Closing vaccine gaps: analysis of adult vaccination rates and predictors of poor uptake

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Introduction

- According to the Center for American Progress, increasing vaccination rates among adults has the potential to save over $96 billion in total medical and societal costs
- Such savings may translate into cost avoidance and increased worker productivity for health plans, their members, employers and society
- Additional incentives may be realized by health plans as increased vaccination rates impact quality ratings and reimbursement
- Such efforts are especially important in an aging population, with increased susceptibility to various diseases, where vaccines have been found to reduce morbidity and mortality
- CDC recommends COVID-19, influenza, pneumococcal, respiratory syncytial virus (RSV), shingles starting at 50 years of age
- Despite benefits of these vaccines, studies have shown a steady decline in vaccination rates in this population since 2015

Table 1. CDC Recommended Vaccinations for Older Adults

Vaccine	Schedule
Influenza (Flu)	• Annually • 18 - 64 years old: Afluria Quadrivalent Jet injector • 65 years old and older: Fluzone High-Dose Quadrivalent inactivated influenza vaccine, Flublok Quadrivalent recombinant influenza vaccine, or Fluad Quadrivalent inactivated influenza vaccine.
Zoster recombinant (Shingrix)	• 50 years old and older: 2 doses (2-6 months apart) • 19 years old and immunocompromised: 2 doses (2-6 months apart)
COVID-19 (Moderna, Pfizer-BioNTech or Novavax)	• Aged 5 – 64 years: 1 age-appropriate updated COVID-19 vaccine • Aged 65 years and older: 2 doses of Moderna OR Pfizer-BioNTech (4 months apart) • Aged 65 years and older: Two-dose Novavax plus any single dose updated 2023–2024 COVID-19 vaccine
Respiratory syncytial virus (RSV) vaccine	• 75 years old and older: Single dose • ages 60-74 at increased virus of severe RSV: Single dose
Pneumococcal conjugate vaccines (PCV15 OR PCV20)	• Age 5 through 64 years old with certain risk conditions OR 65 years or older AND who never received a PCV: PCV15 OR PCV20 • 65 year and older who received PCV13 (at any age) AND PPSV23 (by 65 years old or older): PCV20 ONLY • Adults 65+ who have received PPSV23 but have NOT received PCV13, PCV15, or PCV20: PCV15 OR PCV20 (1 year later)
Pneumococcal polysaccharide vaccine (PPSV23)	• 19 years or older who previously receive PCV15: PPSV23 (one year later) • Previously received both PCV13 and PPSV23 but no PPSV23 was received at age 65 years or older: PCV20 or PPSV23

Purpose

- By analyzing claims data for pneumococcal, shingles, flu, COVID, and RSV vaccines, we aim to develop targeted educational text messaging to increase vaccination uptake
- Our goal is to establish baseline rates of vaccination status in adults ≥ 50 years and further breakdown the data by zip code, gender, comorbidities, and channel to identify predictors of poor uptake

Methods

- All adjudicated claims for medical and pharmacy from 6-1-21 through 6-30-24 were used to identify risk factors for patients ≥ 50 years of age
- Medical claims were matched based on CDC comorbidities of interest to identify high risk patients
- Demographic and clinical characteristics for continuous measures reported as means (SD) and/or median (IQR) with categorical measures reported as counts (%)
- Differences between groups for continuous measures evaluated with Student t-test with categorical measures evaluated with Chi-square test and logistical regression used to evaluate characteristics most influencing lower vaccine rate
- Minitab v20.2 used for all statistical analyses with two-tailed alpha=0.05

Results

Table 2. Demographic and clinical characteristics*

	No vaccine, n=27,774 (42.5%)	Any vaccine, n=37,602 (57.5%)	P value
Sex			
Female	13,652 (49.2)	21,373 (56.8)	<0.001
Male	14,122 (50.9)	16,229 (43.2)	
Age			
Mean (SD)	58.9 (6.4)	59.5 (5.8)	<0.001
Median (IQR)	58 (9)	60 (9)	
State			
KS	7,591 (27.3)	13,207 (35.1)	
MO	15,065 (54.2)	17,953 (47.7)	<0.001
Other	5,118 (18.4)	6,442 (17.1)	
Medical claim			
CVD	88 (0.3)	128 (0.3)	0.602
DM	6,984 (25.1)	6,778 (18)	<0.001
HTN	18,002 (64.8)	16,512 (43.9)	<0.001
Smoker	1,041 (3.7)	846 (2.2)	<0.001
BMI > 25 kg/m²	11,377 (41)	12,458 (33.1)	<0.001
Lung disease	2,347 (8.5)	2,240 (6)	<0.001
Asthma	2,078 (7.5)	2,817 (7.5)	0.962
CKD	1,306 (4.7)	1,425 (3.8)	<0.001
Imm Disorder	446 (1.6)	805 (2.1)	<0.001
Imm Rx	10 (0.04)	22 (0.06)	0.183
Sickle Cell	23 (0.08)	24 (0.06)	0.38
Neuro dev disorder	30 (0.1)	37 (0.1)	0.706
Active cancer	1,608 (5.8)	1,994 (5.3)	0.007

*percentages are rounded and may not equal 100%

Table 3. Vaccine category and utilization (n=65,376)

Vaccine Category	Count	Percent
Covid Only	3,509	5.37%
Flu and Covid	14,876	22.75%
Flu Only	17,087	26.14%
No Flu Or Covid	29,904	45.74%

Table 4. Number of Vaccines per member (n=65,376)

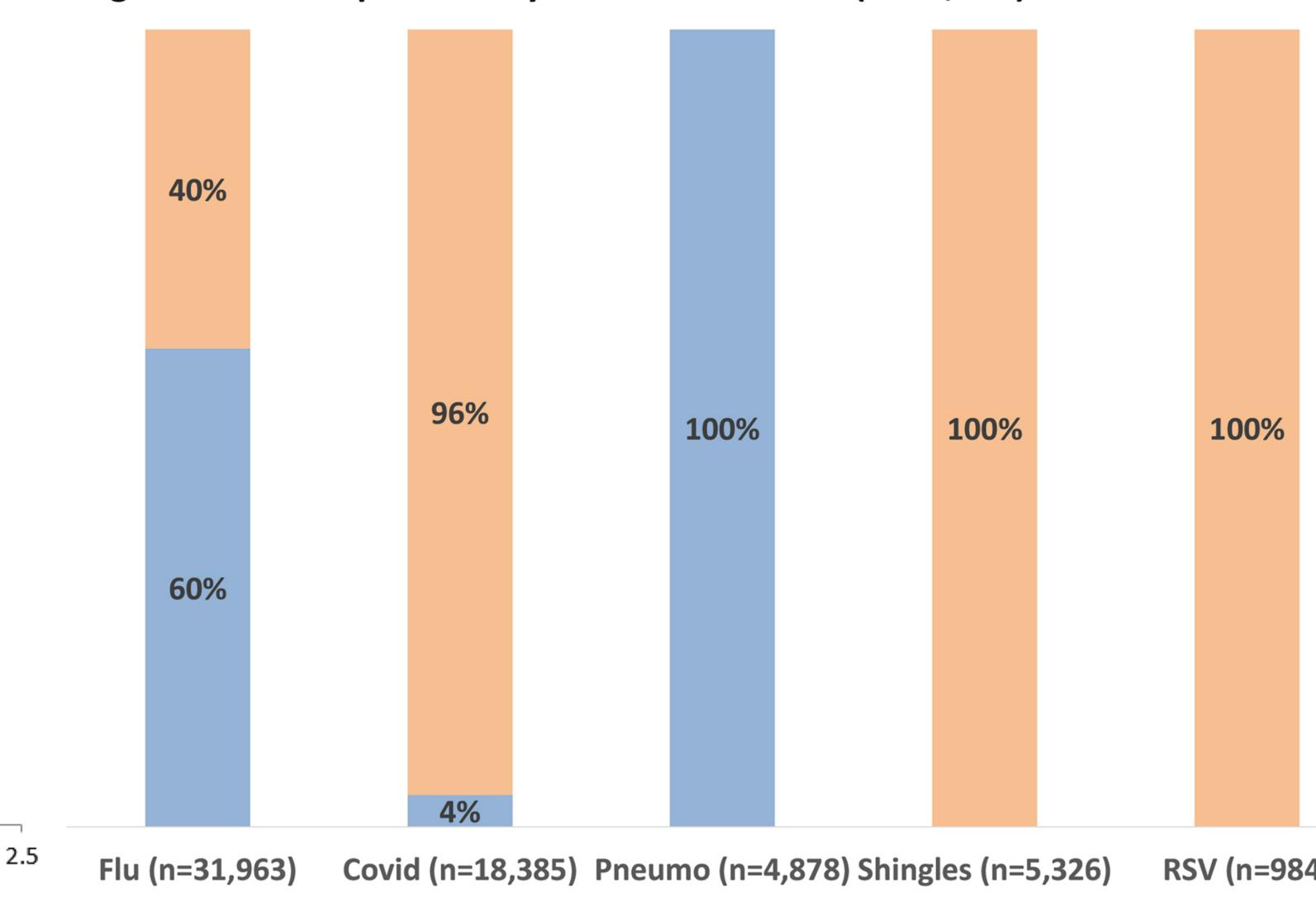| Vaccine Count	Count	Percent
0	27,774	42.48%
1	19,310	29.54%
2	13,446	20.57%
3	4,119	6.30%
4	658	1.01%
5	69	0.11%

Figure 1: Multivariate logistical regression: lower vaccine rate

Parameters (odds ratio and 95% CIs):
- Male (1.25, 1.21-1.29)
- MO vs KS (1.35, 1.3-1.4)
- Other vs KS (1.34, 1.28-1.41)
- Other vs MO (0.99, 0.95-1.04)
- Cancer (1.21, 1.13-1.3)
- CKD (0.89, 0.82-0.96)
- Smoker (1.59, 1.45-1.76)
- DM (1.26, 1.21-1.31)
- BMI >25 (1.37, 1.33-1.42)
- Chronic Lung Dx (1.36, 1.28-1.45)
- HTN (2.22, 2.15-2.29)
- 65-70 vs 50-64 y (0.81, 0.74-0.89)
- >70 vs 50-64 y (0.56, 0.5-0.61)
- >70 vs 65-70 y (0.69, 0.66-0.72)

(odds ratio and 95% CIs)

Odds ratio for level A relative to level B.

Figure 2. Service provider by vaccine utilization (n=37,602)

- Flu (n=31,963): Medical 60%, Pharmacy 40%
- Covid (n=18,385): Medical 4%, Pharmacy 96%
- Pneumo (n=4,878): Medical 100%
- Shingles (n=5,326): Pharmacy 100%
- RSV (n=984): Pharmacy 100%

Medical / Pharmacy

Discussion

- Understanding gaps can guide targeted interventions to improve vaccine coverage by addressing socioeconomic factors, healthcare access, education, and cultural beliefs
  - gender (male vs female)
  - geographic location (MO vs KS)
  - age (younger vs older)
  - regardless of risk factor conditions
- Flu vaccine seems a cornerstone to other vaccines, with pharmacy being a vaccine leader
- Identifying risk factors such as chronic diseases or mobility limitations allows for better prioritization of at-risk populations and collaboration with pharmacies, payers, and drug manufacturers to enhance care coordination
- Addressing these gaps may reduce hospitalizations, emergency visits, and healthcare costs, ultimately enhancing quality of life for older adults and strengthening the public health infrastructure

Next Steps

This project serves as a pilot study to describe at-risk individuals by age, race, comorbidities, and location for next steps.

- **Engage identified members over SMS texting** platform to gain insight onto behaviors, beliefs and preferences about vaccinations. This platform may improve member participation and provide needed education about vaccines as well as available resources in the community for vaccinations
- **Expand Pharmacy-Based Vaccination Programs**: Leverage the role of community pharmacists, who are often more accessible to elderly patients, to administer vaccines. Pharmacists can also play a role in educating patients about the importance of receiving age-appropriate vaccinations
- **Mobile Clinics and Home-Based Care**: Offer mobile vaccination units or home-based vaccination services to reach elderly individuals who have mobility issues or lack access to transportation. These services can be especially beneficial for homebound individuals or those in rural areas

Limitations

- The vaccine rollups are based on a custom list of NDCs/HCPCs for the in-scope categories we queried from both the medical and pharmacy data
- The risk factors are based on a custom list of ICD10 codes for each applicable category; this is pulled from the medical data
- We used primary diagnosis only for the risk factor data – we did not look at secondary or tertiary
- We are reliant on matching the deidentified member ID provided by BlueKC across the pharmacy and medical data to provide the member level summary of vaccine utilization and risk factors
- We excluded any unidentified genders and ages that appeared to be erroneous

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