PUBLIC HEALTH IMPACT AND COST-EFFECTIVENESS ANALYSIS OF UNIVERSAL VARICELLA VACCINATION IN THE UNITED KINGDOM

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Background

Varicella is a highly infectious childhood disease caused by the varicella-zoster virus (VZV).[1,2]

Following primary infection, VZV remains latent in the body and can reactivate later in life as herpes zoster (HZ).[3] Currently, there is no universal varicella vaccination (UVV) in the United Kingdom (UK).

Varicella vaccination impact and cost-effectiveness was assessed in Akpo et al.[4] This model is an update including HZ immunization strategy, updating key parameters, and considering several vaccination schedules.

Aims

This study aimed to **assess the public health impact** and **cost-effectiveness** of implementing **UVV** in addition to the existing HZ vaccination strategy in the **UK**.

Methods

Model age-structured deterministic compartmental DTM adapted from Akpo et al[4].

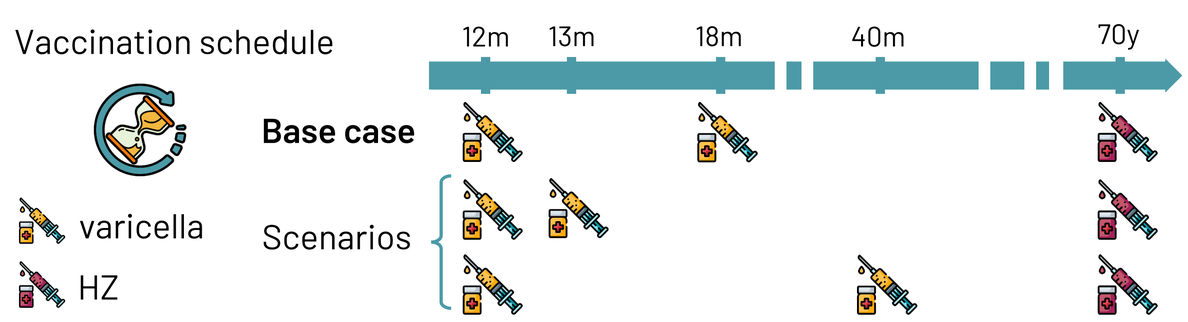
Population UK population (0-100 years).

Intervention & comparator varicella vaccination with HZ vaccination vs no varicella vaccination with HZ vaccination.

Outcomes direct costs, indirect costs, numbers of natural and breakthrough cases of varicella and HZ, and QALY losses.

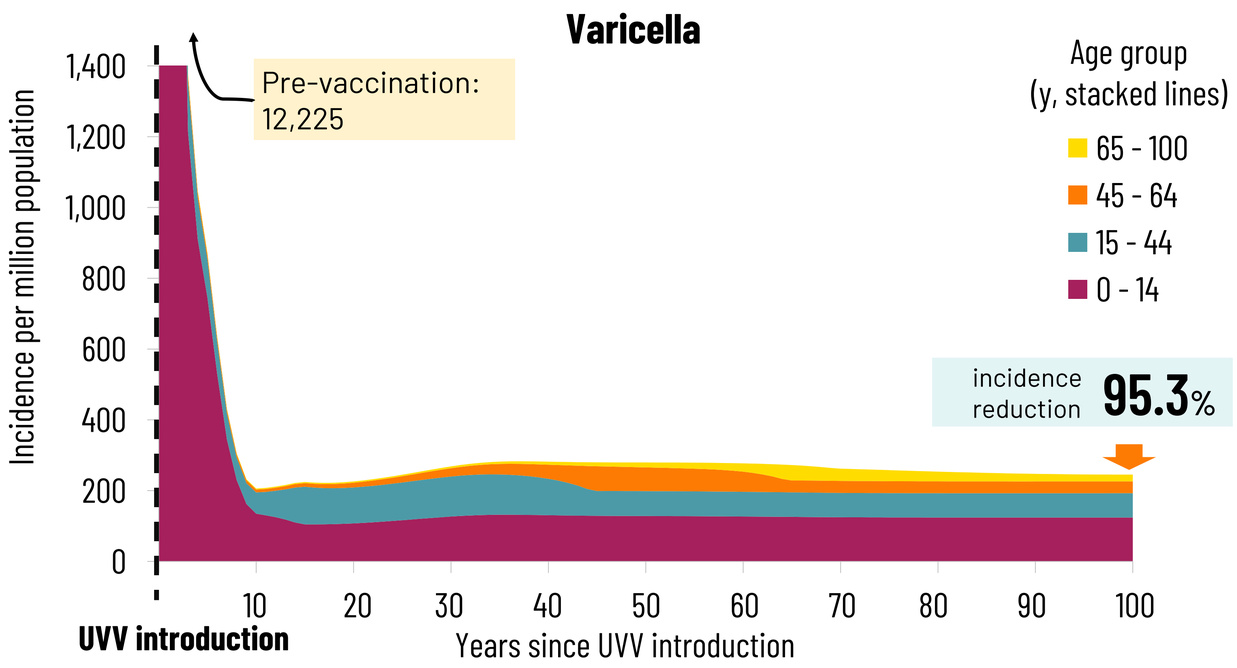
Perspective 100-year time horizon with a payer and societal perspective (20-year and 50-year in scenario analyses).

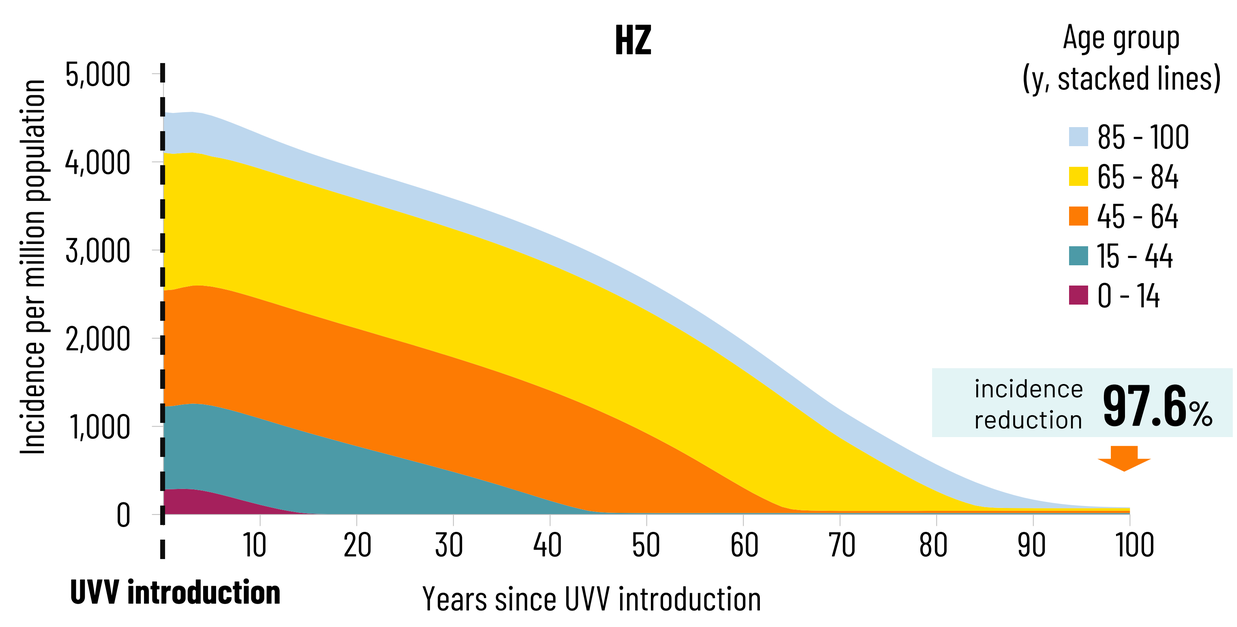
Discount rate 3.5% applied on both costs and outcomes.



Results

Following UVV implementation, the **total incidence** of **varicella** and **HZ** was **reduced** by **95%** (with the largest reductions occurring in the first five years) and **98%**, respectively, over 100 years in the base case.





From a **payer's** perspective, the incremental cost-utility ratio was **£7,069** and **£2,984** per **QALY gained** in the base case using a 20-year and a 100-year time horizon, respectively. From a **societal** perspective, **UVV** was considered **cost saving**.

	20 years			100 years		
	UVV	No UVV	Difference	UVV	No UVV	Difference
Total direct costs	3,051,777	2,696,703	355,075	5,497,291	5,044,138	453,152
Vaccine cost	*1,577,143*	*1,050,929*	*526,214*	*3,061,470*	*1,979,622*	*1,081,848*
Outpatient cost	*16,455*	*102,915*	*-86,460*	*20,663*	*193,858*	*-173,195*
Hospital cost	*1,458,180*	*1,542,859*	*-84,679*	*2,415,157*	*2,870,658*	*-455,501*
Total indirect cost	2,991,345	5,841,718	-2,850,373	4,271,508	11,003,983	-6.732.475
Total costs (direct+ indirect)	6,043,122	8,538,421	-2,495,299	9,768,798	16,048,122	-6,279,323
QALYs lost	262,827	313,056	-50,229	431,643	583,504	-151.861
Direct cost per QALY saved	-	-	7.1	-	-	3.0
Total cost per QALY saved	-	-	Dominant	-	-	Dominant

All costs are expressed in thousands £. Direct costs include GP and specialist visit, hospitalization, vaccine acquisition and administration, **indirect costs** include productivity loss due to morbidity and due to premature mortality for both varicella and HZ.

Varying the timing of the second dose has **little impact on the annual incidence reduction.**

Abbreviations: **DTM** dynamic transmission model, **GP** general practitioner, **HZ** herpes zoster, **m** month (of age), **QALY** quality adjusted life year, **VZV** varicella-zoster virus, **UK** United Kingdom, **UVV** universal varicella vaccination , **y** years (of age)

Conclusions

- The introduction of UVV in the UK would result in reducing both varicella and HZ incidence.
- The implementation of such a vaccination program was found to be cost-effective from a payer's perspective (at £20K/QALY threshold) and cost-saving from a societal one.
- The latest evidence retrieved from real-world studies show that the introduction of UVV was not associated with an increase of HZ cases.[5,6] However further research is needed to apprehend the long-term evolution in HZ incidence after UVV implementation.

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