Pneumococcal Vaccines

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Pneumococcal Vaccines Work Group Chair
Advisory Committee on Immunization Practices
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Pneumococcal Vaccines Work Group

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Pneumococcal Vaccines Work Group

CDC Contributors

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- Doug Campos-Outcalt
- Rebecca Morgan

Serotypes contained in pneumococcal vaccines

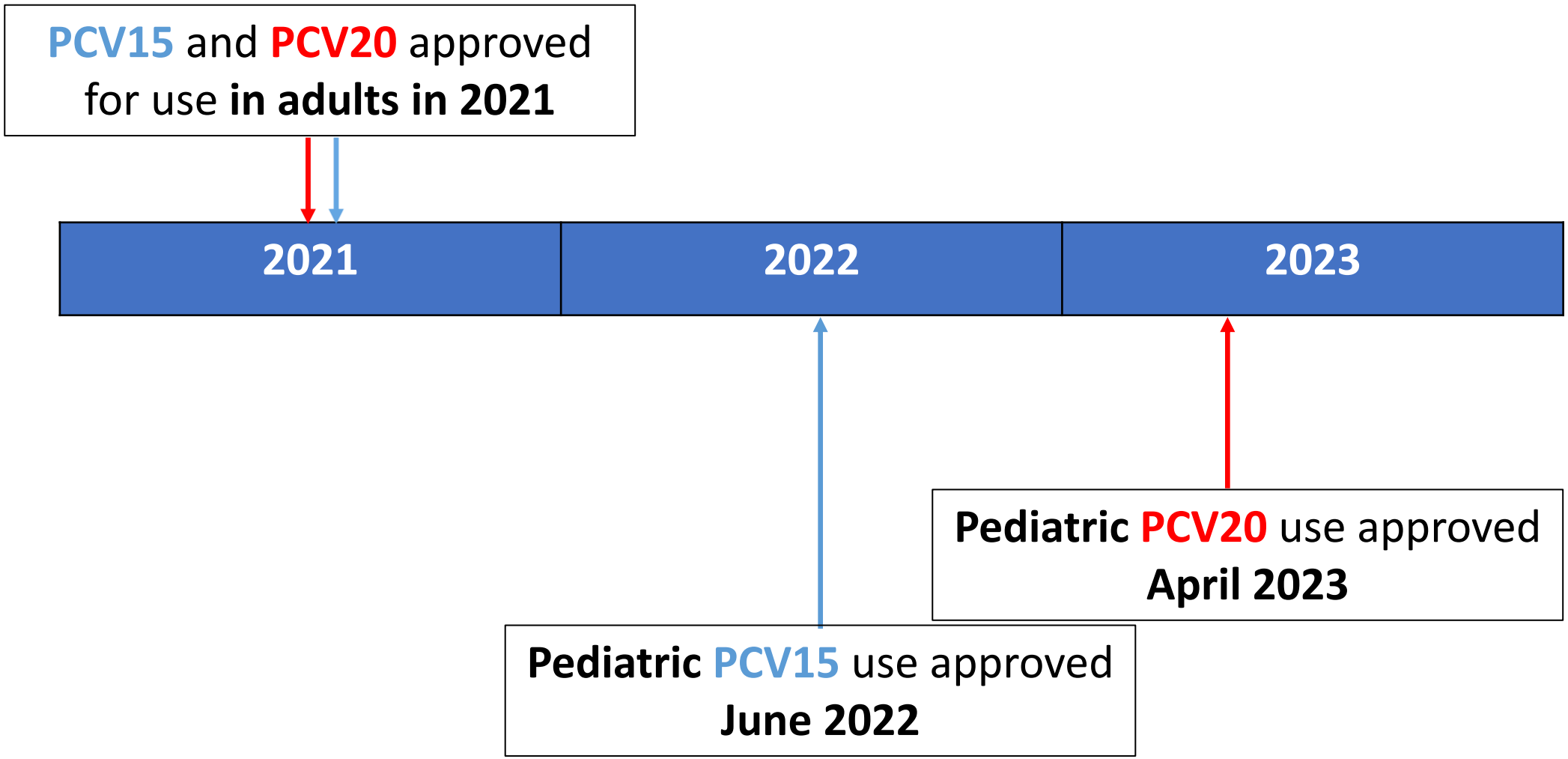
	1	3	4	5	6A	6B	7 F	9V	14	18 C	19 A	19 F	23 F	22 F	33 F	8	10 A	11 A	12 F	15 B	2	9N	17 F	20
PCV13	■	■	■	■	■	■	■	■	■	■	■	■	■											
PCV15	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■									
PCV20	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
PPSV23	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Pneumococcal conjugate vaccines (PCVs): PCV13, PCV15, PCV20

Pneumococcal polysaccharide vaccine (PPSV): PPSV23

- **PCV15 non-PCV13**: serotypes **22F and 33F**
- **PCV20 non-PCV15**: serotypes **8, 10A, 11A, 12F, and 15B**
- **PPSV23 non-PCV20**: serotypes **2, 9N, 17F, and 20**

Extended indication for PCV20 use among children approved on April 27, 2023

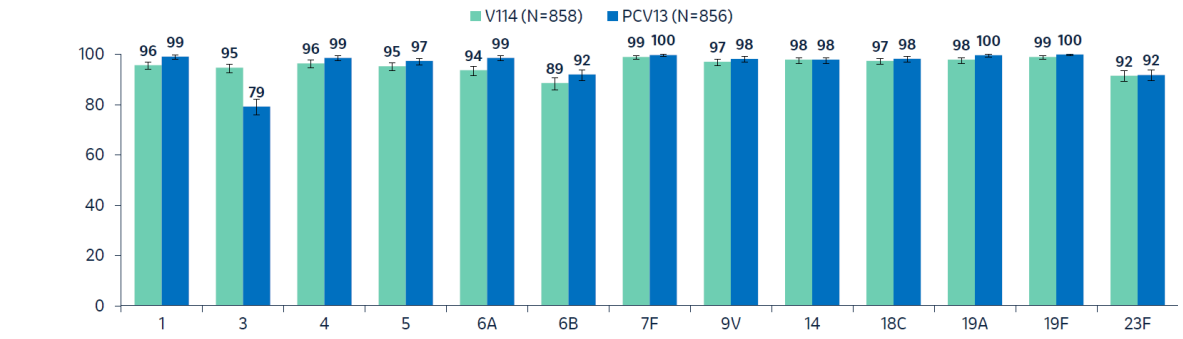


Both PCV15 and PCV20 were approved based on safety and immunogenicity data compared with PCV13

- **No direct PCV15 vs PCV20 comparison**
- **Unknown clinical implications:**
  - Numerically lower antibody responses vs PCV13
  - Numerically higher antibody response against serotype 3 in PCV15 vs PCV13

V114-029: Pivotal, 3+1

PD3: V114 is **noninferior** to PCV13 for all 13 **shared** serotypes based on the proportion of **responders** (IgG ≥0.35 µg/mL)



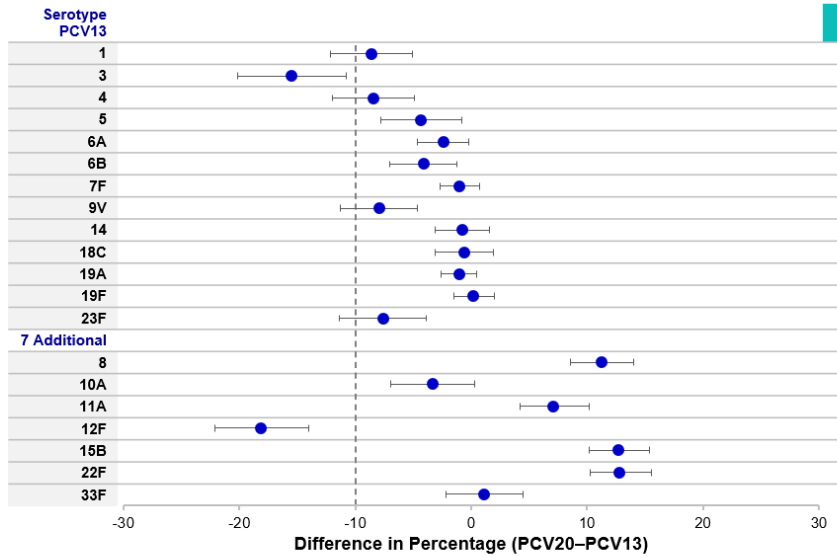
	1	3	4	5	6A	6B	7F	9V	14	18C	19A	19F	23F
Percentage point difference (V114-PCV13)	−3.4 (**−5.2**, −1.8)	15.6 (**12.1**, 19.2)	-2.2 (**-4.0**, -0.6)	-2.1 (**-4.2**, -0.2)	-4.9 (**-7.1**, -3.0)	-3.4 (**-6.6**, -0.3)	-0.8 (**-1.9**, -0.1)	-1.0 (**-2.8**, 0.6)	-0.0 (**-1.6**, 1.6)	-0.9 (**-2.6**, 0.7)	-1.8 (**-3.2**, -0.8)	-1.0 (**-2.1**, -0.4)	-0.3 (**-3.2**, 2.7)
P-value (1-sided)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Noninferiority requires the lower bound of the 2-sided 95% CI for the difference in response rates (V114 - PCV13) to be >-10 percentage points (1-sided p-value <0.025).

Error bars indicate 95% CIs; CI=confidence interval, IgG=immunoglobulin G

Post Dose 3: Percentage with Predefined IgG Concentrations

14 Serotypes Met Noninferiority (Difference in %)



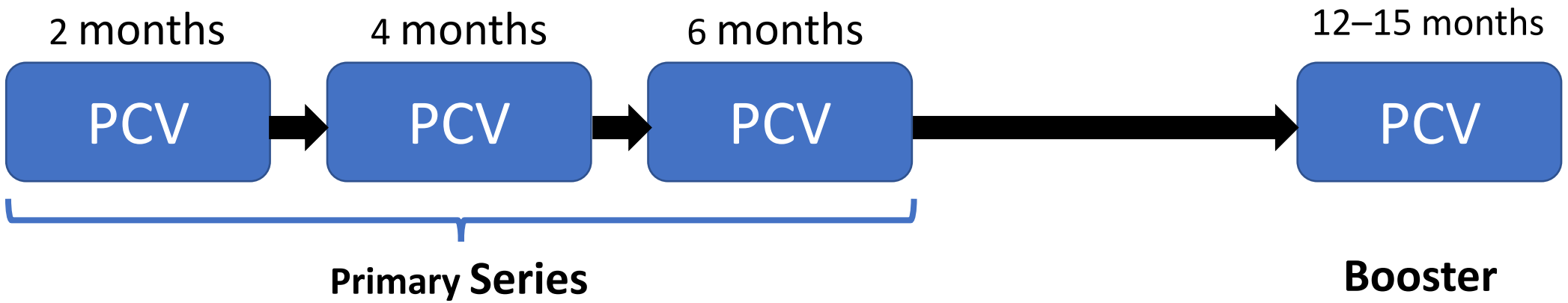
Serotype PCV13	PCV20 (%)	PCV13 (%)	Difference (%) (95% CI)
1	79.8	88.4	-8.6 (-12.1, -5.1)
3	52.1	67.6	-15.5 (-20.1, -10.8)
4	79.7	88.2	-8.4 (-12.0, -4.9)
5	82.5	86.8	-4.3 (-7.8, -0.8)
6A	93.5	95.9	-2.4 (-4.6, -0.2)
6B	88.3	92.4	-4.1 (-7.0, -1.2)
7F	96.6	97.6	-1.0 (-2.7, 0.7)
9V	81.9	89.8	-7.9 (-11.3, -4.6)
14	93.4	94.1	-0.8 (-3.1, 1.6)
18C	92.6	93.1	-0.6 (-3.1, 1.9)
19A	97.1	98.1	-1.0 (-2.6, 0.5)
19F	96.9	96.6	0.2 (-1.5, 2.0)
23F	77.9	85.5*	-7.6 (-11.4, -3.9)
7 Additional			
8	96.8	*85.5*	11.2 (8.6, 14.0)
10A	82.2	*85.5*	-3.3 (-6.9, 0.3)
11A	92.7	*85.5*	7.1 (4.2, 10.2)
12F	67.5	*85.5*	-18.1 (-22.1, -14.0)
15B	98.2	*85.5*	12.7 (10.2, 15.4)
22F	98.3	*85.5*	12.8 (10.3, 15.5)
33F	86.7	*85.5*	1.1 (-2.2, 4.5)

*The 7 additional serotypes are compared to the percentage for serotype 23F after Dose 3 (lowest in PCV13 group, excluding serotype 3).
Predefined IgG concentration – ≥0.35 µg/mL for all serotypes except ≥ 0.23 µg/mL, ≥0.10 µg/mL and ≥ 0.12 µg/mL for serotypes 5, 6B and 19A respectively.

February 2022, 2023 ACIP meeting presentations

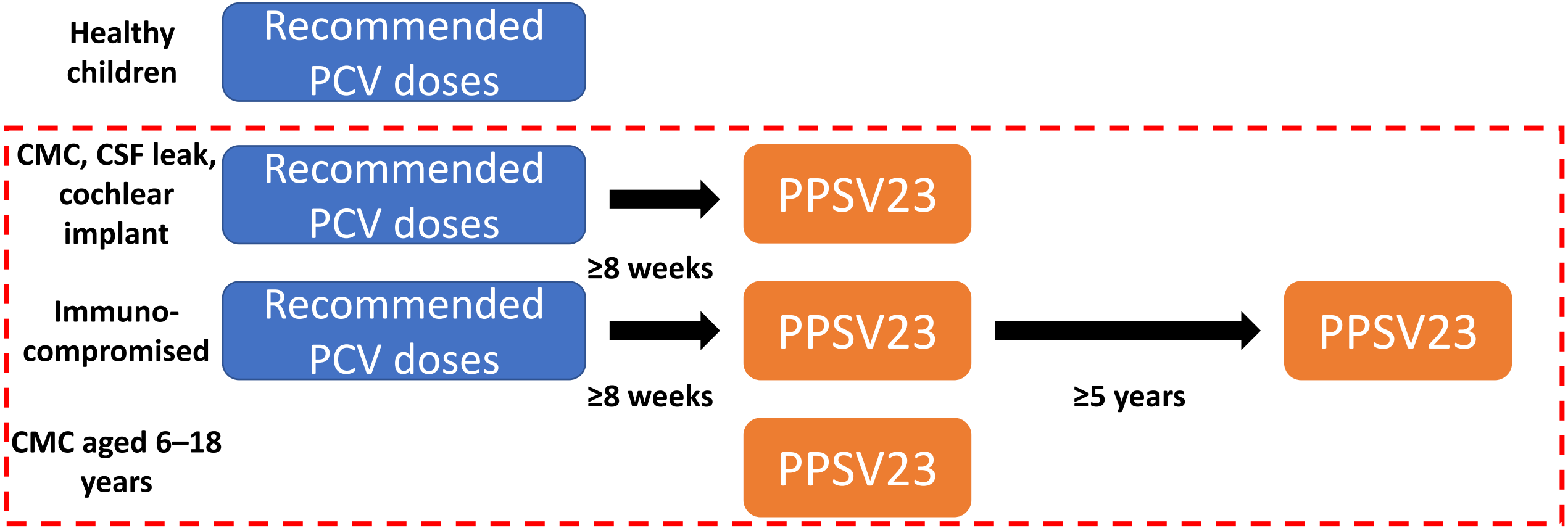
All children under age 2 years have the same pneumococcal vaccine recommendations

- **3 primary series and a booster=“3+1” schedule**



Currently, either **PCV13** or **PCV15** can be used

Children with certain underlying conditions are recommended to receive PPSV23 in addition to the recommended PCV doses



Note: Excludes catch-up vaccination schedules.
CMC=chronic medical conditions, including chronic heart disease, chronic lung disease, diabetes mellitus
CSF=cerebrospinal fluid

Use of 15-Valent Pneumococcal Conjugate Vaccine Among U.S. Children: Updated Recommendations of the Advisory Committee on Immunization Practices — United States, 2022 | MMWR (cdc.gov)

Current Risk-Based Pneumococcal Vaccine Recommendations

	Children	Adults
Alcoholism		
Chronic heart disease		
Chronic lung disease		
Chronic liver disease		
Cigarette smoking		
Diabetes mellitus		
Cerebrospinal fluid leak		
Cochlear implant		
Chronic renal failure or nephrotic syndrome		
Congenital or acquired asplenia, or splenic dysfunction		
Congenital or acquired immunodeficiency		
Diseases and conditions treated with immunosuppressive drugs or radiation therapy		
HIV infection		
Sickle cell disease or other hemoglobinopathies		
Solid organ transplant		

- **Children:** Including asthma **if treated with high-dose oral corticosteroid therapy.**
- **Adults:** Includes chronic obstructive pulmonary disease, emphysema, and **asthma.**

→ **Should we expand the indication for asthma in children?**

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	Children	Adults
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Chronic lung disease		
Chronic liver disease		
Cigarette smoking		
Diabetes mellitus		
Cerebrospinal fluid leak		
Cochlear implant		
Chronic renal failure or nephrotic syndrome		
Congenital or acquired asplenia, or splenic dysfunction		
Congenital or acquired immunodeficiency		
Diseases and conditions treated with immunosuppressive drugs or radiation therapy		
HIV infection		
Sickle cell disease or other hemoglobinopathies		
Solid organ transplant		

Should we add “chronic liver disease” as part of pediatric risk-based recommendation?

Current Risk-Based Pneumococcal Vaccine Recommendations

	Children	Adults
Alcoholism		
Chronic heart disease		
Chronic lung disease		
Chronic liver disease		
Cigarette smoking		
Diabetes mellitus		
Cerebrospinal fluid leak		
Cochlear implant		
Chronic renal failure or nephrotic syndrome		
Congenital or acquired asplenia, or splenic dysfunction		
Congenital or acquired immunodeficiency		
Diseases and conditions treated with immunosuppressive drugs or radiation therapy		
HIV infection		
Sickle cell disease or other hemoglobinopathies		
Solid organ transplant		

Should we expand the indication to those with stage 2–5 chronic kidney disease?

Policy questions considered by the Work Group

- Should **PCV20** be recommended as an option for pneumococcal conjugate vaccination **according to currently recommended dosing and schedules, for U.S. children aged <2 years**?

- Should **PCV20 without PPSV23** be recommended as an option for pneumococcal vaccination **for U.S. children aged 2–18 years with underlying medical conditions that increase the risk of pneumococcal disease?**

Today's Pneumococcal Vaccines session outline

Introduction	Dr. Katherine Poehling (ACIP, WG Chair)
Economic analysis and public health impact of PCV20 use in children	Dr. Charles Stoecker (Tulane University)
Comparison of cost-effectiveness analyses on PCV20 use in children	Dr. Ayabina Diepreye (CDC/NCIRD)
Summary of WG interpretation of EtR and policy options	Dr. Miwako Kobayashi (CDC/NCIRD)
VFC resolution	Dr. Jeanne Santoli (CDC/NCIRD)