Evaluation of the impact of the Herpes Zoster vaccination programme in England five years following its introduction in September 2013

Galena Kuyumdzhieva[1], Nick Andrews[1] ,Gayatri Amirthalingam[1], Simon de Lusignan[2], Ivelina Yonova[2];

1.Public Health England ; 2.University of Oxford

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INTRODUCTION

Shingles is caused by the reactivation of latent varicella zoster virus infection with incidence increasing with age. A vaccination programme was introduced in England in September 2013, targeting 70-79 year olds, with the goal of reducing postherpetic neuralgia (PHN) a painful and distressing condition. A vaccine was offered to adults aged 70 (routine cohort) and 78-79 years (catch up).

The study assessed the impact of this vaccination programme on GP consultations and hospital admissions.

METHODS

We used the Royal College of General Practitioners (RCGP) Research and Surveillance Centre (RSC) sentinel network for the primary care, representing over 1% English population that is geographically representative of the general population.

Data for the period October 2005 to September 2018 were obtained for patients aged 60 to 89 years. Denominator data was obtained for patients registered each month and stratified by age at September 2013, year/month, gender and GP practice.

RCGP RSC data were used to estimate vaccine coverage, eligibility and incidence of shingles and postherpetic neuralgia incidence change from the period before to after vaccine introduction in each targeted birth cohort. To account for changes that may have occurred in the absence of vaccination we used the incidence trend in those birth cohorts not yet targeted at each time point. This interrupted time-series modelling was done using Poisson regression with factors to identify the vaccine targeted cohorts as well as age effects and a time trend.

RESULTS

Vaccine uptake based on GP consultations was similar to the national uptake, achieving 60-65% coverage and subsequent increase to over 75%. The catch-up cohorts reached 60-65% uptake .

Coverage was similar for males and females for the routine programme. For the catch-up cohorts coverage was initially 6% higher in males, although this difference reduced to 2% by the most recent catch-up. Coverage varied by 10% across the four regions.

The unadjusted rates show evidence of lower incidence in the vaccine eligible cohorts across all years. However, there were higher rates in females; outside London and increases with age.

Cumulative uptake, observed and predicted cases and relative incidence estimates from the fitted models are summarised for zoster (Fig 1) and PHN (Fig 2).

We also observed 47% and 38% reduction in PHN incidence across routine and catch-up cohorts.

This would be equivalent to reduction in PHN episodes of 0.6-0.7/1000 person years - vaccine effectiveness of approximately 75% for the routine cohorts and 66% for the catch-up cohorts

Region, month and gender were not confounders. No significant interactions were identified.

It is of interest to note that in the first cohorts targeted incidence of herpes zoster and PHN remains low, demonstrating little evidence of waning. This evidence is particularly strong for the first catch-up cohort whom were no longer eligible for vaccination after age 79.

In that study the vaccine effectiveness (VE) was estimated 64% (95%CI = 60-68%) against incident zoster and 81% (95%CI = 61-91%) against PHN, with very similar VE estimates in the routine and catch-up cohorts and with some evidence of waning.

Age at Sep-2013 (age range vaccinated in first year eligible)	Period	Average cumulative uptake	Expected events*	Observed events	Incidence Rate ratio** (95% confidence interval)	Expected incidence per 1000 p-years	Incidence reduction per 1000 p-years (95% confidence interval)	Vaccine Effectiveness to give impact (95% confidence interval)
66-70 (70-71)	The year of vaccination	47%	1098	851	0.77 (0.72-0.83)	8.2	1.9 (1.4-2.3)	48% (37% -59%)
67-70 (70-71)	One year later	64%	838	509	0.61 (0.55-0.66)	8.5	3.3 (2.9-3.8)	61% (53% -69%)
68-70 (70-71)	Two years later	71%	616	378	0.61 (0.55-0.68)	8.7	3.4 (2.8-3.9)	54% (45% -63%)
69-70 (70-71)	Three years later	75%	413	217	0.52 (0.46-0.6)	8.9	4.2 (3.5-4.8)	63% (53% -72%)
70 (70-71)	Four years later	77%	199	124	0.62 (0.52-0.74)	9.1	3.4 (2.3-4.3)	49% (33% -62%)
66-70 (70-71)	All years	62%	3164	2079	0.66 (0.63-0.69)	8.5	2.9 (2.7-3.2)	55% (50% -60%)
74-79 (78 to 80)	The year of vaccination	48%	942	718	0.76 (0.71-0.82)	9.7	2.3 (1.7-2.9)	50% (38% -62%)
75-79 (78 to 80)	One year later	62%	757	481	0.63 (0.58-0.69)	9.8	3.6 (3.0-4.1)	59% (49% -68%)
77-79 (78 to 80)	Two years later	63%	578	397	0.68 (0.62-0.76)	9.9	3.1 (2.4-3.8)	50% (38% -60%)
78-79 (78 to 80)	Three years later	63%	409	273	0.67 (0.59-0.75)	10.1	3.4 (2.5-4.1)	53% (40% -65%)
79 (79 to 80)	Four years later	59%	124	81	0.65 (0.52-0.81)	10.2	3.5 (1.9-4.8)	58% (32% -80%)
74 -79 (78 to 80)	All years	57%	2811	1950	0.69 (0.66-0.73)	9.8	3.0 (2.7-3.3)	53% (47% -59%)

Fig. 1 Relative incidence estimates for GP diagnosed Zoster by year since introduction of herpes zoster vaccination programme

Age at Sep-2013 (age range vaccinated in first year eligible)	Period	Average cumulative uptake	Expected events*	Observed events	Incidence Rate ratio** (95% confidence interval)	Expected incidence per 1000 p-years	Incidence reduction per 1000 p-years (95% confidence interval)	Vaccine Effectiveness to give impact (95% confidence interval)
66-70 (70-71)	The year of vaccination	47%	151	103	0.67 (0.55-0.82)	1.1	0.4 (0.2-0.5)	**70% (38% -95%)**
67-70 (70-71)	One year later	64%	121	52	0.43 (0.32-0.56)	1.2	0.7 (0.5-0.8)	**89% (68% -105%)**
68-70 (70-71)	Two years later	71%	93	46	0.49 (0.37-0.66)	1.3	0.7 (0.4-0.8)	**71% (48% -89%)**
69-70 (70-71)	Three years later	75%	65	35	0.53 (0.38-0.75)	1.4	0.6 (0.4-0.9)	**62% (34% -82%)**
70 (70-71)	Four years later	77%	32	12	0.37 (0.21-0.64)	1.5	0.9 (0.5-1.2)	**82% (46% -103%)**
66-70 (70-71)	All years	62%	461	248	0.53 (0.46-0.61)	1.2	0.6 (0.5-0.7)	**75% (63% -86%)**
74-79 (78 to 80)	The year of vaccination	48%	174	133	0.76 (0.63-0.9)	1.8	0.4 (0.2-0.7)	**51% (21% -77%)**
75-79 (78 to 80)	One year later	62%	143	87	0.6 (0.48-0.74)	1.9	0.7 (0.5-1.0)	**64% (41% -83%)**
77-79 (78 to 80)	Two years later	63%	112	48	0.42 (0.32-0.56)	1.9	1.1 (0.8-1.3)	**91% (69% -108%)**
78-79 (78 to 80)	Three years later	63%	81	55	0.67 (0.51-0.88)	2.0	0.7 (0.2-1.0)	**53% (20% -78%)**
79 (79 to 80)	Four years later	59%	25	13	0.51 (0.3-0.88)	2.1	1.0 (0.2-1.5)	**82% (20% -118%)**
74 -79 (78 to 80)	**All years**	**57%**	**536**	**336**	**0.62 (0.55-0.69)**	**1.9**	**0.7 (0.6-0.8)**	**66% (54% -78%)**

Fig. 2 Relative incidence estimates for GP diagnosed PHN by year since introduction of herpes zoster vaccination programme

CONCLUSIONS

This study provides continued evidence of a population impact of the herpes zoster vaccination programme on herpes zoster and PHN amongst older adults in England.

The reduction translates to approximately 38,000 fewer zoster presentations and 8,100 fewer PHN episodes amongst the 4.5 million individuals, eligible for vaccination between 2013-2018.

This is in the context of an increasing incidence of zoster over time, reflecting changes in population demographics and similar to trends observed in other countries.

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