Impact of PCV13 use among adults with and without indications for PCV13 use

Sana Shireen Ahmed, MD

W. Xing, A. Liu, M. Farley, W. Schaffner, A. Thomas, A. Reingold, L. Harrison, C. Holtzman, S. Zansky, N. Bennett, S. Petit, L. Miller, J. Bareta, B. Beall, and C. Whitney, T. Pilishvili

Advisory Committee on Immunization Practices

October 20, 2016

Current ACIP Recommendations for PCV13 and PPSV23 Use among Adults

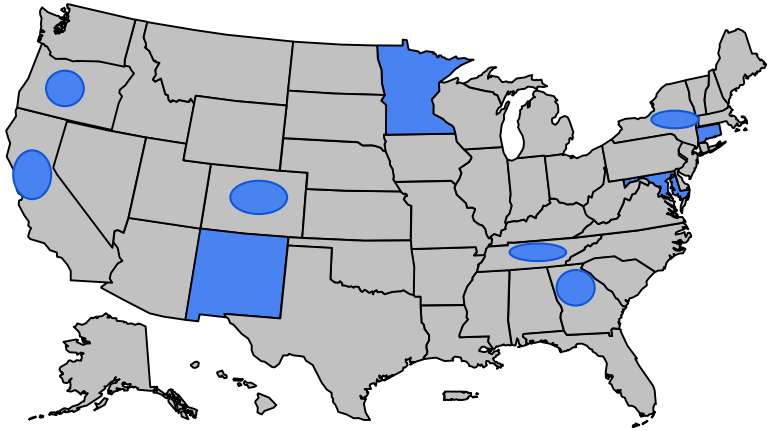
Vaccine	Age-based ≥65 years old	Medical condition-based 19–64 years old	
		Immunocompromising conditions	Immunocompetent chronic conditions
PCV13	√	√	
PPSV23	√	√	√

Objectives

- **Evaluate PCV13 impact on invasive pneumococcal disease (IPD) burden among adults aged 19–64 years with and without current indications for PCV13 use**

- **Estimate remaining vaccine preventable IPD burden among adults aged 19–64 years for these groups of adults in 2013–2014**

Data Sources

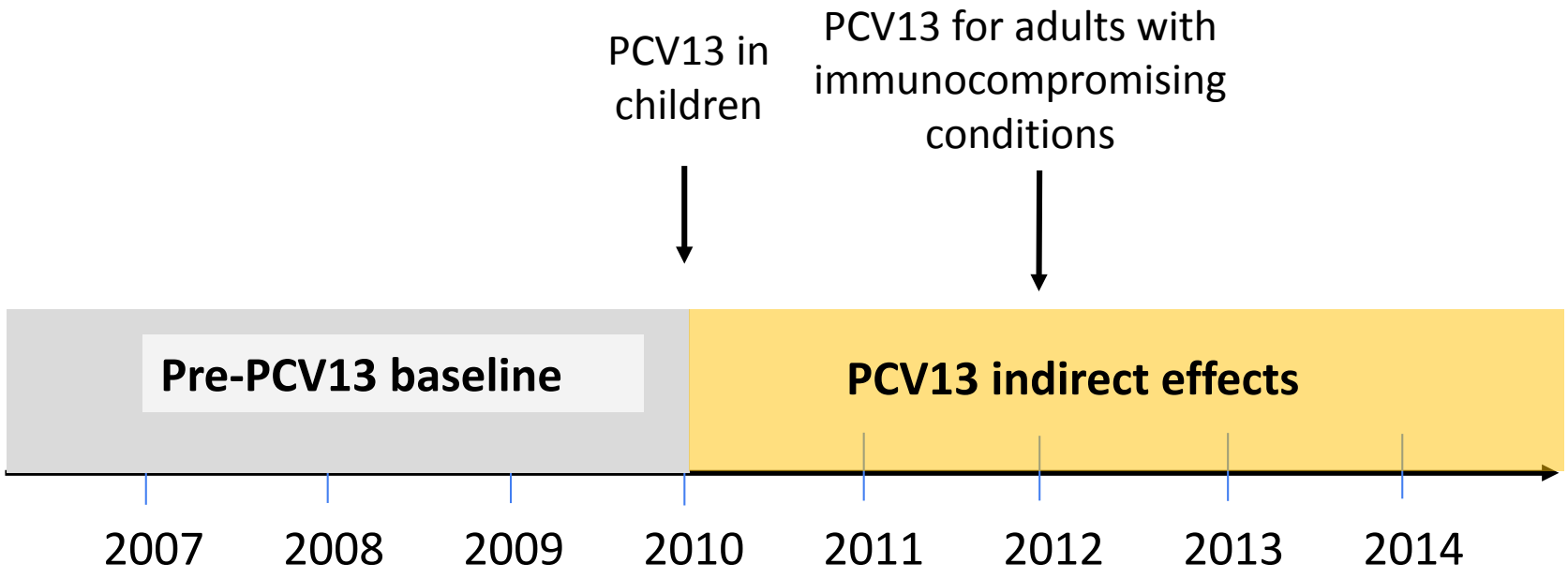


- **Active Bacterial Core Surveillance (ABCs):**
  - Active laboratory and population-based surveillance, 10 sites
  - Pneumococcus isolation from sterile site
- **National Health Interview Survey (NHIS):**
  - National Center for Health Statistics/CDC data collection program
  - Cross-sectional interview survey, continuous throughout year
  - Households and non-institutional groups
- **Included adults 19-64 years old with and without select chronic conditions**

Groups Based on Presence of Chronic Conditions

PPSV23-only indications	PCV13 indications (PCV13+PPSV23)	Healthy
Atherosclerotic disease Coronary heart disease Myocardial infarction Heart failure Cardiomyopathy	Leukemia Hodgkins lymphoma Other lymphoma Multiple myeloma Solid cancer	Do NOT have any conditions included in current analysis
COPD/emphysema Chronic Bronchitis Asthma		
Diabetes mellitus		
Cirrhosis/liver failure		
Current smoker		
Alcohol Abuse		

Methods: Defining Time Periods Used to Estimate PCV13 Effects in Adults 19–64 Years Old



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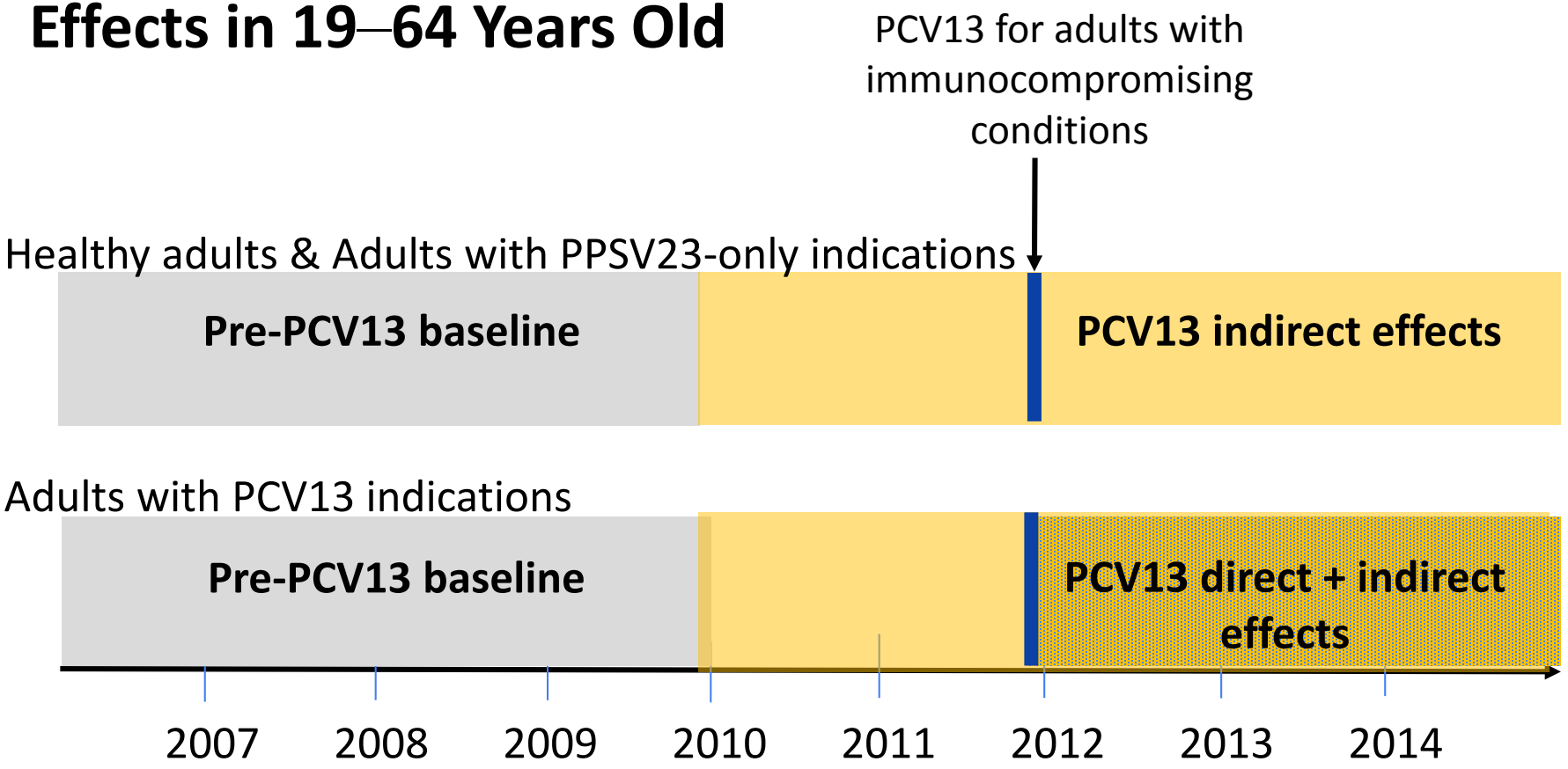

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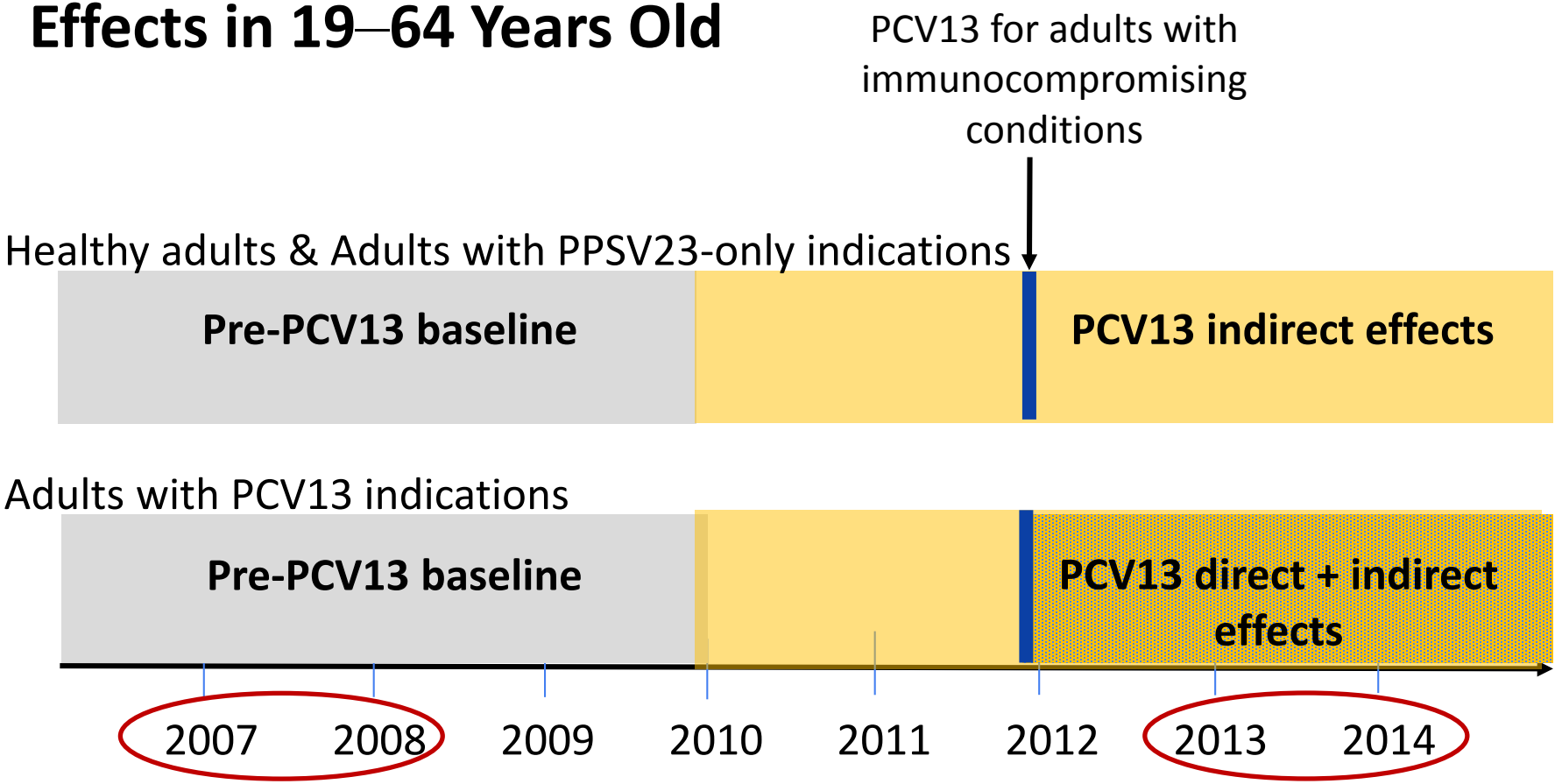


Methods

- **IPD incidence**

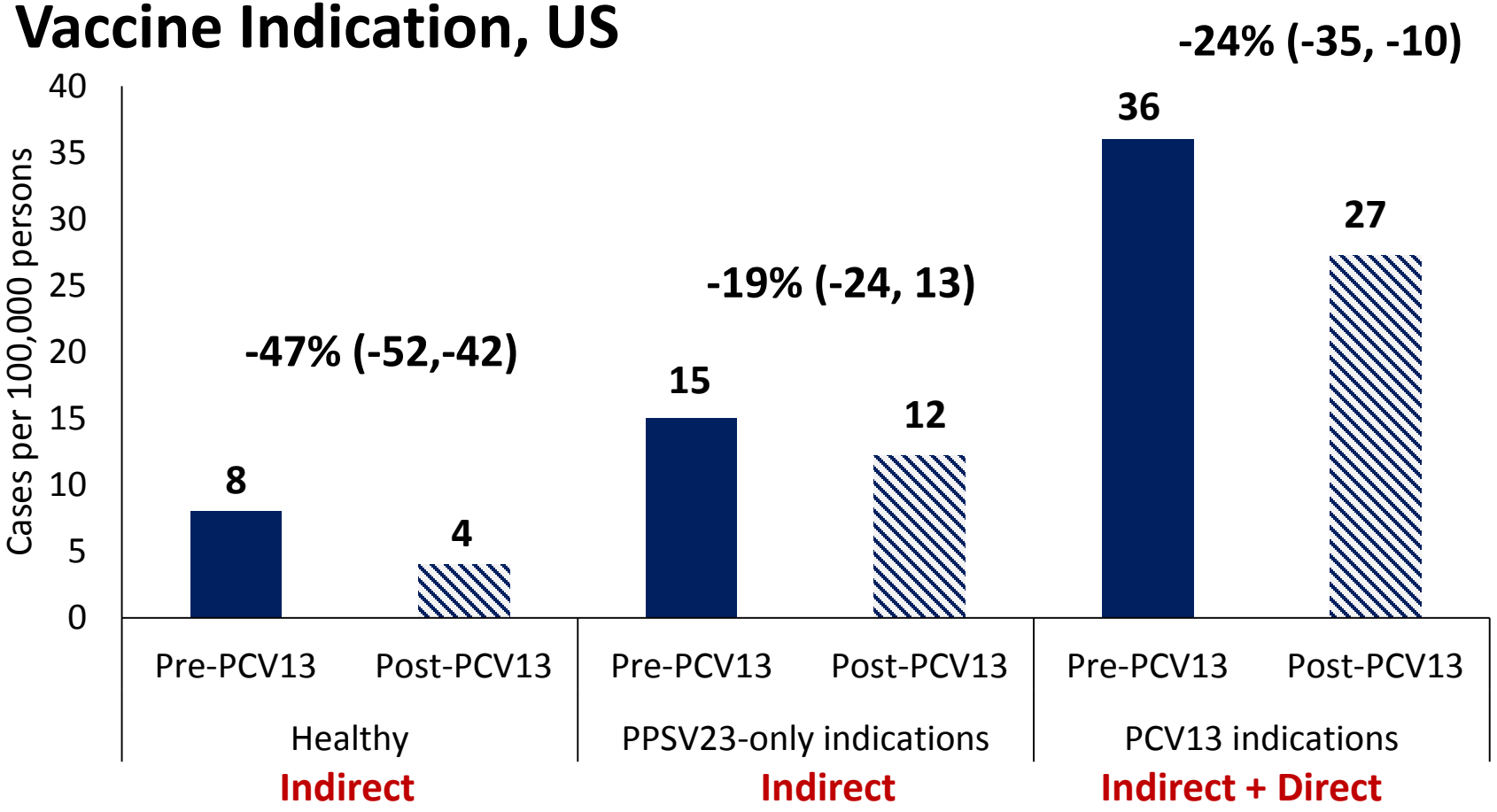
$$= \frac{\text{Estimated US IPD cases with underlying condition}}{\text{NHIS national population estimate with underlying condition}}$$

- **Percent change of overall and PCV13-type IPD incidence**

$$= \frac{\text{Post-PCV IPD Rate} - \text{Pre-PCV IPD Rate}}{\text{Pre-PCV Incidence Rate}} \times 100\%$$

- **Contribution of direct vs. indirect effects on overall impact**

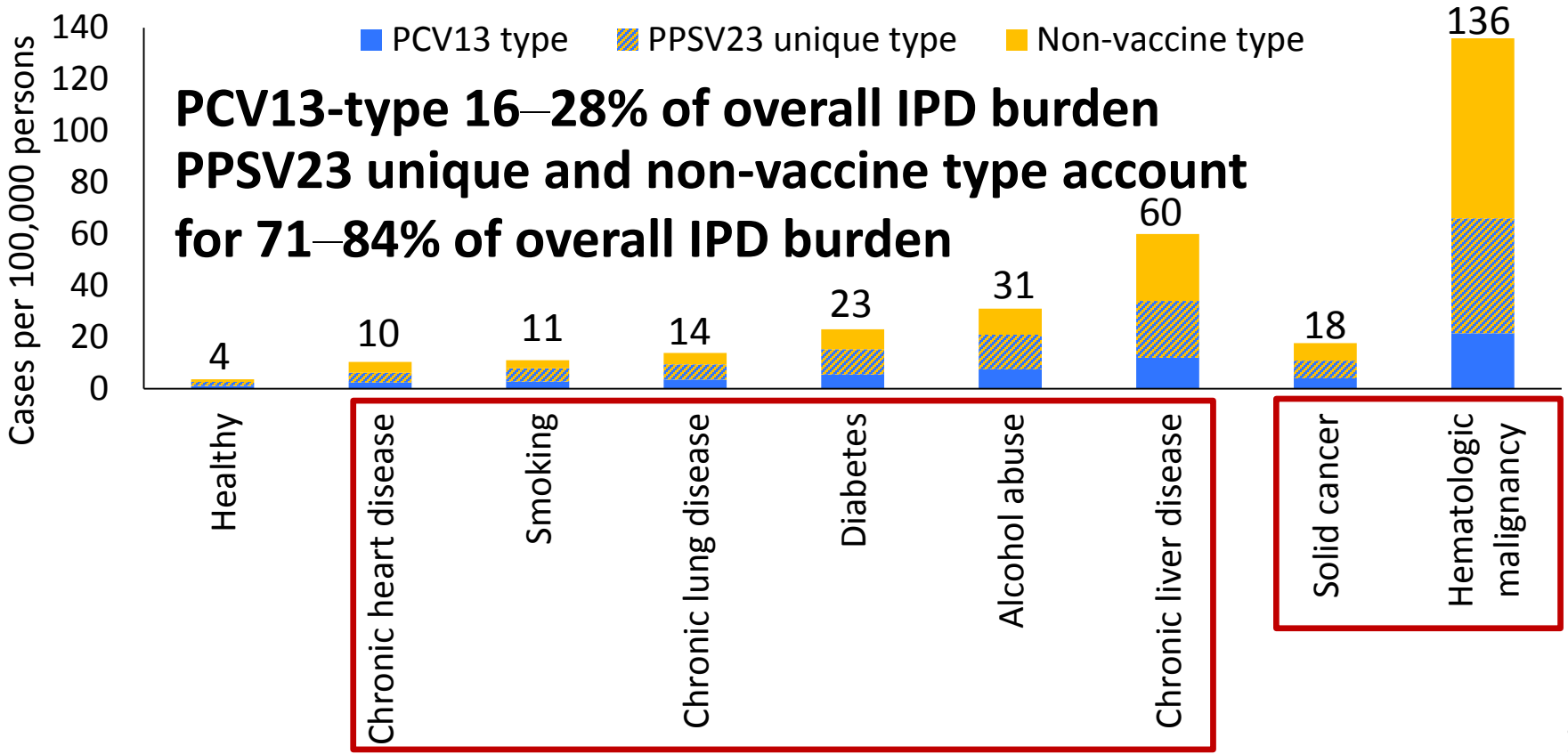
Changes in Overall IPD Pre- and Post-PCV13 Introduction, by Vaccine Indication, US



IPD Rates Pre- and Post-PCV13, among Adults 19–64 Years Old by Vaccine Indication, US

Condition	Serotype group	Incidence (2007–2008) (cases/100,000)		Incidence (2013–2014) (cases/100,000)	Percent change (95%CI)
Healthy	PCV13	4	-3	1	-73 (-77, -69)
Indirect	PPSV23 unique	2		2	-7 (-20, +8)
	Non -vaccine	2		1	-26 (-38, -11)
PPSV23-only indications	PCV13	7	-4	3	-57 (-61, -52)
Indirect	PPSV23 unique	4		6	+34 (+21, +49)
	Non-vaccine	3		4	+10 (-2, +24)
PCV13 indications	PCV13	13	-7	6	-57 (-68, -43)
Indirect +Direct	PPSV23 unique	10		10	0 (-23, +31)
	Non-vaccine	13		12	-9 (-28, +15)

Disease Burden among Adults 19–64 Years, by Serotype Group, Post-PCV13 Introduction, 2013–2014



Estimating Expected PCV13 Direct Versus Indirect Effects

Adults with hematologic malignancy	Estimated IPD cases in US	
	Pre-PCV13 2007-2008	Post-PCV13 2013-2014
Observed burden of PCV13-type disease	890	260

630 cases prevented through direct + indirect effects

Assumptions:

- Observed changes in IPD burden only influenced by PCV13 and not by PPSV23
- Additive effect of PCV13 direct and indirect effects

Estimation of PCV13 Direct Effects among Adults 19–64 years old

- **Assumptions:**
  - **5–7% PCV13 coverage through 2014[1,2]**
  - **74% PCV13 efficacy against IPD[3,4]**

Cases prevented from vaccine use =

Burden of PCV13-type disease × PCV13 efficacy × PCV13 coverage

[1] *Quintiles IMS, Anonymized Patient-Level Data (APLD), Oct 2016 (includes diagnostic and prescription utilization claims for PCV13)*
[2] *Pfizer, Inc. internal sales data for PCV13, Oct 2016*
[3] *French, N. et al. N Engl J Med 2010;362:812-22.*
[4] *Bonten, M. et al. N Engl J Med 2015; 372:1114-1125.*

Estimating Expected PCV13 Direct Versus Indirect Effects, 2013–2014

Adults with hematologic malignancy	
Baseline burden of PCV13-type disease	890
Vaccine efficacy	74%
Vaccine coverage	5–7%
Expected cases prevented from direct effects	33–46
Total (direct + indirect) effects	630
Expected cases prevented from indirect effects	584–597

93-95% cases prevented through indirect effects

Estimating Expected PCV13 Direct Versus Indirect Effects, 2013–2014

Adults with hematologic malignancy

Baseline burden of PCV13-type disease	890	
Vaccine efficacy	74%	74%
Vaccine coverage	5–7% →	20%
Expected cases prevented from direct effects	33–46	132
Total (direct + indirect) effects	630	630
Expected cases prevented from indirect effects	584–597	498

79% cases prevented through indirect effects

Limitations

- National estimates for IPD cases and population estimates for adults with select medical conditions were obtained using different methodology
- Groups with and without select conditions from ABCs and NHIS were subject to misclassification bias
- “Healthy” group included adults with certain conditions (i.e., HIV, CKD/dialysis)
- Medical condition groups were not mutually exclusive, interactions exist
- Our study does not evaluate impact on community-acquired pneumonia

Conclusions

- **PCV13 introduction among children in the US reduced IPD incidence among healthy adults and those with underlying conditions**
- **Similar reductions among those with and without PCV13 indications suggest that benefits observed to date are largely due to indirect PCV13 effects**
- **Adults with PCV13 and PPSV23 indications continue to experience higher IPD rates compared to healthy adults in the post-PCV13 period**
- **Most of remaining burden of IPD in adults is due to non-PCV13 serotypes**

Acknowledgments

Center for Disease Control and Prevention

National Center for Immunizations and Respiratory Diseases

Tamara Pilishvili
Nong Shang
Tom Taylor
Bernard Beall
Cynthia Whitney

Anran Liu
Wei Xing
Tracy Pondo

National Center for Health Statistics

Active Bacterial Core Surveillance Sites

Arthur Reingold
Monica Farley
William Schaffner
Ann Thomas
Lee Harrison
Corinne Holtzman
Shelley Zansky
Nancy Bennett
Susan Petit
Lisa Miller
Joseph Bareta

Thank you

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.