EE204

Budgetary Impact of New Recommendations for Pneumococcal Vaccination of US Adults

Ahuva Averin[1], Reiko Sato[2], Emily Kutrieb[1], Mark Atwood[1], Derek Weycker[1]

[1]Policy Analysis Inc. (PAI), Chestnut Hill, MA, USA; [2]Pfizer Inc, Collegeville, PA, USA

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For more information please contact: Ahuva Averin Policy Analysis Inc. E-mail: aaverin@pai2.com

INTRODUCTION

- The US Advisory Committee on Immunization Practices (ACIP) recently updated the adult pneumococcal immunization recommendations[1] to include:
  - Use of 20-valent pneumococcal conjugate vaccine (PCV20) alone; or
  - Sequentially administered 15-valent PCV (PCV15) followed by 23-valent pneumococcal polysaccharide vaccine (PCV15→PPSV23)
- The previous (2019) US ACIP adult pneumococcal immunization recommendations[2] included:
  - PPSV23 alone for immunocompetent adults aged ≥19 years with underlying chronic medical conditions
  - Either PPSV23 alone or sequentially administered 13-valent PCV (PCV13) followed by PPSV23 (PCV13→PPSV23) for immunocompetent adults aged ≥65 years, based on shared clinical decision-making
  - PCV13→PPSV23 for immunocompromised adults aged ≥19 years

OBJECTIVE

- To evaluate the budgetary impact of PCV20 alone and, alternatively, PCV15→PPSV23 compared with the 2019 ACIP recommendations

METHODS

Model Structure

- Analyses were conducted using a deterministic model **(Figure 1)**
- Model population was characterized by age (1-year increments) and risk profile (healthy [immunocompetent without chronic medical conditions], at-risk [immunocompetent with chronic medical conditions], and high-risk [immunocompromised])
- Persons in the model population were either vaccinated at model entry, vaccinated in subsequent years of modeling horizon, or never vaccinated
- Clinical and economic outcomes included:
  - Cases of invasive pneumococcal disease (IPD) and inpatient and outpatient all-cause nonbacteremic pneumonia (NBP)
  - Disease-attributable deaths
  - Disease-related medical care costs and vaccination costs

Model Parameters

- The model included a hypothetical population of 10 million persons comprising at-risk and high-risk adults aged 19–64 years (n=5.3M) and all adults aged 65–99 years (n=4.7M)
- Disease rates, case-fatality rates, general population mortality rates, serotype coverage, costs of medical care and vaccination, and vaccine effectiveness were based on published literature or publicly available data **(Tables 1–2; Figure 2)**
- Annual vaccine uptake and history of vaccination were based on Pfizer data on file:
  - Vaccine uptake was assumed to be the same under 2022 ACIP recommendations and 2019 ACIP recommendations (ie, no increase in overall uptake)
  - Adults with previous PCV13 were not eligible to receive PCV15 or PCV20

METHODS (continued)

Figure 1. Model Schematic

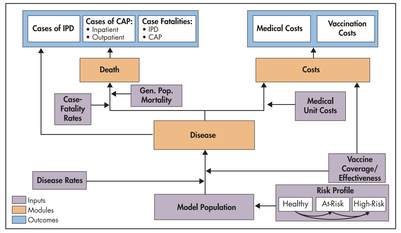
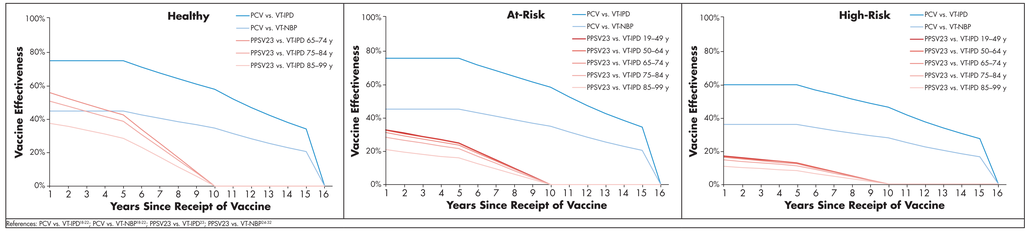


Figure 2. Vaccine Effectiveness



References: PCV vs. VT-IPD[3,22]; PCV vs. VT-NBP[3,22]; PPSV23 vs. VT-IPD[23]; PPSV23 vs. VT-NBP[24,25]

Table 1. Base Case Model Input Values

	Age/Risk Profile													
	19–49 years		50–64 years		65–74 years			75–84 years			≥85 years			
	At-Risk	High-Risk	At-Risk	High-Risk	Healthy	At-Risk	High-Risk	Healthy	At-Risk	High-Risk	Healthy	At-Risk	High-Risk	Reference
No. of adults (in thousands)	2,834	231	1,894	355	1,093	1,260	358	591	622	227	199	239	98	3,4
Annual disease incidence (per 100,000)														
IPD	8.1	16.2	24.0	37.3	8.2	25.9	35.1	13.9	33.3	36.8	33.1	58.6	46.4	5
All-cause inpatient NBP	207.0	701.0	429.0	1,226.0	191.0	941.0	2,124.0	957.0	2,745.0	3,992.0	957.0	2,745.0	3,992.0	6
All-cause outpatient NBP	676.1	1,266.2	851.3	1,594.4	523.0	1,579.5	2,144.1	805.8	2,434.1	3,303.8	1,121.5	3,388.0	4,598.1	7,8
Annual mortality/case-fatality (per 100)														
General population	0.2	0.3	0.9	1.2	1.3	1.9	2.6	3.0	4.6	6.1	9.5	14.3	19.1	9
IPD	7.8	10.4	11.8	12.5	7.4	13.9	12.9	10.6	13.6	10.6	19.4	23.7	20.0	5
All-cause inpatient NBP	0.8	2.6	2.5	5.4	3.1	4.6	6.8	6.8	8.4	9.0	8.2	8.3	11.0	10
All-cause outpatient NBP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Assumption
Medical care costs (per case)														
IPD	$62,526	$61,719	$62,526	$61,719	$30,900	$40,480	$32,363	$30,900	$40,480	$32,363	$30,900	$40,480	$32,363	8,12
All-cause inpatient NBP	$22,241	$25,215	$22,911	$26,076	$17,564	$20,450	$22,156	$17,723	$19,630	$24,929	$18,117	$20,543	$22,044	11,12
All-cause outpatient NBP	$814	$1,019	$814	$1,019	$662	$684	$776	$662	$684	$776	$662	$684	$776	8,12
Historic vaccination														
Previously vaccinated with PCV13, %	0.0	0.0	0.0	0.0	19.0	19.0	19.0	14.8	14.8	14.8	13.1	13.1	13.1	13,14
Years since receipt of PCV13	0	0	0	0	4	4	4	4	4	4	4	4	4	Assumption
Previously vaccinated with PPSV23, %	14.4	0.0	30.6	0.0	10.3	10.3	10.3	17.2	17.2	17.2	22.9	22.9	22.9	13,14
Years since receipt of PPSV23	7	0	7	0	4	4	4	14	14	14	24	24	24	Assumption
Previously vaccinated with PCV13→PPSV23, %	0.0	22.7	0.0	42.4	26.4	26.4	26.4	40.6	40.6	40.6	39.3	39.3	39.3	13,14
Years since receipt of PCV13→PPSV23	0	4	0	4	4	4	4	4	4	4	4	4	4	Assumption
Serotype coverage														
IPD														
PPSV23, %	74.6	74.6	70.3	70.3	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	5
PCV13, %	30.8	30.8	29.9	29.9	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	5
PCV15, %	44.1	44.1	42.7	42.7	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	5
PCV20, %	64.4	64.4	60.4	60.4	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	55.3	5
All-cause NBP														
PPSV23, %	8.7	8.7	9.9	9.9	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	15
PCV13, %	4.6	4.6	5.2	5.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	15
PCV15, %	6.3	6.3	6.2	6.2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	15
PCV20, %	8.0	8.0	8.8	8.8	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	15
Vaccination costs (per administration)														
PPSV23	$110													16
PCV13	$212													16
PCV15	$215													16
PCV20	$232													16
Administration	$14													17

Analysis

- Budgetary impact of 2022 (vs. 2019) ACIP recommendations was calculated as the difference in total costs over a 5-year period
- Benefits and costs were not discounted given the short modeling horizon

Table 2. Annual Vaccine Uptake[14]

	2019 ACIP Recommendations			2022 ACIP Recommendations*	
Age, y/Risk	PPSV23, %	PCV13 PPSV23**, %	No Vaccine, %	PCV20/PCV15 PPSV23**, %	No Vaccine, %
19–49					
At-risk	3.1	0.0	96.9	3.1	96.9
High-risk	0.0	7.2	92.8	7.2	92.8
50–64					
At-risk	6.9	0.0	93.1	6.9	93.1
High-risk	0.0	6.5	93.5	6.5	93.5
65–74					
Healthy	17.3	15.0	67.8	32.2	67.8
At-risk	18.3	15.9	65.8	34.2	65.8
High-risk	0.0	11.6	88.4	11.6	88.4
75–84					
Healthy	5.7	5.0	89.3	10.7	89.3
At-risk	8.2	7.1	84.7	15.3	84.7
High-risk	0.0	5.7	94.3	5.7	94.3
85–99					
Healthy	5.7	5.0	89.3	10.7	89.3
At-risk	8.2	7.1	84.7	15.3	84.7
High-risk	0.0	5.7	94.3	5.7	94.3

*The PCV20 and PCV15→PPSV23 strategies were compared with 2019 ACIP recommendations in 2 alternative analyses, but uptake of each respective strategy was assumed to be the same.
**100% of persons who received the first dose in a sequential vaccination strategy were assumed to receive the second dose.

RESULTS

PCV20 vs. 2019 ACIP Recommendations

- Compared with 2019 recommendations, use of PCV20 alone would result in fewer cases of pneumococcal disease, fewer disease-attributable deaths, and lower medical care costs **(Table 3)**
- Vaccination costs would increase, resulting in a budget impact of $61.0M overall or $0.52 per-member per-month (PMPM)

PCV15→PPSV23 vs. 2019 ACIP Recommendations

- Use of PCV15→PPSV23 would prevent more cases of pneumococcal disease and disease-attributable deaths and lower medical care costs compared with 2019 recommendations **(Table 4)**
- Vaccination costs would increase considerably (due to sequential vaccination); thus, the budget impact of PCV15→PPSV23 would be $397.7M overall or $3.42 PMPM

Table 3. Results of Analysis Considering Use of PCV20 In Lieu of 2019 ACIP Recommendations Among At-Risk and High-Risk Adults Aged 19–64 Years and All Adults Aged 65–99 Years

Outcome	2019 Recommendations	PCV20	Difference
Health outcomes			
No. of cases			
IPD	8,982	8,637	(345)
NBP			
Inpatient	441,567	439,611	(1,956)
Outpatient	599,563	596,729	(2,834)
No. of disease-related deaths	28,918	28,761	(156)
Costs (in millions)			
Medical care			
IPD	$425	$409	($16)
NBP			
Inpatient	$9,413.3	$9,372.8	($40.5)
Outpatient	$452.6	$450.5	($2.1)
Subtotal	$10,291.1	$10,232.1	($59.0)
Vaccination			
Vaccine			
PCV20	—	$674.7	$674.7
PPSV23	$207.3	—	($207.3)
PCV13→PPSV23	$332.5	—	($332.5)
Administration	$56.9	$42.0	($14.9)
Subtotal	$596.7	$716.7	$120.0
Total	$10,887.8	$10,948.8	$61.0
PMPM cost	$94.12	$94.64	$0.52

Table 4. Results of Analysis Considering Use of PCV15→PPSV23 In Lieu of 2019 ACIP Recommendations Among At-Risk and High-Risk Adults Aged 19–64 Years and All Adults Aged 65–99 Years

Outcome	2019 Recommendations	PCV15→ PPSV23	Difference
Health outcomes			
No. of cases			
IPD	8,982	8,792	(191)
NBP			
Inpatient	441,567	440,348	(1,219)
Outpatient	599,563	597,750	(1,813)
No. of disease-related deaths	28,918	28,826	(91)
Costs (in millions)			
Medical care			
IPD	$425	$416	($9)
NBP			
Inpatient	$9,413.3	$9,388.1	($25.2)
Outpatient	$452.6	$451.3	($1.3)
Subtotal	$10,291.1	$10,255.1	($36.0)
Vaccination			
Vaccine			
PPSV23	$207.3	—	($207.3)
PCV15→PPSV23	—	$946.4	$946.4
PCV13→PPSV23	$332.5	—	($332.5)
Administration	$56.9	$84.0	$27.1
Subtotal	$596.7	$1,030.4	$433.7
Total	$10,887.8	$11,285.5	$397.7
PMPM cost	$94.12	$97.54	$3.42

CONCLUSION

- **Both vaccination strategies included in the new 2022 ACIP adult pneumococcal immunization guidelines prevent additional cases of disease and disease-attributable deaths compared with 2019 ACIP recommendations**
- **PCV20 alone, however, prevents more disease (IPD: 154; inpatient NBP: 737; outpatient NBP: 1,021) and deaths (65) than the alternative strategy involving PCV15→PPSV23, which is costlier by $337M**

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DISCLOSURES

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