Health State Utilities in Children With Peanut Allergy and Their Caregivers: A United Kingdom Vignette Study

M Schurer,[1] E Jones,[2] PA Powell,[3] D Rowen,[3] S Baker,[4] A Warner,[5] A Muraro,[6] F Girard,[7] N Makwana [8]

[1]Lumanity, Utrecht, Netherlands; [2]Lumanity, Sheffield, UK; [3]School of Health and Related Research, Sheffield, UK; [4]Anaphylaxis UK, Farnborough, UK; [5]Allergy UK, Sidcup, UK; [6]University Hospital Padua, Padua, Italy; [7]DBV Technologies, Montrouge, France; [8]Sandwell and West Birmingham NHS Trust, Birmingham, UK

RATIONALE

- Peanut allergy (PA) is a common allergy affecting approximately 2% of children in the United Kingdom (UK), although diagnosis of peanut and tree nut allergy has largely increased in the last 30 years[1, 2]
- Current management strategies for PA focus primarily on allergen avoidance and use of epinephrine injection as a rescue medication in case of accidental exposure
- The health-related quality of life (HRQoL) of children with peanut allergy and their caregivers (defined as parents or guardians) is often adversely affected owing to constant dietary vigilance, social restrictions, and anxiety about accidental peanut ingestion, which could result in anaphylaxis[3, 4]
- Immunotherapies have shown the ability to increase the amount of allergen required to trigger an allergic reaction, known as the eliciting dose (ED). An increase in ED raises the reactive threshold in a person with PA, leading to a lower risk of anaphylaxis through accidental exposure and a potential improvement in their HRQoL
- Health technology assessment (HTA) agencies in the UK (such as NICE) require pharmaceutical manufacturers to demonstrate the clinical and economic potential of their product compared with the current standard of care to inform reimbursement decisions. When evaluating the cost-effectiveness of a new treatment, HTA bodies typically require health state utilities (HSUs) to indicate any changes in HRQoL. If preferred measures of HRQoL are inappropriate or insufficient, vignettes—qualitative health state descriptions—can be valued and used to derive utility data[5]
- To date, no study has investigated the association between PA sensitivity (ie, increase in ED) and change in HRQoL in terms of utility values

OBJECTIVE

- To estimate utility values of children with PA and their caregivers, for four distinct health states defined by ED of peanut protein of <150 mg peanut (<0.5 peanut); ≥150-300 mg (≥0.5-1 peanut); ≥300 mg (≥1 peanut), mono-nut allergy; and ≥300 mg, poly-nut allergy

RESULTS

Vignettes

- Five key domains were included in the child and caregiver-based vignettes: a description of the child's age; the child's allergy and sensitivity to peanut; the average number of reactions per year; the impact of PA on social life, daily life, working/school life, and overall emotional well-being; and management of the allergy, including the need to train others
  - **Figure 2** provides an example vignette for caregivers of a child with an ED of <150 mg peanut protein

Figure 2: Example Vignette—Caregiver Perspective, ED of <150 mg Peanut Protein (<0.5 peanut)

Vignette 1

Imagine you are the **caregiver of a child** aged 4-11 years who has a peanut allergy: Your child could have an allergic reaction after being exposed to a **trace** of the allergen (such as a product made in the same factory as other products containing peanuts), either by **eating** or **touching** that food, or even by **breathing it in**.

On average there is a **1 in 2** chance your child will experience an allergic reaction per year.

Impact on daily life:

- You **very often feel anxious and worried**
- You **very often feel upset** that your child will be exposed to peanuts
- You **very often feel guilt** for your child's allergy

Normal life activities and work:

- Normal life activities are **very often impacted** and **are avoided** because you are worried that your child will be exposed to peanuts or peanut particles in the air. This includes **avoidance** of:
  - Eating out as a family
  - Attending social events with your child
  - Family holidays abroad and air travel
- **You worry when you leave your child in the care of others** as you feel others do not understand the severity of the allergy and do not take appropriate precautions. **This leads you to avoid leaving them in the care of others** outside your close circle of friends and family—for example, at a birthday party
- **Your career opportunities are rarely impacted** because you are concerned about commuting or traveling too far away from your child
- You **rarely miss days from work** due to your child having an allergic reaction

Management:

- You must **always check the labels of foods and products that you expect may contain peanuts** (eg, cereals)
- You must **always check the labels of foods and products that you do not expect may contain peanuts** (eg, lettuce or cosmetics)
- You **monitor everything that comes into the house** in a bid to ensure that peanuts do not come close to your child
- You **do not allow foods or products in the house that state they may contain peanuts**
- If you leave your child in the care of others, you **always spend time teaching** them about your child's condition, how to check and prepare foods, how to spot the signs of a reaction, and how to use the adrenaline autoinjector

Note: Key words were **bolded** for emphasis; words that indicate the frequency of the impact, which varied per health state, were highlighted in **purple**.

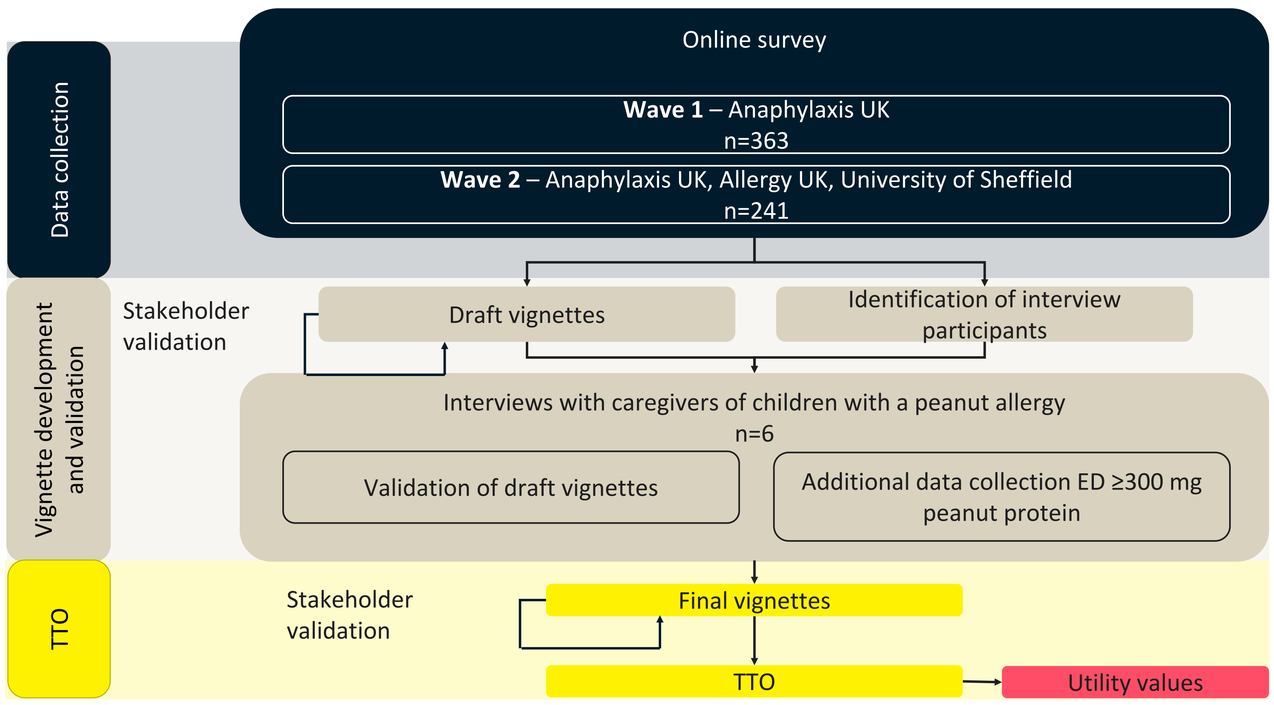
TTO and Utility Values

- During the time trade-off (TTO), participants were asked to 'trade off' a shorter life spent in full health for a longer life but in a decreased health state[6]
- Depending on the respondent's answer, the time spent in full health was increased or decreased until a point of indifference was reached
- **Figure 3** shows an example TTO question

METHODS

- An online survey investigating the impact of PA on children and their caregivers was conducted in collaboration with Anaphylaxis UK, Allergy UK, and the University of Sheffield
- 604 participants completed the survey across two waves between 2019 and 2020
- Eight health state vignettes were generated based on the qualitative and quantitative survey outcomes, representing the four ED categories for both child and caregiver perspectives
- The vignettes were validated via six semistructured interviews with caregivers of children with PA, members of patient organizations, and two clinical experts
- Additional information was acquired from caregivers to develop vignettes for the ≥1 peanut ED category (split by mono- versus poly-nut allergy), as insufficient survey data were available for this category
- The resulting eight vignettes were valued by 100 members of the UK general public using the TTO technique to derive HSUs for all health states
- **Figure 1** provides an overview of the methodology used

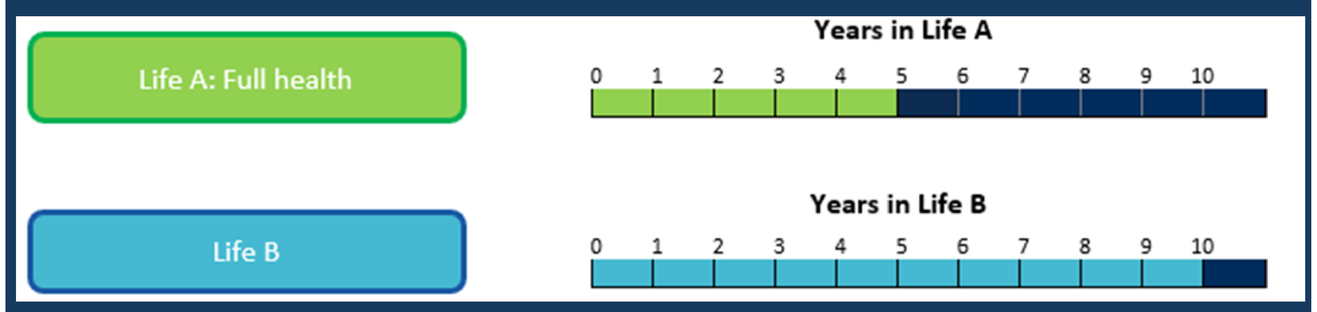
Figure 1: Schematic Overview of Methodology



TTO, time trade-off.

Figure 3: Example TTO Question – Better Than Dead, Life A at x=5 Years

Imagine that you are living in the blue health state (Life B). Now you have a choice between Life A, in which you will live in full health for 5 years, after which you will die, or Life B, in which you will live in the blue health state for 10 years, and then die.



Which would you prefer, Life A or Life B, or are they about the same?

- The estimated HSUs generated using the TTO method are presented in **Table 1**. The HSUs mirrored the findings from the online survey and semistructured interviews:
  - Children who were more sensitive to experiencing an allergic reaction to peanut (ie, those with a lower ED) had lower utility values than those who were less sensitive
  - For children and caregivers of children with an ED of ≥1 peanut, HRQoL was seen to be lower for children with poly-nut allergies than for children with peanut-only allergy
    - This is expected as those with a poly-nut allergy may still need to maintain a strict nut-avoidance diet, given their additional nut allergies
    - However, the HRQoL for children with poly-nut allergies and an ED ≥1 peanut was still higher than the HRQoL for children with mono-nut allergy and an ED of <1 peanut

Table 1: TTO-derived Utility Values Compared With UK General Population[7]

Caregiver utility values (aged ≥18 years old)			
		UK adult general population mean (SD)	
Health state	TTO mean (SD)	Male	Female
<150 mg peanut protein (<0.5 peanut)	0.82 (0.27)	0.89 (0.02)	0.91 (0.02)
≥150-300 mg peanut protein (0.5-1 peanut)	0.89 (0.18)		
≥300 mg (≥1 peanut), mono-nut allergy	0.93 (0.16)		
≥300 mg (≥1 peanut), poly-nut allergy	0.91 (0.17)		
Child utility values			
		UK child general population 4-11 years' old mean (SD)	
Health state	TTO mean (SD)	Male	Female
<150 mg peanut protein (<0.5 peanut)	0.80 (0.24)	0.91 (0.00)	0.95 (0.00)
≥150-300 mg peanut protein (0.5-1 peanut)	0.86 (0.21)		
≥300 mg (≥1 peanut), mono-nut allergy	0.92 (0.18)		
≥300 mg (≥1 peanut), poly-nut allergy	0.88 (0.19)		

SD, standard deviation.

CONCLUSIONS

- This study successfully generated HSUs for children with PA and their caregivers for different ED categories. These utilities could be used to inform future economic modelling and reimbursement decisions
- A key strength to this study was the methodology, as the vignettes were based and validated by the parents/caregivers of the children themselves
- Overall, this study provided supportive evidence of a potential association between sensitivity (ED) and HRQoL and utility, highlighting the importance of treatments focused on desensitizing patients
- The results suggest that the impact of desensitization applies to both peanut-only and poly-nut allergies, as in both cases an increase in ED improved HRQoL for children with a higher baseline ED and their caregivers

REFERENCES: 1. Stiefel G et al. *Clin Exp Allergy*. 2017;47(6):719-739. 2. DunnGalvin A et al. *Allergy*. 2020;75(11):2899-2908. 3. Roy KM et al. *Clin Pediatr (Phila)*. 2011;50(11):1045-1051. 4. Avery NJ et al. *Pediatr Allergy Immunol*. 2003;14(5):378-382. 5. Rowen D et al. Report by the NICE Decision Support Unit. 2020. Accessed May 11, 2023. https://www.sheffield.ac.uk/nice-dsu/methods-development/measuring-health-related-quality-life 6. Lugnér AK et al. *Expert Rev Pharmacoecon Outcomes Res*. 2020;20(4):331-342. 7. Office for National Statistics. *Population estimates for the UK, England, Wales, Scotland and Northern Ireland: mid-2021*. Released 21 December 2022.

ACKNOWLEDGMENTS: This study was sponsored by DBV Technologies. Editorial support for the preparation of this poster was provided by Red Nucleus, funded by DBV Technologies.