



IMMUNISATION  
COALITION

# MASTERCLASS: IMMUNISATION OF OLDER ADULTS

## Pneumococcal Disease.

## Paul Van Buynder



We were young and beautiful

Now we are just beautiful

Demotivation.us

# Disclosures:

- Over the last twelve months I have received honoraria or travel support from GSK, Moderna, MSD and Sanofi.
- I am a member of the Australian Influenza Vaccination Committee, a TGA body.
- I am a past president of the Immunisation Coalition and until recently a member of its Scientific Advisory Committee.
- I am a member of the Asia Pacific Alliance for the control of influenza and am a registered expert with the International Federation of Aging.

The content of my talks at this workshop represents my personal views and not those of any vaccine company

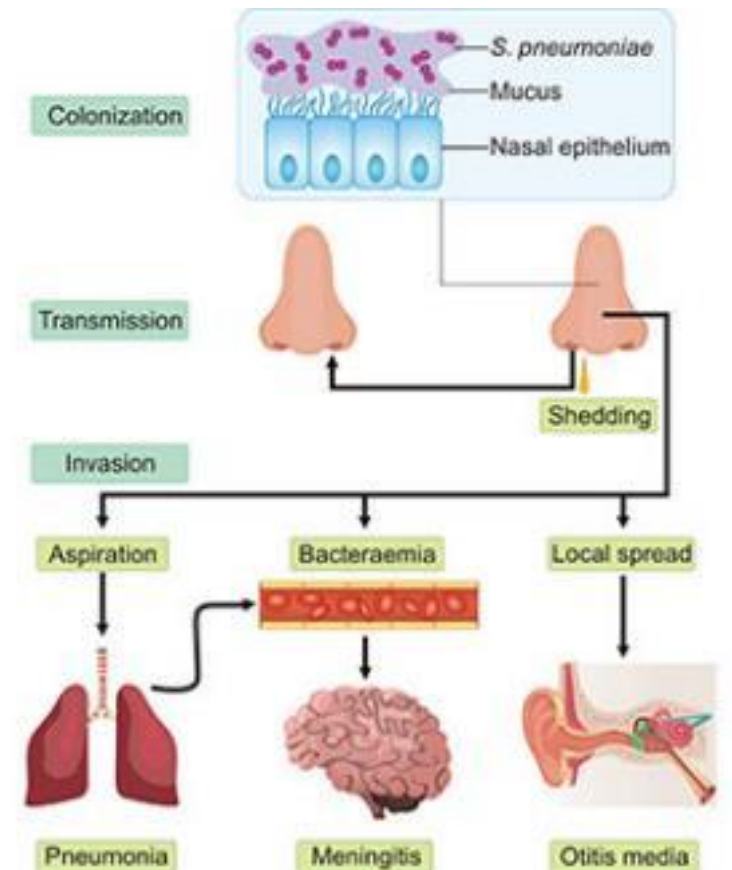
# Overview

- Principles important
  - Pneumococcal immunity is largely serotype specific
  - Serotype replacement occurs
  - Continually adding more serotypes can lessen effectiveness: downward drift
  - Vaccinating children protects older persons against those serotypes .. Takes about 6 years
  - Our coverage is poor because
    - Program too complicated
    - Program largely unfunded
    - HCP underwhelmed



# Invasive Pneumococcal Disease

- Progression from URT colonisation to invasive infection
- In humans, pneumococcal carriage is believed to be a prerequisite of invasive disease
- Can involve lungs (pneumonia), ears (otitis media), brain (meningitis), blood stream (bacteraemia), heart (endocarditis)
- Bacteria with different capsular polysaccharides vary considerably in their ability to cause invasive disease
- Disproportionate impact on very young and elderly  $\geq 65$  years (**>90% IPD cases and deaths occur in adults**)
- Invasive pneumococcal disease remains a leading cause of morbidity and mortality globally
- Risk of pneumococcal pneumonia is greatly enhanced (100-fold) by influenza A virus (IAV) co-infection, resulting in seasonal increases in lethal infections, the majority (70–85%) in elderly individuals



# Morbidity / Mortality (Australia)

- Streptococcus pneumoniae (pneumococcus) was responsible for:
  - 4,039** cases of invasive pneumococcal disease (IPD) in Australia in 2019.
  - 12,388** hospitalisations for CAP in Australia in 2018-19.
  - 1,128** deaths due to pneumococcal infection in 2018.
- However, not all cases of CAP are tested for pneumococcal infection, and therefore, the exact number of CAP cases attributable to pneumococcal disease is difficult to determine.

1. Australian Bureau of Statistics. (2018). Causes of death, Australia, 2018. Retrieved from <https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/latest-release>

2. Australian Government Department of Health. (2018). Pneumococcal disease. Retrieved from <https://www.health.gov.au/health-topics/pneumococcal-disease>

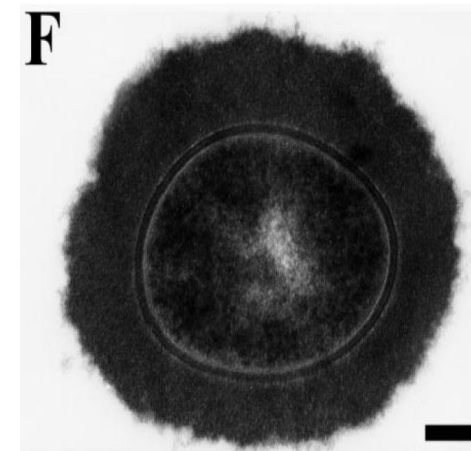
3. McEllistrem, M. C., et al. (2018). Reduction in vaccine-type pneumococcal pneumonia in adults aged  $\geq 65$  years associated with use of 13-valent pneumococcal conjugate vaccine. *Clinical Infectious Diseases*, 67(10), 1498-1504. doi: 10.1093/cid/ciy284

# Current policy

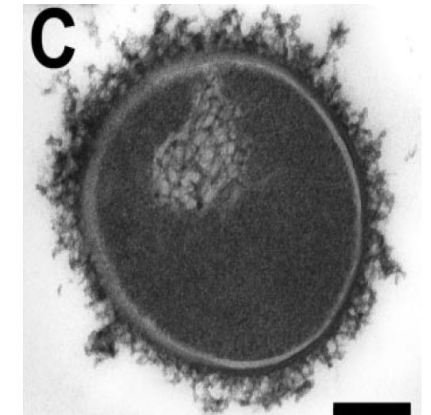
- Up to 18 years:
  - PCV20 for everyone, baby program funded
  - Standardises the program, removes confusion
  - Removes PCV13, PCV15, PPSV23
- Older persons
  - PCV13 +/- PPSV23
  - Review soon to report
  - Funded over 70 +very restricted risk groups

# Pneumococcal capsules are highly variable giving rise to multiple serotypes

- Pneumococci are grouped into many serotypes, on the basis of their chemically and serologically distinct capsular polysaccharides
- Pneumococci infectivity is enhanced by its **polysaccharide capsule**
- There are **more than 95 serotypes** identified and grouped into 46 serogroups based on immunological similarities
- ST3 capsular polysaccharide prevents entrapment in mucus during colonization, traps water to protect against desiccation, can serve as an energy reserve, and protects the bacterium against complement-mediated opsonization and immune cell phagocytosis.
- Serotype 3 resists antibody-mediated clearance despite its inclusion in the current vaccines formulation.



Serotype 3



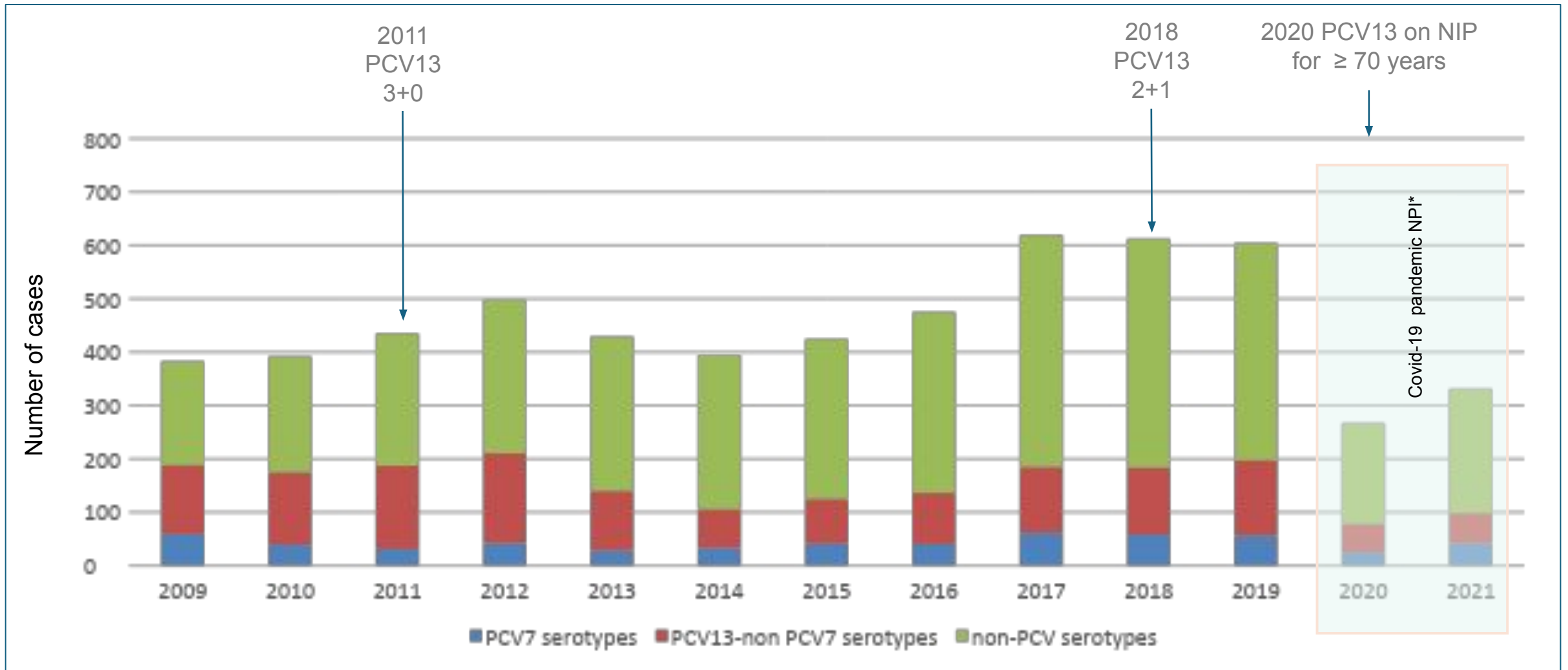
Serotype 19F

1 Principi N, Di Cara G, Bizzarri I, Isidori C, Borgia P, Mignini C, et al. Prevention of invasive pneumococcal disease: Problems emerged after some years of the 13-valent pneumococcal conjugate vaccine use. *Curr Infect Dis Rep* 2018;20(1):1. <https://doi.org/10.1007/s11908-018-0607-z>.

2 Namkoong H, Ishii M, Funatsu Y, Kimizuka Y, Yagi K, Asami T, et al. Theory and strategy for pneumococcal vaccines in the elderly. *Hum Vaccin Immunother* 2016;12(2):336–43. <https://doi.org/10.1080/21645515.2015.1075678>. <https://www.nfid.org/infectious-diseases/pneumococcal/>

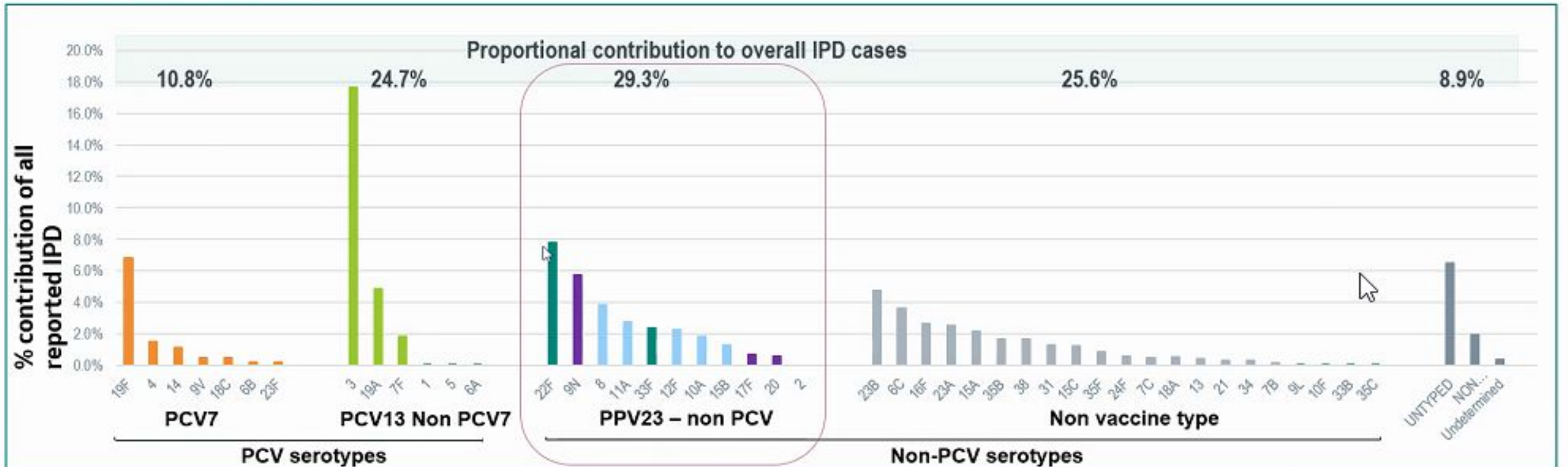
3. CDC. 2021. <http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/pneumo.pdf>. Accessed July 01, 2021. Luck, J et al, *Front Cell Infect Microbiol* 2020 10: 613287

# IPD cases and epidemiology in Australian adults $\geq 70$ years



\*NPI Non-Pharmaceutical Interventions related to Covid-19

# Serotype distribution of IPD cases, by associated vaccine type, Australia 2019



Non-typable: ST reported by reference lab at non-typable strain  
 Untyped: may be due to no isolate/isolate not referred for typing/isolate not viable

# Unmet Needs for Adults with Current Programs

- Serotypes for which vaccine is non-effective ST3
- Serotypes not in PCV13 – ST22F, 33F AMR concerns
- Other serotypes not in PCV13 in PCV20 – 8, 10A, 11A, 12F, 15B
- Non-vaccine serotypes
- But can't just keep adding (EMA review findings)

# Pneumococcal Vaccine Serotype Overview

## Previously/currently registered pneumococcal vaccines

PCV7*	4	6B	9V	14	18C	19F	23F																	
PCV13	4	6B	9V	14	18C	19F	23F	1	3	5	6A	7F	19A											
PPV23	4	6B	9V	14	18C	19F	23F	1	3	5		7F	19A	22F	33F	2	8	9N	10A	11A	12F	15B	17F	20
V114 PCV15	4	6B	9V	14	18C	19F	23F	1	3	5	6A	7F	19A	22F	33F									
PCV20	4	6B	9V	14	18C	19F	23F	1	3	5	6A	7F	19A	22F	33F		8		10A	11A	12F	15B		

\* PCV7 is no longer available in Australia

Downward drift is a challenge. Can't keep adding more valencies and maintain effect



Centers for Disease Control and Prevention  
National Center for Immunization and Respiratory Diseases

# Pneumococcal Vaccines

**June 2024, ACIP Meeting**

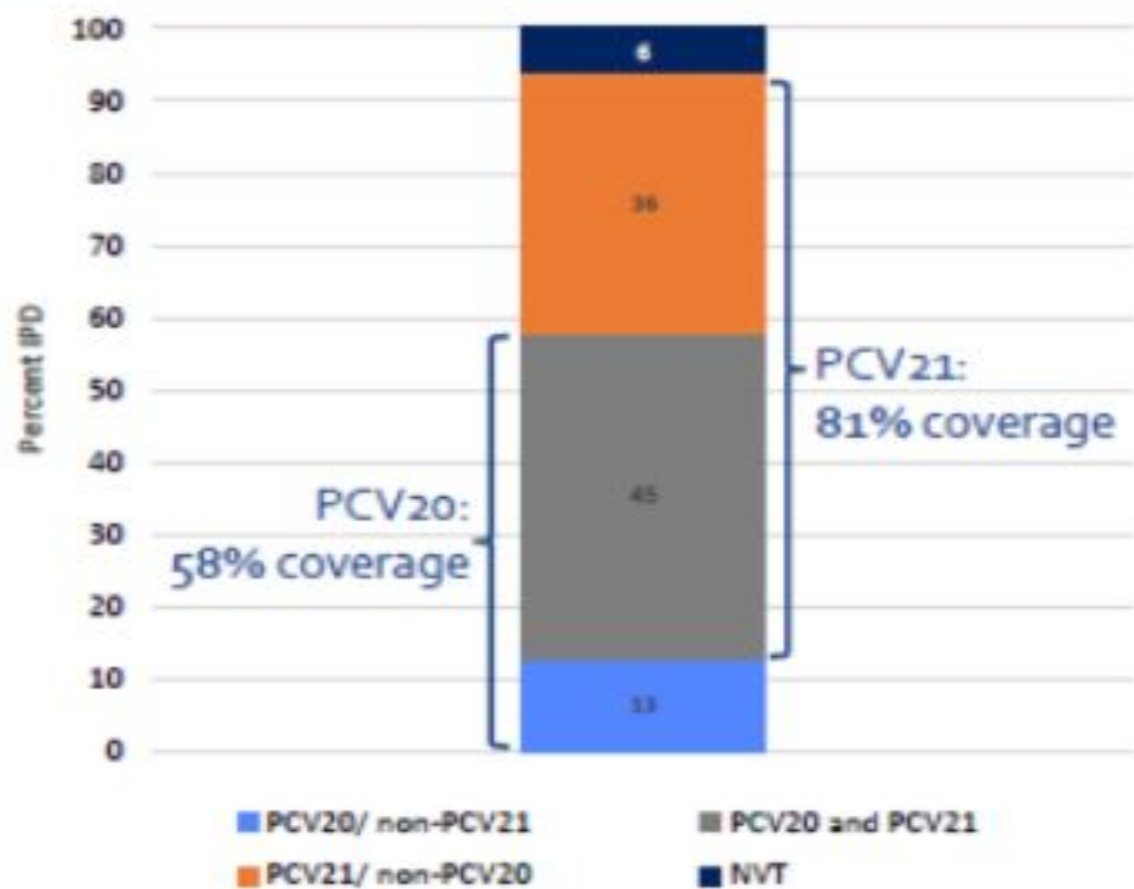
June 27, 2024

Pneumococcal Vaccine Work Group Chair

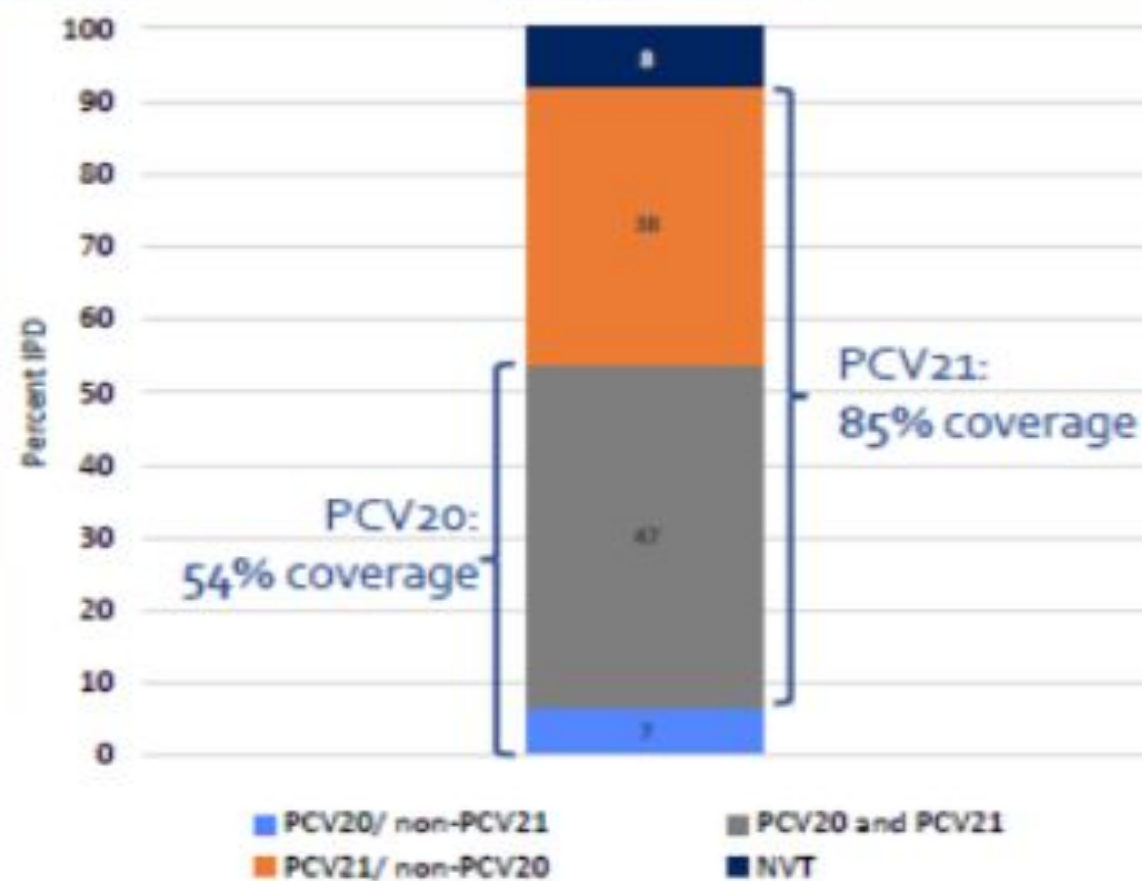
James Loehr, MD, FAAFP

# Proportion of IPD by vaccine-type among adults with a pneumococcal vaccine indication, 2018–2022

## 19-64 years old (with a risk-based indication)

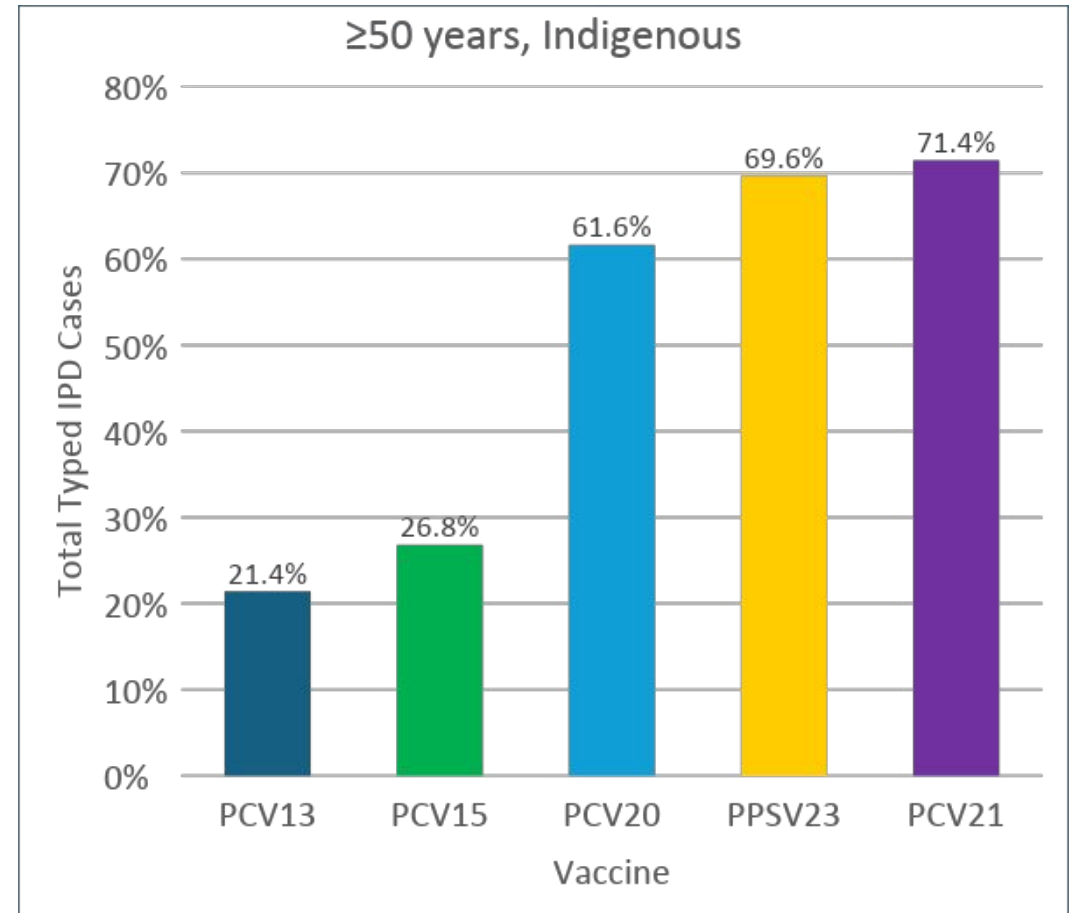
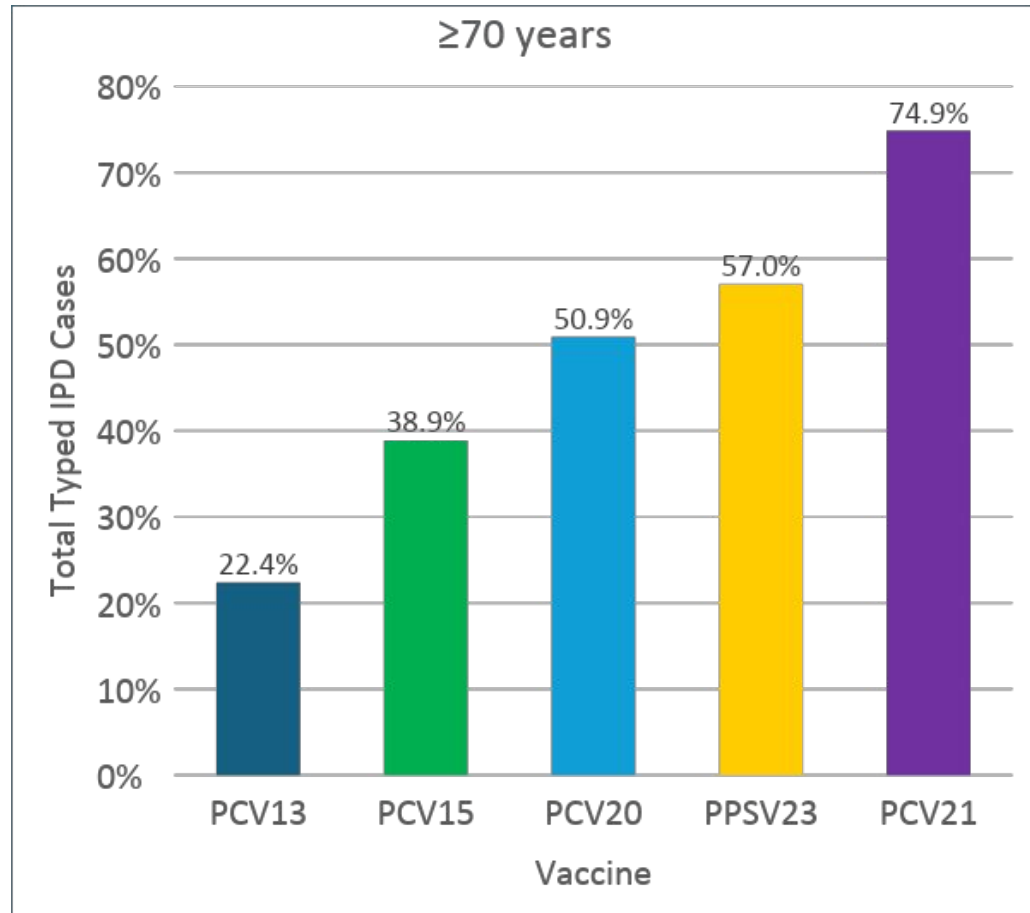


## ≥65 years old



PCV20/ non-PCV21 serotype: 1, 4, 5, 6B, 9V, 14, 18C, 19F, 23F, 15B  
PCV20/ in-PCV21 serotypes: 3, 6A, 7F, 19A, 22F, 33F, 8, 10A, 11A, 12F, +6C  
PCV21/ non-PCV20 serotypes: 9N, 17F, 20, 15A, 15C, 16F, 23A, 23B, 24F, 31, 35B

# Vaccine Coverage for IPD Serotypes in Australian Adults 2024, by NIP eligible cohort



# Herd Effects from PCV20 in Children

- ❑ **Apply serotype group-specific declines observed in PCV13 types (+6C, -3, -19F) in adults after PCV13 introduction in children**
- ❑ **Apply to additional types in PCV20**
- ❑ **Run versions of the model with and without these herd effects to assess importance**

## Remaining Share of Disease

Year	Base	Lower	Upper
1	0.755161	0.707483	0.813869
2	0.496227	0.459737	0.53535
3	0.339094	0.312705	0.372755
4	0.244074	0.220786	0.268572
5	0.187125	0.166702	0.206661
6	0.156599	0.138492	0.177142
7+	No further declines		

# Economic Assessment of PCV21 in U.S. Adults

Charles Stoecker  
Tulane University  
School of Public Health and Tropical Medicine

ACIP  
June 27, 2024

## Summary

- ❑ **Replacing PCV20 with PCV21 at age 65 increases QALYs with modest increases in cost**
  - Simulations range from \$4,000 to \$28,000 / QALY in several scenarios
  - Replacing PCV20 with PCV21 is dominated (lower QALYs and more costs) in a scenario where serotype 4 disease accounts for 30% of pneumococcal disease
- ❑ **Replacing PCV20 with PCV21 at diagnosis of IC or CMC before age 65 is cost-saving**
  - Cost is \$110,000/QALY in a scenario where serotype 4 disease accounts for 30%
  - At serotype 4 disease rates at 35% or above it results in decreased QALYs

**PBAC meeting November 2025**

# PCV21 (Capvaxive) recommendations

- The PBAC recommended that 21-valent pneumococcal conjugate vaccine (21vPCV, Capvaxive) be a designated vaccine for the purposes of the National Health Act 1953, for the prevention of pneumococcal disease in individuals with an at-risk condition aged  $\geq 18$  years, nonIndigenous adults aged  $\geq 65$  years and Aboriginal and Torres Strait Islander adults aged  $\geq 25$  years.
- The PBAC recommended reducing the age threshold for non-indigenous adults to 65 years (from 70 years), as proposed by the ATAGI
- The PBAC noted that adults with chronic liver disease (CLD) and chronic obstructive pulmonary disease (COPD) are at increased risk of pneumococcal disease. It therefore recommended expanding the eligibility of the adult MaR population to include people with CLD or COPD.

# SO:

- Policy today unchanged
  - PCV13 +/- PPSV23 for MaR and ATSI
- Awaiting tender mid-year and new policy **(non-competitive)**
- PCV21 is coming
- ST 4 not an issue here yet
- Many places PCV20 or PCV21 (or PCV15 + PPSV23 US)
  
- Watch for announcements
  
- ???