Acceptance Code: HSD128

Preferences of healthcare providers in Switzerland for attributes of pediatric hexavalent vaccines

Salome Samant[1]; Susanne Oberle[2]; Tomas Marcek[3]; Christine Poulos[4]; Phani Chintakayala[5]; Edith Langevin[6]; Tanaz Petigara[1]; Marco Boeri[7]

[1]Merck & Co., Inc., Rahway, NJ, USA; [2]Sanofi Vaccines, Rotkreuz, Switzerland; [3]MCM Vaccine B.V., Leiden, Netherlands; [4]RTI Health Solutions, Research Triangle Park, NC, USA; [5]RTI Health Solutions, Manchester, UK; [6]Sanofi, Lyon, France; [7]RTI Health Solutions, Belfast, UK

Introduction

- Vaccination is considered to be one of the most successful public health interventions, especially in children[1]
- Combination vaccines take two or more vaccines that could be given individually and combine them into one injection.[2] Combination vaccines offer several advantages, including fewer injections, a simplified vaccination schedule, and improved parental acceptance, which have helped increase vaccination coverage and on-time vaccination rates[2-4]
- Additionally, combination vaccines help improve operational efficiencies for healthcare providers (HCPs) by decreasing the time for administration and reducing the risk of errors during preparation (eg, during reconstitution)[5]
- Pediatric hexavalent vaccines help protect against diphtheria, tetanus, pertussis, poliomyelitis, hepatitis B (HepB), and invasive disease due to *Haemophilus influenzae* type b (Hib). There are two pediatric hexavalent vaccines licensed in Switzerland: the ready-to-use DTaP5-IPV-HepB-Hib[6] and DTaP3-IPV-HepB/Hib,[7] requiring reconstitution before administration
- While previously published studies have found that HCPs in several countries prefer prefilled vaccines over vaccines requiring reconstitution,[8-11] little is known about which hexavalent vaccine attributes drive HCPs' choices in Switzerland

Objective

- To understand the preferences of Swiss HCPs for attributes of pediatric hexavalent vaccines

Methods

- A discrete-choice experiment (DCE) survey was designed to elicit preferences of HCPs in Switzerland for various hexavalent vaccine attributes
- The development of the DCE survey instrument was informed by a targeted review of the literature and input from the study team
- The survey was administered online between 23 November 2022 and 20 February 2023 to HCPs who prescribe or administer hexavalent vaccines in Switzerland. The study team aimed to have at least 20% to 30% of respondents practicing in non-German cantons, 30% to 50% experienced with DTaP5-IPV-HepB-Hib, and 50% to 70% experienced with DTaP3-IPV-HepB/Hib. Participants were paid an honorarium for participation
- HCPs were presented with a series of questions asking them to choose between two hypothetical pediatric hexavalent vaccines with varying levels for 5 attributes:
  1. **Type of device:** A ready-to-use vaccine available as a prefilled syringe vs a syringe and vial combination with components requiring reconstitution. This attribute was bundled together with its respective associated preparation time and risk of vaccination errors to avoid collinearity between these closely related attributes
  2. **Protective antibody levels against Hib at the time of the booster dose (11-12 months of age):** 50% vs 70% vs 90%
  3. **Packaging size:** Smaller (500 cm^3) vs larger (1,000 cm^3) box of 10 vaccines
  4. **Years that the vaccine has been available on the market:** <1 year vs 1-3 years vs >3 years
  5. **Time that vaccines can safely stay at room temperature (up to 25°C):** 6 days vs 3 days
- Respondents were asked to assume that both hypothetical vaccines were similar with respect to other attributes, including safety, efficacy, and cost to the provider, unless otherwise specified
- Eligible participants were pediatricians or nursing staff working in Switzerland, aged ≥21 years, who were able to read and speak German or French, had prescribed and/or administered pediatric hexavalent vaccines, and had ≥10 pediatric patients vaccinated on average per month in their practice
- The pattern of a respondent's choices between the hypothetical profiles reveals their preferences for the included attributes and levels
- Data were analyzed using a random-parameters logit model
  - Estimates are presented as odds ratios
  - The conditional relative importance (CRAI) of each attribute was calculated based on the model output

Results

Respondent characteristics

- A total of 150 pediatricians and 40 nursing staff participated in the survey, with quotas for cantons, type of HCP, and the pediatric hexavalent vaccine prescribed or administered in the past year (**Table 1**)
- Most respondents were female (74%), <50 years of age (67%), and practiced in an urban setting (65%)
- Over 90% of respondents were responsible for administering vaccines. Additionally, pediatricians were often responsible for deciding which vaccines to buy for their practice and prescribing them, while the nursing staff was often responsible for vaccine preparation, storage, and ordering

Table 1. Respondent characteristics

	All HCPs (N = 190)	Pediatricians (N = 150)	Nursing staff (N = 40)
Gender			
Female	140 (73.7%)	102 (68.0%)	38 (95.0%)
Male	49 (25.8%)	47 (31.3%)	2 (5.0%)
Prefer not to answer	1 (0.5%)	1 (0.7%)	0 (0.0%)
Age			
<50 years	128 (67.4%)	94 (62.7%)	34 (85.0%)
≥50 years	62 (32.6%)	56 (37.3%)	6 (15%)
Geographic area			
Urban	123 (64.7%)	97 (64.7%)	26 (65.0%)
Rural	67 (35.3%)	53 (35.3%)	14 (35.0%)
Years practicing			
Less than 10 years	50 (36.3%)	33 (22.0%)	17 (42.5%)
10-20 years	78 (41.1%)	62 (41.3%)	16 (40.0%)
More than 20 years	62 (32.6%)	55 (36.7%)	7 (17.5%)
Which pediatric hexavalent vaccine(s) have you prescribed or administered in the past year?			
DTaP3-IPV-HepB/Hib	68 (35.8%)	54 (36.0%)	14 (35.0%)
DTaP5-IPV-HepB-Hib	44 (23.2%)	26 (17.3%)	18 (45.0%)
Both	78 (41.1%)	70 (46.7%)	8 (20.0%)
Which of the following activities are you responsible for regarding pediatric hexavalent vaccines?			
Administer vaccines	173 (91.1%)	142 (94.7%)	31 (77.5%)
Decide which vaccines to buy	123 (64.7%)	118 (78.7%)	5 (12.5%)
Prepare vaccines	117 (61.6%)	85 (56.7%)	32 (80.0%)
Prescribe vaccines	117 (61.6%)	111 (74.0%)	6 (15.0%)
Store vaccines	106 (55.8%)	71 (43.3%)	35 (87.5%)
Order vaccines	78 (41.1%)	47 (31.3%)	31 (77.5%)
Prefer not to answer	2 (1.1%)	0 (0.0%)	2 (5.0%)

Preference results: Odds ratios

The odds ratios represent the change in the likelihood that an HCP would choose a vaccine with the given attribute level rather than the reference level, assuming all other attributes remained the same. All odds ratios were statistically significant except for the odds ratio related to the time that the vaccine can stay safely at room temperature (**Table 2**)

- **Type of device:** HCPs were almost three times more likely to prefer a ready-to-use vaccine available as a prefilled syringe to a vaccine available as a syringe and vial combination with components requiring reconstitution
- **Protective antibody levels against Hib at the time of the booster dose (11-12 months):** HCPs were unlikely to choose a vaccine conferring 50% or 70% of infants with protective Hib antibody levels when presented with a 90% seroprotection alternative
- **Packaging size:** HCPs were almost twice as likely to prefer smaller (500 cm^3) vs larger (1,000 cm^3) packaging size for a box of 10 vaccines
- **Years that the vaccine has been available on the market:** HCPs were nearly five times more likely to prefer a vaccine that was commercially available for >3 years compared to one available for <1 year and nearly three times more likely to prefer a vaccine available for 1 to 3 years compared to <1 year
- **Time that the vaccine can stay safely at room temperature:** There was no preference for a vaccine that can stay at room temperature for 6 days vs 3 days

Table 2. Random-parameters logit model odds ratios

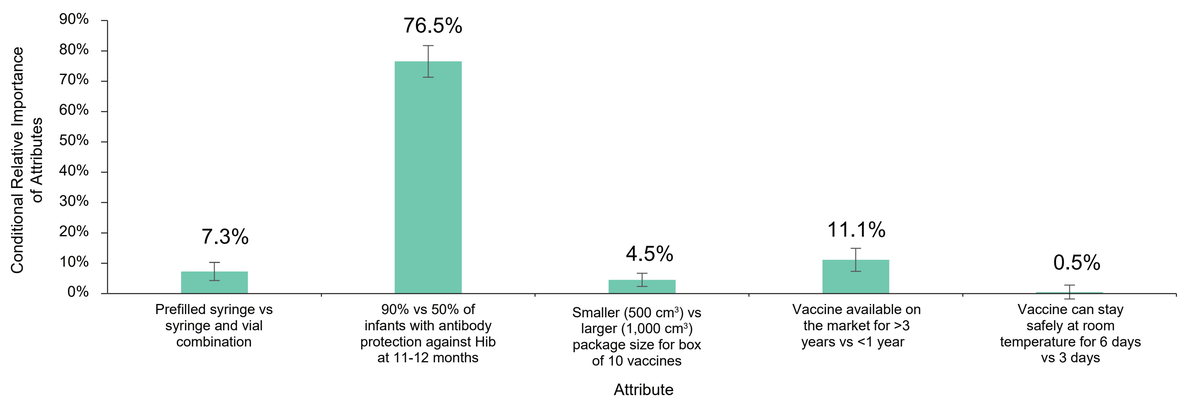
Variable	Odds ratio	95% Confidence intervals
Type of device		
Prefilled syringe – ready-to-use	**2.77***	(1.39, 4.15)
Syringe and vial with components that require reconstitution	Reference	
Protective antibody levels against Hib at the time of the booster dose (11-12 months)		
5 out of 10 vaccinated (50%) have protective antibody levels	**0.00[a]**	(0.00, 0.00)
7 out of 10 vaccinated (70%) have protective antibody levels	**0.01[a]**	(0.00, 0.01)
9 out of 10 vaccinated (90%) have protective antibody levels	Reference	Reference
Packaging size		
Smaller (500 cm^3) box of 10 vaccines	**1.89[a]**	(1.23, 2.55)
Larger (1,000 cm^3) box of 10 vaccines	Reference	
Years that the vaccine has been available on the market		
More than 3 years	**4.76[a]**	(1.87, 7.65)
1-3 years	**2.83[a]**	(1.57, 4.08)
Less than 1 year	Reference	
Time that the vaccine can stay safely at room temperature		
6 days	1.07	(0.73, 1.42)
3 days	Reference	

[a]Statistically significant using *P*-value of <0.05.

Conditional relative importance (CRAI)

- CRAI is the difference between preference weights for the most and least desirable levels, rescaled as a percentage of the sum of the differences across all attributes
- Seroprotection against Hib at 11-12 months was the most important attribute (CRAI: 76.5%), followed by years on the market (11.1%), type of device (7.3%), and the packaging size (4.5%; **Figure 1**)
- The relative importance of the time the vaccine can be kept safely at room temperature was not statistically different from zero, indicating that respondents did not differentiate between the attribute levels (6 days vs 3 days) when making vaccine choices in the survey

Figure 1. Conditional relative importance of attributes



Hib, *Haemophilus influenzae* type B. Bars show 95% confidence intervals.

Limitations

- Participation in the study was voluntary, thus, study results are subject to potential selection and response bias, and the respondent sample may not be representative of the broader populations of HCPs in Switzerland
- Not all attributes that may be relevant to HCPs who administer hexavalent vaccines could be included in the DCE
- The preference data are based on hypothetical choice profiles, which simulate possible clinical or administrative decisions but may not have the same consequences as actual real-world decisions

Conclusions

- To our knowledge, this is the first study to evaluate the preferences of HCPs in Switzerland for the attributes of pediatric hexavalent vaccines
- Our findings indicate that when presented with hypothetical alternatives of pediatric hexavalent vaccines, pediatricians and nursing staff in Switzerland considered Hib seroprotection at 11-12 months to be the most important attribute
- Device type, time on the market, and packaging size are also aspects important for HCPs when choosing pediatric hexavalent vaccines

References

1. World Health Organization. Immunization coverage. 2023. https://www.who.int/news-room/fact-sheets/detail/immunization-coverage. Accessed October 8, 2023.
2. US Centers for Disease Control and Prevention. Combination Vaccines; updated August 1, 2019. https://www.cdc.gov/vaccines/parents/why-vaccinate/combination-vaccines.html. Accessed October 8, 2023.
3. Maman K, et al. *Hum Vaccin Immunother.* 2015;11(9):2132-2141.
4. Samant S, et al. *Curr Med Res Opin.* 2022;38(11):2003-2009.
5. De Coster I, et al. *Vaccine.* 2015;33(32):3976-3982.
6. European Medicines Agency. Vaxelis. https://www.ema.europa.eu/en/medicines/human/EPAR/vaxelis#authorisation-details-section. Accessed October 8, 2023.
7. European Medicines Agency. Infanrix Hexa. https://www.ema.europa.eu/en/medicines/human/EPAR/infanrix-hexa#overview-section. Accessed October 8, 2023.
8. Icardi G, et al. *J Prev Med Hyg.* 2020;61(3):E424-E444.
9. Cuesta Esteve I, et al. *Prev Med Rep.* 2021;22:101376.
10. Lloyd AJ, et al. *Patient Prefer Adherence.* 2015;9:1517-1524.
11. Bakhache P, Virey B, Bienenfeld C. *Eur J Pediatr.* 2019;178(4):533-540

Disclosure

- Funding for this research was provided by MCM Vaccine B.V., a partnership between Merck Sharp & Dohme LLC, a subsidiary of Merck & Co., Inc., Rahway, NJ, USA, and Sanofi Inc., Swiftwater, PA, USA.

Presented at ISPOR-EU; Copenhagen, Denmark; November 12-15, 2023.