Acceptance Code HSD102

Preferences of nurses for attributes of pediatric hexavalent vaccines in the United Kingdom

Marco Boeri[1]; Tomas Marcek[2]; Phani Chintakayala[3]; Christine Poulos[4]; Amy Francis[5]; Edith Langevin[6]; O. Balogh[5]; Tanaz Petigara[7]; Jennifer O'Connor[8]; Salome Samant[7]

[1]RTI Health Solutions, Belfast, UK; [2]MCM Vaccine B.V., Leiden, Netherlands; [3]RTI Health Solutions, Manchester, UK; [4]RTI Health Solutions, Research Triangle Park, NC, USA; [5]Sanofi, Reading, Berkshire, UK; [6]Sanofi, Lyon, France; [7]Merck & Co., Inc., Rahway, NJ, USA; [8]Goring & Woodcote Medical Practice, Reading, UK

Introduction

- Combination vaccines have become a cornerstone of pediatric immunization programs, help improve operational efficiencies for healthcare providers,[1] and offer several advantages including fewer injections, a simplified vaccination schedule, and improved parental acceptance, which have helped increase vaccination coverage and timeliness[2,3]
- Currently there are two pediatric hexavalent (6-in-1 combination vaccines) vaccines available in the United Kingdom (UK)[4]:
  - DTaP5-IPV-HepB-Hib available as a fully liquid, ready-to-use, prefilled syringe
  - DTaP3-IPV-HepB/Hib available as syringe/vial combination that needs reconstitution before administration
- Both vaccines offer protection against the same diseases (diphtheria, tetanus, pertussis, poliomyelitis, hepatitis B [HepB], and invasive diseases due to *Haemophilus influenzae* type b [Hib]) with similar safety and tolerability profiles.[4] However, they differ in vaccine device type and administration characteristics[4,5]

Objective

- To understand the preferences of nurses in the UK for selected attributes of pediatric hexavalent vaccines

Methods

- A discrete-choice experiment (DCE) survey was designed to elicit preferences for various hexavalent vaccine attributes, using vaccine attributes and levels identified by a targeted literature review, qualitative interviews with nurses, and expert opinion
- Survey participants were presented with a series of questions asking them to choose between two hypothetical pediatric hexavalent vaccines, characterized by the following attributes with varying levels:
  1. **Type of device:** Prefilled syringe vs syringe and vial with components requiring reconstitution
  2. **Plastic in packaging:** Plastic blisters used in packaging vs no plastic blisters used in packaging
  3. **Years on market:** <1 year vs 1-3 years vs >3 years
  4. **Time that the vaccine can safely stay at room temperature (up to 25°C):** 6 days vs 3 days
- The respondents were asked to assume that other attributes, including safety, efficacy, availability, and cost to the provider were similar between the vaccines unless otherwise specified
- The survey was administered online between 3 February 2023 and 14 March 2023. Respondents were nurses in the UK who administered pediatric hexavalent vaccines. Quotas were used to reflect the relative distribution of nurses across the 3 countries and to have at least 50% to 75% respondents with some experience using the DTaP5-IPV-HepB-Hib vaccine, which was newer to market than DTaP3-IPV-HepB/Hib
- Respondents were paid an honorarium for their participation
- The analysis of respondents' choices between the hypothetical profiles revealed their preferences for the included attributes and levels
- Odds ratios and the conditional relative importance of attributes were calculated using random-parameters logit model estimates
- Conditional relative importance 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

Results

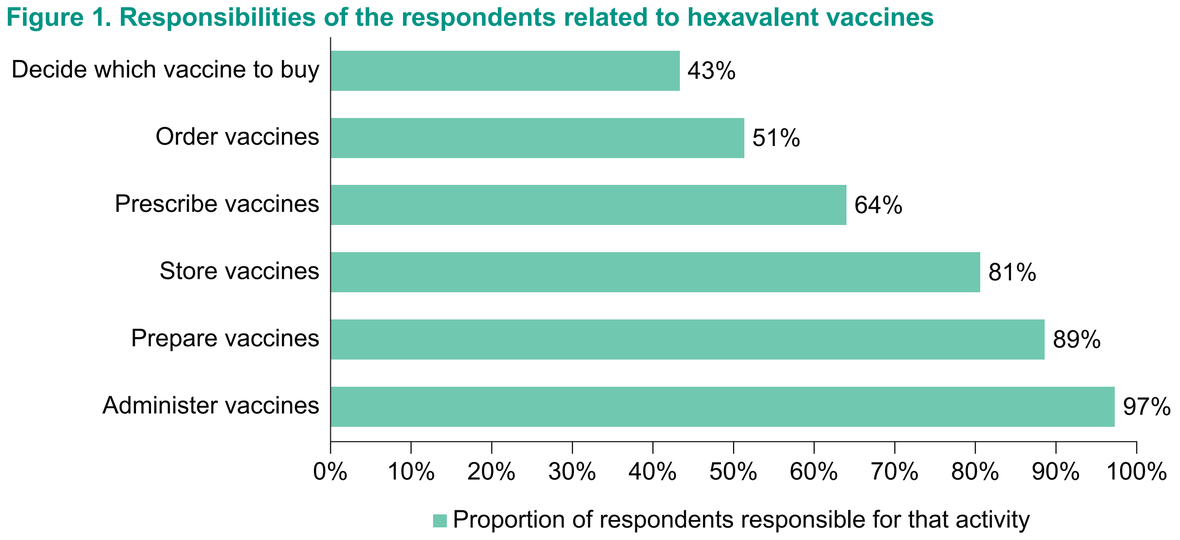
Respondent characteristics

- A total of 150 nurses were included in the study, and most respondents were female (78%), <50 years of age (75%), and practiced in an urban setting (91%; **Table 1**)
- Most of the nurses worked in England (79%), followed by Scotland (14%), and Wales (7%). Quotas were used to ensure proportional distribution of nurses from the three countries
- Nearly half of respondents (48%) had experience prescribing and administering both hexavalent vaccines in the past year
- Nearly all respondents (97%) reported that they were responsible for administering vaccines in their practice (**Figure 1**)

Table 1. Respondent demographic and practice characteristics

	Respondents (n = 150)
Gender	
Female	117 (78.0%)
Male	33 (22.0%)
Age category	
<50 years	113 (75.3%)
>51 years	37 (24.7%)
Where is your work/practice located?	
England	118 (78.7%)
Scotland	21 (14.0%)
Wales	11 (7.3%)
Which of the following best describes the geographic area in which you practice?	
Urban	137 (91.3%)
Rural	13 (8.7%)
How many years have you practiced?	
<10 years	41 (27.3%)
10-20 years	76 (50.7%)
>20 years	33 (22.0%)
Which hexavalent pediatric vaccine(s) have you prescribed or administered in the past year?	
DTaP3-IPV-HepB/Hib	70 (46.7%)
DTaP5-IPV-HepB-Hib	8 (5.3%)
Both	72 (48.0%)
Rate your level of concern about the use of plastic blisters in packaging for hexavalent vaccines (scale ranging from 0-5 with 0: not concerned at all, and 5: extremely concerned)	
0-2	27 (18.0%)
3	42 (28.0%)
4	62 (41.3%)
5	(12.7%)

Figure 1. Responsibilities of the respondents related to hexavalent vaccines



Note: Respondents were allowed to select multiple responses.

Odds ratios (Table 2)

- Nurses were almost 3 times more likely to choose a vaccine available as a prefilled syringe compared with a vaccine available as a syringe and vial combination requiring reconstitution (OR, 2.8; 95% CI, 1.92-3.68)
- Vaccines that have been commercially available for less than 1 year were 34% less likely to be chosen over vaccines that have been commercially available for more than 3 years (OR, 0.66; 95% CI, 0.47-0.84). However, there was no statistically significant preference for vaccines available for 1-3 years vs >3 years on the market (OR, 0.93; 95% CI, 0.72-1.13)
- Odds ratios for the time a vaccine can stay at room temperature (3 vs 6 days; OR, 0.94; 95% CI, 0.71-1.16) and for plastic blisters in packaging vs no plastic (OR, 1.19; 95% CI, 0.80-1.56) were not significant, indicating that nurses' vaccine choices were likely not influenced by changes in these attributes

Table 2. Random-parameters logit model odds ratios

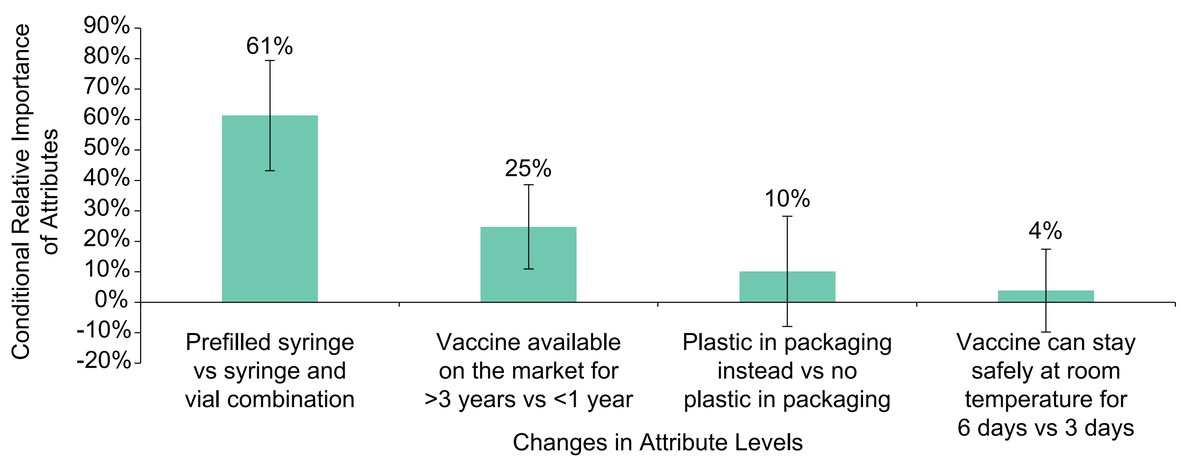
Variable	Odds ratio	95% Confidence interval
Type of device[a]		
Prefilled syringe – ready-to-use	**2.80[b]**	(1.92-3.68)
Syringe and vial with components that require reconstitution	Reference	
Plastic in packaging		
Plastic blisters used in packaging	1.19	(0.80-1.56)
No plastic blisters used in packaging	Reference	
Years that the vaccine has been available on the market		
Less than 1 year	**0.66[b]**	(0.47-0.84)
1-3 years	0.93	(0.72-1.13)
More than 3 years	Reference	
Time that the vaccine can stay safely at room temperature		
3 days	0.94	(0.71-1.16)
6 days	Reference	

[a]With its associated risk of dosage error and preparation time; [b]Statistically significant.

Conditional relative importance (CRAI) (Figure 2)

- Changing from a syringe and vial combination that requires reconstitution to a prefilled, ready-to-use syringe yielded the largest change in utility (CRAI: 61%), making it the most important attribute for nurses' decision-making
- Time that the vaccine has been available on the market (CRAI: 25%) was the next most important attribute
- The conditional relative importance of plastic in packaging and the time that the vaccine can stay safely at room temperature were not statistically different from zero, suggesting that these attributes did not influence vaccine choices in the survey

Figure 2. Conditional relative importance of attributes



Limitations

- We restricted the survey to nurses since nurses typically choose, order, and administer vaccines in community settings in the UK. However, it is possible that physicians may have different preferences that may potentially influence the choice of vaccine in a practice
- The preference data are based on hypothetical choice profiles and attributes and may not necessarily reflect real-world decision-making

Conclusion

- The type of device was the most important attribute of pediatric hexavalent vaccines among nurses in the UK in this study, and is aligned with previously published literature demonstrating the importance of this attribute to nurses.[5-7] The preferences of nurses may be of interest to policy makers evaluating different hexavalent vaccines

References

1. De Coster I, et al. *Vaccine.* 2015;33(32):3976-3982.
2. US Centers for Disease Control and Prevention. Combination Vaccines. August 1, 2019. https://www.cdc.gov/vaccines/parents/why-vaccinate/combination-vaccines.html. Accessed July 11, 2023.
3. Maman K, et al. *Hum Vaccin Immunother.* 2015;11(9):2132-2141.
4. UK Health Security Agency. The hexavalent DTaP/IPV/Hib/HepB combination vaccine. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1157602/Hexavalent-information-for-HCP.pdf. Accessed September 12, 2023.
5. Icardi G, et al. *J Prev Med Hyg.* 2020;61(3):E424-E444.
6. Lloyd AJ, et al. *Patient Prefer Adherence.* 2015;9:1517-1524.
7. Cuesta Esteve I, et al. *Prev Med Rep.* 2021;22:101376.

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

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.