PCR136

Consumer and Healthcare Provider Preferences for Adult Combination COVID-19 and Influenza Vaccines: Results from a Discrete Choice Study in France, Italy and Germany

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BACKGROUND

- Influenza and coronavirus 2019 (COVID-19) contribute substantially to global healthcare burden and vaccination is a critical public health intervention endorsed by the World Health Organization[1,2]
- In the European Union (EU), seasonal vaccination strategies include recommendations for higher influenza and COVID-19 vaccine coverage rates (VCRs) across high-risk groups, including older adults (aged ≥60 or ≥65 years)[3,4]
- Despite these recommendations, 2023-2024 seasonal VCRs remained sub-optimal in older adults in the EU, with medians of 45.7% (range: 12–78%) for influenza and 14% (range: 0.02–66.1%) for COVID-19[3,4]
- VCRs for older adults from the countries of interest to this study were as follows[3,4]
  - France: influenza, 54%; COVID-19, 16-38% (2023-2024 season)
  - Germany: influenza, 43% (2021-2022 season); COVID-19, no recent data reported
  - Italy: influenza, 53%; COVID-19, 6-16% (2023-2024 season)
- As demonstrated in the pediatric space[5], one approach for improving VCRs could be the implementation of combination vaccines[6-8]
- A recent study conducted in the U.S. found most consumers and HCPs would prefer a combination vaccine over individual vaccines for influenza and COVID-19[9]
- Preferences for potential influenza and COVID-19 combination vaccines, however, have not been well-documented in EU-based populations

OBJECTIVES

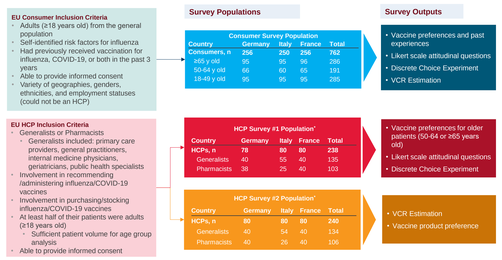
- The goal of this study was to quantify EU consumer and HCP preferences for an adult combination influenza and COVID-19 (Flu+COVID) vaccine compared with individual vaccines
  - Individual surveys were conducted in three EU-member countries: France, Italy, and Germany
- The study also aimed to project the estimated impact a combination vaccine would have on influenza and COVID-19 VCRs for older adults in these countries

METHODS

- The study population was recruited via an online panel and included adult consumers and HCPs responsible for vaccination (**Figure 1**)
  - Consumers were broken down by age groups: 18-49, 50-64 and ≥65 years old; some analyses herein focused on the two older age groups
- Discrete-choice experiments (DCEs) with hypothetical vaccine profiles were conducted in each country to assess the importance of varying vaccine attributes (**Figure 2**)
- Findings from the DCE were also used to perform a separate analysis of derived preference for influenza mono vs Flu+COVID combo
  - Multinomial logit and hierarchical Bayesian models were used for calculating attribute utilities
  - Sawtooth software was used to run the choice-based modelling to derive DCE outputs consisting of utility scores for each attribute level
  - Based on utility scores, a calculation was performed to derive total utility scores for influenza mono and Flu+COVID combo vaccines
  - The total utility score for a product was calculated by summing the individual utility scores of all the attribute levels from the design grid that correspond to the product
  - Total utility scores were then translated into preferences using a sigmoid function
  - Sigmoid function: $Pi = 1/(1+e^{-Ui})$; where Pi is the preference for product i, Ui is the total utility score of product i
- Respondent data were weighted to reflect the population by age segment and to align influenza and COVID VCR for 2023 – 2024
- Respondent preferences from the DCE were used to estimate the absolute change in influenza and COVID VCRs due to availability of a combined vaccine

METHODS

Figure 1. Study Populations & Survey Contents



*HCP questions were split over two surveys to maintain data quality and reduce respondent burden. There was a 66% overlap in respondents between surveys.

- Survey respondents were from France, Germany, or Italy
- Consumers included adults from the general population who met inclusion criteria, recruited from March – April 2024
- A minimum quota was applied to ensure adequate statistical power for age level analysis
- HCPs included generalists or pharmacists who were licensed to practice in the EU, recruited from April – May 2024
- Recruitment targets were applied to ensure that the HCP sample distribution was well-distributed across practitioner types

Figure 2. Discrete Choice Experiment Design

Consumer Attribute Grid

	Attribute	Level 1	Level 2	Level 3	Level 4	Level 5
1	**What type of vaccine is it?**	mRNA vaccine	Non-mRNA vaccine			
2	**How effective is it for influenza?**	Works similar among adults 18-64 years old and worse among adults 65+ compared to current flu vaccines Adults 18-64 years: similar compared to standard dose flu vaccine Adults 65+ years: worse compared to high-dose flu vaccine	Works similar to current standard dose flu vaccines in all adults Adults 18-64 years: similar compared to standard dose flu vaccine Adults 65+ years: similar compared to standard dose flu vaccine	Works similar to current flu vaccines in all adults Adults 18-64 years: similar compared to standard dose flu vaccine Adults 65+ years: similar compared to high-dose flu vaccine	Works better among adults 18-64 years old and similar among adults 65+ compared to current flu vaccines Adults 18-64 years: better compared to standard dose flu vaccine Adults 65+ years: similar compared to high-dose flu vaccine	Works better than current flu vaccines in all adults Adults 18-64 years: better compared to standard dose flu vaccine Adults 65+ years: better compared to high-dose flu vaccine
3	**How effective is it for COVID?**	Not Applicable (influenza mono)	Works similar to currently available COVID-19 vaccines	Works better than currently available COVID-19 vaccines		
4	**Are there any mild side effects*?**	20 out of 100 people experience mild side effects	30 out of 100 people experience mild side effects	40 out of 100 people experience mild side effects	50 out of 100 people experience mild side effects	60 out of 100 people experience mild side effects
5	**Are there any moderate side effects* that limit ability to perform daily routine?**	<5 out of 100 people experience moderate side effects	<10 out of 100 people experience moderate side effects	20 out of 100 people experience moderate side effects	30 out of 100 people experience moderate side effects	

HCP Attribute Grid

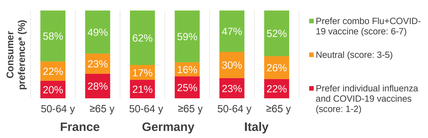
	Attribute	Level 1	Level 2	Level 3	Level 4	Level 5
1	**Vaccine Composition**	mRNA-based	Non-mRNA-based			
2	**COVID Immunogenicity OR Relative Vaccine Efficacy (rVE)**	Not Applicable (influenza mono)	Non-inferior to currently available mRNA COVID vaccines	Superior to currently available mRNA COVID vaccines		
3	**Influenza Immunogenicity OR Relative Vaccine Efficacy (rVE)**	Aged 18-64 years old: Non-inferior to standard dose Aged 65+ years old: Inferior to high dose	Aged 18-64 years old: Non-inferior to standard dose Aged 65+ years old: Non-inferior to standard dose	Aged 18-64 years old: Non-inferior to standard dose Aged 65+ years old: Non-inferior to high dose	Aged 18-64 years old: Superior to standard dose Aged 65+ years old: Non-inferior to high dose	Aged 18-64 years old: Superior to standard dose Aged 65+ years old: Superior to high dose
4	**Tolerability (Grade 1/2 systemic adverse reactions*)**	20%	30%	40%	50%	60%
5	**Tolerability (Grade 3† systemic adverse reactions*)**	<5%	<10%	20%	30%	
6	**Storage and Stability**	6 months total shelf life, refrigerator only +2-8°C; (freezing not required)	Total expiry 9 months -20°C, Inclusive of 30 days +2-8°C	Total expiry 9 months -20°C, Inclusive of 90 days +2-8°C	Total expiry 12 months -20°C, Inclusive of 6 months +2-8°C	Total expiry 12 months -20°C, Inclusive of 7-9 months +2-8°C
7	**[ONLY SHOW IF FR] Product Presentation**	Pre-filled syringe (needle not included)	Pre-filled syringe (with needle)			

*Include symptoms like: Pain, redness, swelling, or a raised hardened area around the injection site (where the vaccine was given), headache, tiredness or low energy, muscle pain or aches, body pain or aches.
†Grade 3 adverse reactions limit patients' ability to perform daily routine.
Note: Type of vaccine was not a part of the grid designs but was shown based on levels of efficacy for influenza and COVID.

- The consumer and HCP DCEs included hypothetical profiles for influenza only or combination Flu+COVID vaccines
- Attributes (shown above) were included at varying levels across the hypothetical profiles, and were selected to account for the broad range of clinical and non-clinical outcomes expected with new vaccines
- Respondents were asked to choose between the hypothetical profiles in each scenario

RESULTS

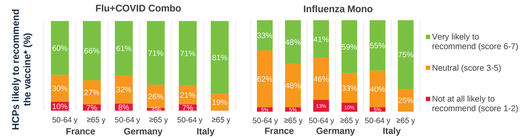
Figure 3. Consumer Preferences for Combo vs Individual Vaccines – Older Adults



Note: Data represents all consumers screened for the research (those who have received influenza and/or COVID vaccines in past 3 years).
*Preference based on a Likert scale from 1 to 7, where 1 is 'strongly prefer individual vaccines' and 7 is 'strongly prefer a combination vaccine.'

- The majority of consumers aged 50-64 years and ≥65 years old preferred a combination vaccine for Flu+COVID over individual vaccines
- Results were fairly consistent across countries

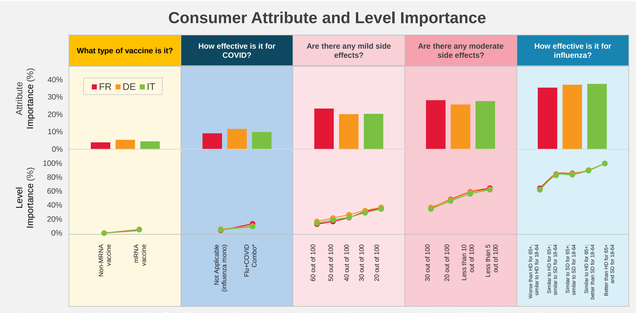
Figure 4. HCP Vaccine Preferences for Recommending to Older Adult Patients



*Likelihood to recommend based on a Likert scale from 1 to 7, where 1 is 'Not at all likely' and 7 is 'Very likely.'

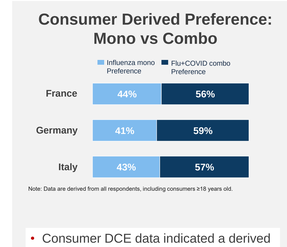
- The majority of HCPs demonstrated a high likelihood to recommend a Flu+COVID combination vaccine to their older patients
- The likelihood to recommend a Flu+COVID combination vaccine was slightly higher for the older age group (≥65 years)
  - Likelihood to recommend an individual influenza vaccine to older patients was somewhat lower

Figure 5. DCE Analysis – Consumer Preferences



Note: order shown is by attribute importance from France. Data represent all consumers screened for the research (those who have received influenza and/or COVID vaccines in past 3 years) of all ages from the study.
*Average of levels 2 and 3 from attribute #3 in DCE consumer attribute grid.

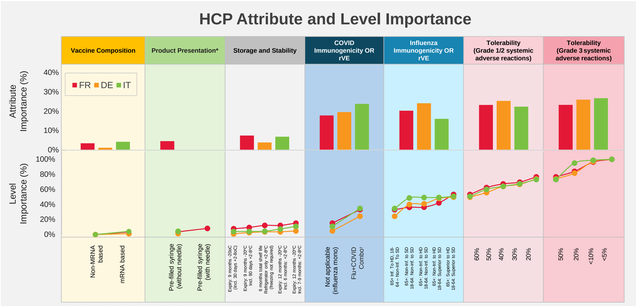
- Consumers considered influenza efficacy to be the most important vaccine attribute, followed by side effects, then COVID efficacy



Note: Data are derived from all respondents, including consumers ≥18 years old.

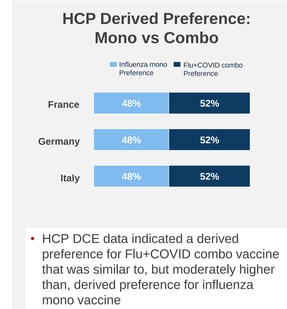
- Consumer DCE data indicated a derived preference for Flu+COVID combo vaccine that ranged from 56–59% overall
- Derived preference toward combo vaccine was similar for older adult consumers:
  - 56-62% for ages 50-64
  - 57-59% for ages ≥65

Figure 6. DCE Analysis – HCP Preferences



Note: order shown is by attribute importance from France.
*This attribute was not shown in DE & IT. †Average of levels 2 and 3 from attribute #2 in DCE HCP attribute grid.
rVE, relative vaccine efficacy.

- HCPs generally prioritized tolerability, followed by influenza and COVID efficacy
- There was a strong increase in utility for the Flu+COVID combination vaccine (18-24% across countries), associated with COVID immunogenicity



- HCP DCE data indicated a derived preference for Flu+COVID combo vaccine that was similar to, but moderately higher than, derived preference for influenza mono vaccine
- Derived preference toward combo vaccine was similar for older adult patients:
  - 51-53% for ages 50-64
  - 50-51% for ages ≥65

Figure 7. Estimation of Flu+COVID Combination Vaccine Availability Impact on Future VCR

Consumers

Absolute Increase				
	COVID VCR		Influenza VCR	
Country	50-64 years	≥65 years	50-64 years	≥65 years
France	16.4%	12.3%	17.6%	9.8%
Germany	16.9%	12.7%	22.3%	24.3%
Italy	18.0%	15.1%	22.0%	20.0%

HCPs

Absolute Increase				
	COVID VCR		Influenza VCR	
Country	50-64 years	≥65 years	50-64 years	≥65 years
France	1.2%	2.2%	0.7%	2.8%
Germany	0.9%	1.2%	2.5%	1.6%
Italy	0.8%	2.2%	1.2%	3.1%

- Modelled preference data projected that both influenza and COVID-19 VCR would likely increase due to availability of a combination vaccine
- Older adult consumers were predicted to have more impact on VCRs than HCPs

DISCUSSION

- Preferences derived using a Likert scale indicated older EU consumers prefer a combination Flu+COVID vaccine compared to individual influenza and COVID-19 vaccines
- Similarly, Likert-derived preferences indicated HCPs generally displayed a higher likelihood to recommended a combination Flu+COVID vaccine to their older patients, compared with an individual influenza vaccine
- There was a derived increase in utility for the combined Flu+COVID vaccine, compared to influenza mono, applicable to both consumers and HCPs
- Access to a combined Flu+COVID vaccine was predicted to result in increased influenza and COVID-19 VCRs in older adults
  - This predicted increase was primarily driven by consumer preferences

LIMITATIONS

- Findings from this study are from three countries and therefore may not be representative of the entire EU as a whole
- The population recruited for this market research study may not be fully representative of the broader HCP or consumer populations, and survey responses may include biases regarding future behavior

CONCLUSIONS

- Most older EU consumers would prefer a combined Flu+COVID vaccine compared to individual vaccines for influenza and COVID-19
- The availability of a combination vaccine could potentially help increase VCRs for influenza and COVID-19 in the EU

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Disclosures

Mariana Servin, Darshan Mehta, and Nicolas Van de Velde are employees of Moderna, Inc and may own stock in the organization. John Crocker, Shivam Jindal, and Omer Ismail are employees of and have equity in Trinity Life Sciences.

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