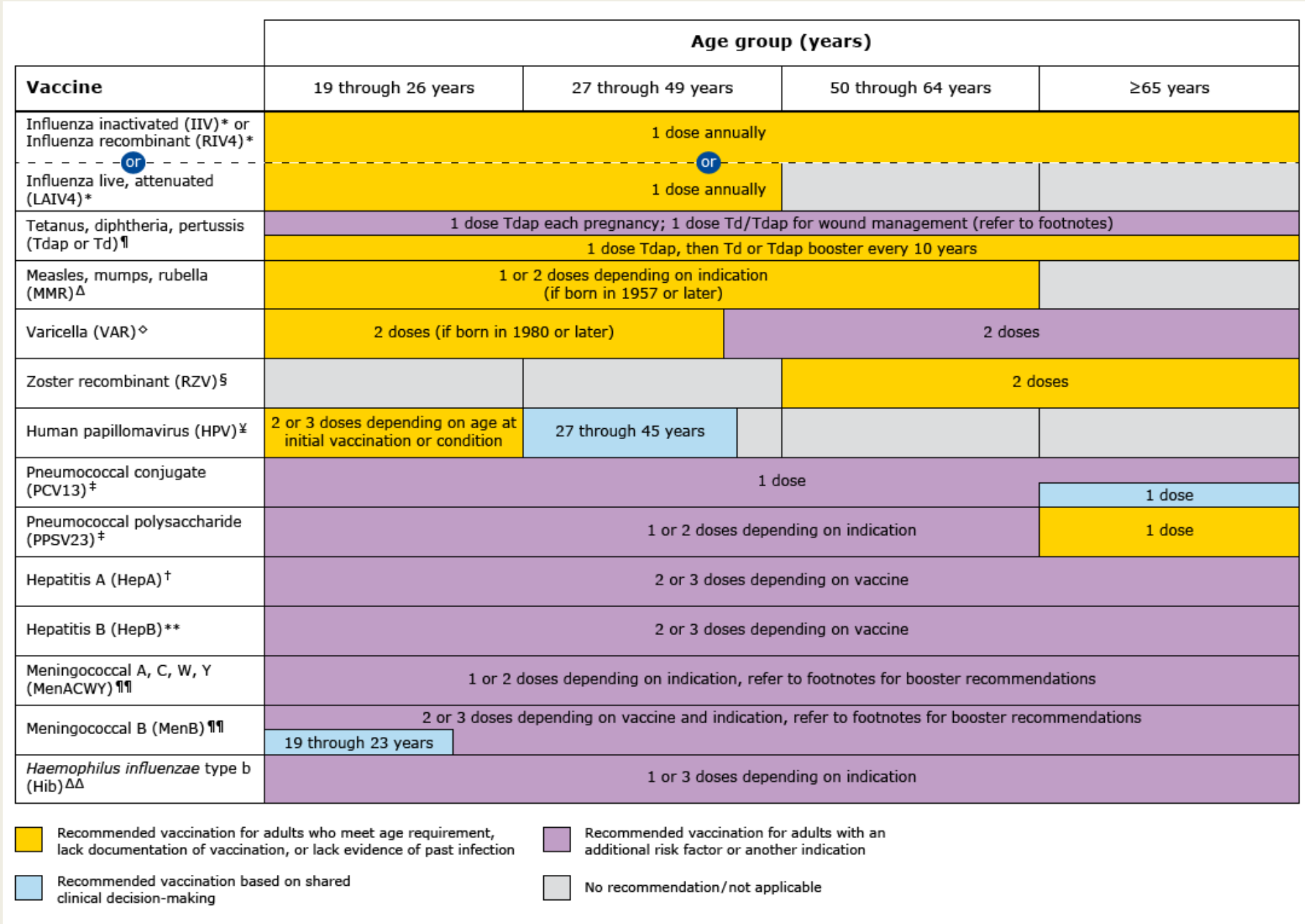
- A single dose of Tdap in place of Td for all adults aged 19 years and older who have not received Tdap previously .
- Adults should receive a Td booster every 10 years.

Varicella vaccination for healthy persons >13 years of age without evidence of immunity, 2 doses 4-8 wk apart.

HPV vaccines for females up to age 26 years who have not been previously vaccinated, for males up to age 21 who have not been previously vaccinated. 3 doses (0,1-2 mo, 6 mo).

- **Zoster vaccine :**
- Administer 2 doses of recombinant zoster vaccine (RZV) 2-6 months apart to adults aged **50 years** or older regardless of past episode of herpes zoster or receipt of zoster vaccine, live (ZVL).
- For adults aged 60 years or older, administer either RZV or ZVL (RZV is preferred).
- ZVL is a 1-dose live attenuated strain of VZV, hence C/I for pregnant women and adults with severe immunodeficiency.
- **Pneumococcal vaccines** : for all adults 19 - 64 years who have a condition that increases the risk of pneumococcal disease and for all adults ≥65 years.
- For >65 yr give PCV13 followed by at least 1 yr with the PPSV23.
- **Meningococcal vaccines**
  - *Military recruits*
  - *Microbiologists exposed to N. meningitidis*
  - *Individuals with functional or surgical asplenia*
  - *Individuals with complement deficiencies.*
  - *Travelers or persons living in areas of the world where meningococcal infection is hyperendemic ; vaccination is required within the past 3 years for all travelers to Mecca, Saudi Arabia, during the annual Hajj.*

Recommended adult immunization schedule, US. 2021



Vaccine	Age group (years)			
	19 through 26 years	27 through 49 years	50 through 64 years	≥65 years
Influenza inactivated (IIV)* or Influenza recombinant (RIV4)*	1 dose annually			
or	or			
Influenza live, attenuated (LAIV4)*	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)¶	1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (refer to footnotes)			
	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)Δ	1 or 2 doses depending on indication (if born in 1957 or later)			
Varicella (VAR)◇	2 doses (if born in 1980 or later)		2 doses	
Zoster recombinant (RZV)§			2 doses	
Human papillomavirus (HPV)¥	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal conjugate (PCV13)‡	1 dose			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, refer to footnotes for booster recommendations			
Meningococcal B (MenB)¶¶	2 or 3 doses depending on vaccine and indication, refer to footnotes for booster recommendations			
	19 through 23 years			
Haemophilus influenzae type b (Hib)ΔΔ	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

Recommended vaccination based on shared clinical decision-making

No recommendation/not applicable

Pediatric National Vaccination Program

Vaccine	Age group
BCG	At Birth
DTaPHiBHBV	2,3,4 months
DTwP	18 months
OPV	3,4, 9, 18 months; 6 years
IPV	2, 3 months
PCV	2, 4, 12 months
Hepatitis A	12, 18 months
Measles	9 months
MMR	12, 18 months
Rotavirus	2,3, 4 months
Td	6, 16 years
VitA	9, 18 months
Influenza	Children and elderly

Well-Child visits

- Neonatal Screening
- Dental caries prevention
- Vision screening
- Screening for obesity
- Screening for HTN
- Screening for dyslipidemia
- Screening for IDA
- Growth and Developmental assessment
- Immunization

Well-Child Visit, *cont'd*

Provide interventions during pregnancy and after birth to support breastfeeding. *(USPSTF, Grade B Recommendation)*

Provide interventions, including education or brief counseling, to prevent initiation of tobacco use among school-aged children and adolescents. *(USPSTF, Grade B Recommendation)*

Screen for obesity in children and adolescents 6 years and older and offer or refer them to comprehensive, intensive behavioral interventions to promote improvements in weight status. *(USPSTF, Grade B Recommendation)*

Screen adolescents for depression annually, beginning at age 12 years. *(USPSTF, Grade B Recommendation)*

Well-Child Visit, *cont'd*

Dental caries prevention (up to age 5 years)

- Application of fluoride varnish to the primary teeth of all infants and children starting at the age of primary tooth eruption in primary care practices.
- Prescription of oral fluoride supplementation starting at age 6 months for children whose water supply is fluoride deficient

Vision screening at least once in all children ages 3-5 years to detect amblyopia, strabismus, and defects in visual acuity.

Neonatal screening

Newborn screening (heel-prick test) for:

- Sickle cell disease.
- **Congenital hypothyroidism**
- **Phenylketonuria**
- **G6PD**
- Congenital Adrenal Hyperplasia.
- Cystic fibrosis

Newborn bilirubin screening (AAP)

Newborn hearing assessment by automated auditory brainstem responses (AABR) or otoacoustic emissions (OAE).

Newborn screening for critical congenital heart disease : using pulse oximetry (AAP, AHA, ACC)

The USPSTF recommends prophylactic ocular topical medication for all newborns to prevent gonococcal ophthalmia neonatorum.

Screening for HTN

Screen children without risk factors or conditions associated with HTN by measuring BP **annually** at health supervision visits, beginning at age 3 years.

For children with risk factors for hypertension, measure BP at all health encounters.

Risk factors for HTN in children can include:

- Birth at <32 weeks GA, SGA, LBW, umbilical artery catheterization
- Recurrent UTIs, renal disease or urologic malformation, F.Hx of congenital renal disease
- Solid organ or hematopoietic cell transplant, malignancy

Screening for IDA

For all children, test for ID at 9-12 months of age.

The AAP recommends performing risk assessment for ID annually during adolescence.

The CDC suggests screening all nonpregnant women every 5-10 years, starting in adolescence.

IDA in children:

- Low MCV and increased RDW.
- Low hemoglobin:
  - <11 g/dL in children 0.5 to <5 years of age
  - <11.5 g/dL in children 5 to <12 years.

IDA in adolescence:

- CBC :Hgb concentration < 11.0 g/dL, MCV <70, RDW >17, Plus
- Low serum ferritin (12 ng/mL)

Growth monitoring

Height and weight to screen for failure to thrive or overgrowth

Head Circumference to look for microcephaly or macrocephaly

Growth charts should be used for monitoring (WHO charts are preferred to CDC charts in the first 2 years)

Weight loss is normal after delivery, and the expected loss is 5-7 % of birth weight. Normal infants stop losing weight by 5 days after birth and typically regain their birth weight by 1-2 weeks of age.

Once breastfeeding is well-established, infants gain 15-40 g per day. (1st 3 months 20-30 g/day, 3-6 mo 15-21 g/day, 6-12 mo 10-13 g/day)

Developmental-Behavioral Screening

The AAP recommends that infants and young children undergo formal **developmental** screening at the following ages :

- 9 months : to evaluate the child's vision, hearing and motor skills e.g. By 9 months all children have to set alone without support.
- 18 months : to evaluate motor, communication, and language skills. E.g. 18 months is a cut-off point for referral for a child who isn't walking.
- 24 or 30 months : to evaluate motor, language, and cognitive skills.

Correction for prematurity (by subtracting the number of weeks or months the infant was premature from his or her chronologic age) until the child has a chronologic age of 24 months.

The AAP recommends **autism**-specific screening at 18 and 24 months.

	Social	Motor	Cognitive	Language
2 months	Begins to smile	Lifts head when on abdomen	Pays attention to faces, begins to follow moving objects with eyes	Coos Turns head towards sounds
4 months	Smiles spontaneously at people (social smile)	Head support, pushes down on legs, lifts head and chest when on abdomen, may roll over from tummy to back, brings hand to mouth	Follows moving object 180º, reaches for toys	Babbles
6 months	Laughs loudly, Begins to know if someone is stranger, likes to look to self in mirror	Rolls over (back to abdomen)	Brings things to mouth, brings things that are in reach	Makes vowel sounds
9 months	Stranger phobia	Sits alone without support Crawls, stands holding on, pulls to stand	Plays “peek-a-boo” Transfers things from hand to other Pincer grasp	Understands “no” Uses fingers to point at things Responds to own name
12 months	Shy or nervous with strangers Cries when mom or dad leaves	Pulls up to stand, walks holding on to furniture	Finds hidden things easily, drinks from cup, brushes hair, Puts things in a container, takes things out of a container	3 words Responds to simple command Waves “bye”
18 months	May have temper tantrums, plays simple pretend, such as feeding a doll	Walks alone Drinks from a cup Eats with a spoon	Scribbles on his own Can follow 1-step verbal commands without any gestures	20 words (at least 6) Points to show someone what he wants

	social	Motor	Cognitive	Language
2 years	Gets excited when with other children, Shows defiant behavior	Stands on tiptoe Kicks a ball Begins to run Climbs onto and down from furniture without help Walks up and down stairs holding on Throws ball overhand Makes or copies straight lines	Might use one hand more than the other, Follows two-step instructions	50-100 words/2-word sentence Knows names of familiar people and body parts
3 years	Separates easily from mom and dad, Dresses and undresses self, wants to play with other children or with toys	Climbs well Runs easily Pedals a tricycle (3-wheel bike) Walks up and down stairs, one foot on each step	Copies a circle with pencil or crayon Screws and unscrews jar lids or turns door handle, Builds towers of more than 6 blocks	3-word sentence Follows instructions with 2 or 3 steps, Says first name, age, and sex , Names a friend
4 years	Would rather play with other children than by himself Cooperates with other children	Hops and stands on one foot up to 2 seconds Catches a bounced ball most of the time	Names some colors and some numbers Draws a person with 2 to 4 body parts, Uses scissors	4-word sentence Tells stories Can say first and last name
5 years	Wants to be like friends,	Stands on one foot for 10 seconds or longer Hops; may be able to skip, Uses a fork and spoon and sometimes a table knife Can use the toilet on her own	Counts 10 or more things Can draw a person with at least 6 body parts, Copies a triangle and other geometric shapes, tell what's real and what's make-believe	Speaks very clearly Tells a simple story using full sentences

References

USPSTF A and B recommendations, updated 2021

Evidence-based approach to prevention, UpTodate 2018

Standard immunization for nonpregnant adults, UpTodate 2021

Preventive care in adults: recommendations, UpTodate 2018

2017 AAP Guidelines for Childhood Hypertension

Developmental Milestones, CDC