Public Health England

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Herpes zoster (shingles) immunisation programme 2013/2014:
Report for England

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Public Health England
Wellington House
133-155 Waterloo Road
London SE1 8UG
Tel: 020 7654 8000
www.gov.uk/phe
Twitter: @PHE_uk
Facebook: www.facebook.com/PublicHealthEngland

Prepared by: Immunisation, Hepatitis and Blood Safety Department, PHE, Virus Reference Department, PHE.
For queries relating to this document, please contact: Philip.Keel@phe.gov.uk

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Published December 2014
PHE publications gateway number: 2014563

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Executive summary

This report presents the evaluation of the first year of the herpes zoster (shingles) vaccination programme in England and a summary of the ongoing surveillance activities undertaken by Public Health England (PHE) to monitor the impact and effectiveness of the programme, since its introduction on the 1 September 2013.

Shingles is caused by the reactivation of a latent varicella zoster virus (VZV) infection and tends to occur decades after the primary varicella infection (chickenpox). It is characterised by a unilateral vesicular rash, generally limited to a single dermatome. The incidence and severity of shingles increases with age and an important complication is persistent pain extending beyond the period of rash, known as post herpetic neuralgia (PHN). The aim of the vaccination programme is to reduce the incidence and severity of shingles in those targeted by the programme by boosting individuals' pre-existing VZV immunity.

In the first year of the programme (2013/14), the vaccine was routinely offered to adults aged 70 years on 1 September 2013 (ie born between 2 September 1942 and 1 September 1943 and to adults aged 79 on 1 September 2013 (ie born between 2 September 1933 and 1 September 1934) as part of the catch up campaign.

In order to monitor the impact and effectiveness of the vaccination programme, PHE has established a number of surveillance systems which are detailed in the report. These include a new vaccine coverage collection, regular data extraction from Clinical Practice Research Datalink (CPRD) to monitor the impact of the programme on the incidence of shingles and PHN, establishment of a surveillance network of pain clinics across England to monitor trends in severe PHN and a collaboration with practices in the Primary Care Research Network (PCRN) and Royal College of General Practitioners' (RCGP) network to (i) estimate the sensitivity of a clinical diagnosis of shingles in cases aged 70 and above and (ii) to validate an oral fluid assay to confirm clinically suspected cases using a non-invasive method.

Coverage of the vaccination programme is being monitored in England through the establishment of monthly and annual collections via automatic uploads of GP practice data using the ImmForm website. Annual shingles vaccine coverage (September 2013 – August 2014) for the routine cohort ie those aged 70 years on 1 September 2013 was 61.8%. This ranged by area team (AT) from 51.3% (London) to 69.5% (Derbyshire and Nottinghamshire), with the majority (19/25) of ATs reporting coverage above 60%. Annual shingles vaccine coverage for the catch-up cohort, ie those aged 79 years, on 1 September 2013 was 59.6%. This ranged by AT from 50.9% (London) to 67% (West Yorkshire), 14 out of 25 ATs reported coverage above 60%. Most of those vaccinated, received shingles vaccine in the first few months of the programme, during the

seasonal influenza vaccination campaign. For the first time, shingles vaccine coverage data is published by ethnicity and gender. Although ethnicity data is experimental, this data suggests that vaccine coverage for the routine cohort does vary by ethnicity with the White-British and Indian ethnic groups having the highest coverage at 65.7% and 64.0% respectively, and the Black or Black British - Any other Black background, and Mixed-White and Black African ethnic groups having the lowest coverage at 41.7% and 43.6%. Vaccination coverage was slightly higher for men when compared to women in both routine (62.1% vs 61.5%) and catch-up (62.5% vs 57.2%) cohorts.

The impact of the vaccination programme on the incidence of clinically diagnosed shingles and PHN attending primary care will be assessed using CPRD data. Although CPRD data will initially be extracted to assess the impact of the first year of the vaccination programme, it is anticipated that follow up over an extended period of time will be required to provide definitive evidence of a direct impact of the programme. In addition, PHE has established a surveillance network of pain clinics across England to monitor trends in cases of severe PHN not managed in primary care,

This report highlights the successful implementation of the shingles vaccine programme in England. The surveillance systems established by PHE in collaboration with a range of partners will be essential to effectively monitor the impact and effectiveness of the shingles vaccine programme in England. After its successful introduction, it is hoped that the coverage achieved in the first year of the programme is maintained and improved upon in order to prevent the significant burden of disease associated with shingles among older adults in England.

Introduction

In 2010, the UK's Joint Committee on Vaccination and Immunisation (JCVI) recommended that a herpes zoster (shingles) vaccination programme should be introduced for adults aged 70 years with a catch up programme for those aged 70 to 79 years [1] [2]. In the first year of the programme (2013/14), the vaccine was routinely offered to adults aged 70 years on 1 September 2013 (ie born between 2 September 1942 and 1 September 1943 and to adults aged 79 on 1 September 2013 (ie born between 2 September 1933 and 1 September 1934) as part of the catch up campaign.

Shingles is caused by the reactivation of a latent varicella zoster virus (VZV) infection, following a decline in cell mediated immunity and the incidence of disease is known to increase with age. The purpose of the vaccination programme is to reduce the incidence and severity of shingles in those targeted by the programme by boosting individuals' pre-existing VZV immunity.

Shingles typically presents with a unilateral vesicular rash, usually limited to a single dermatome. The diagnosis is almost exclusively made on clinical suspicion with very few cases being laboratory confirmed. An important and debilitating complication of shingles is persistent pain extending beyond the period of rash known as post-herpetic neuralgia (PHN). The risk of PHN increases with age and is known to contribute significantly to the overall burden of shingles within the population [3] [4].

Zostavax®, which is a live attenuated vaccine, is the only market authorised shingles vaccine in the UK [5]. It is derived from the Oka strain of VZV and has a significantly higher antigen content than the Varivax varicella vaccine [5]. Since it is a live vaccine, Zostavax® should not be given to patients who have a known primary or acquired immunodeficiency state or patients who are receiving current immunosuppressive therapy including high-dose corticosteroids, biological therapies or combination therapies [5].

As shingles is not a notifiable disease and primarily based on a clinical diagnosis, there has not been any routine surveillance data previously collected in England. In order to monitor the impact and effectiveness of the shingles vaccination programme, PHE has set up new surveillance systems to:

- estimate vaccine coverage in the routine and catch up cohorts
- assess the impact of the vaccination programme on the age specific incidence rates of clinically diagnosed shingles and PHN
- estimate the effectiveness of the shingles vaccination programme against incident cases of clinically diagnosed shingles
- estimate the specificity of a clinical diagnosis of shingles in primary care

- validate the use of an oral fluid assay as a diagnostic tool in primary care

Vaccine coverage

In order to monitor the implementation of the programme in England, PHE has established a national vaccine coverage collection via ImmForm.[1]

Aggregated GP practice level shingles vaccine coverage data is automatically uploaded via participating GP IT suppliers to the ImmForm website on a monthly and annual basis. The ImmForm website provides a secure platform for vaccine coverage collections and these data collections are monitored, validated and analysed by PHE.

The data presented in this report is derived from the annual survey and covers the period September 2013 to August 2014. In order to monitor inequalities in vaccine coverage, additional information on gender and ethnicity was extracted in the annual survey. PHE also commissioned PRIMIS*[2] to provide Read Code specifications [6] for clinical risk groups in whom shingles vaccination may be contraindicated [5]. These Read Codes were used to attempt to estimate the size of this population in the eligible cohorts. This report updates data published in May 2014 reporting coverage to end-April 2014 and provides final shingles vaccine coverage data for the first year of the programme by area team (AT) in England [7].

Almost 90% (7,107/7,904) of GP practices in England reported annual shingles coverage data for the period September 2013 to August 2014. GP practice participation was very high across the country ranging from 77.6% to 99.7% of all practices in each AT (Appendix 1).

Annual shingles vaccine coverage for the routine cohort, ie those aged 70 years on 1 September 2013, was 61.8%. This ranged by AT from 51.3% (London) to 69.5% (Derbyshire and Nottinghamshire), with the majority (19/25) of ATs reporting coverage above 60% (Appendix 1, Figure 1). Annual shingles vaccine coverage for the catch-up cohort, ie those aged 79 years on 1 September 2013, was 59.6%. This ranged by AT from 50.9% (London) to 67% (West Yorkshire), 14 out of 25 ATs reported coverage above 60% (Appendix 1, Figure 1).

Most of those vaccinated received shingles vaccine in the first few months of the programme, during the seasonal influenza vaccination campaign. By the end of January 2014 (the end of the seasonal influenza vaccination coverage monitoring period for

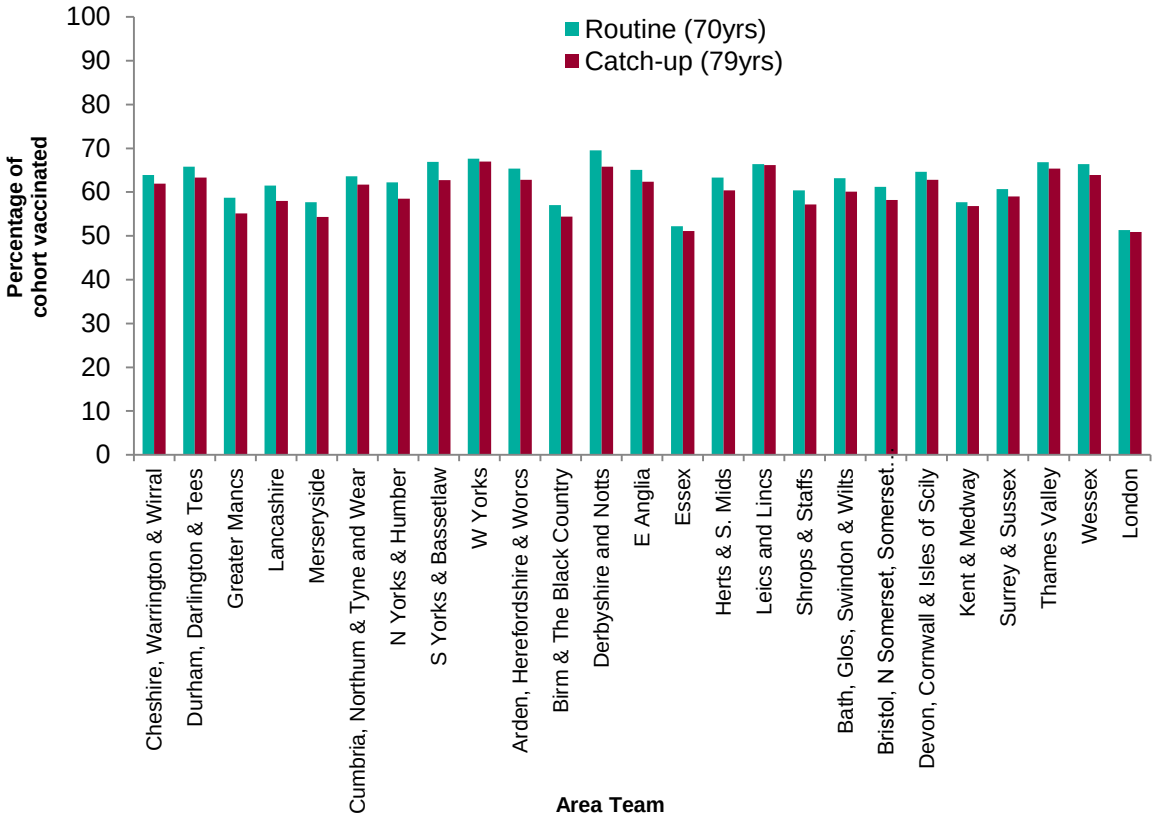
[1] ImmForm is the system used by PHE to record vaccine coverage data for some immunisation programmes and to provide vaccine ordering facilities for the NHS. https://www.immform.dh.gov.uk/SignIn.aspx?ReturnUrl=%2f

[2] *http://www.nottingham.ac.uk/primis/tools/specifications/index.aspx

2013/14) shingles vaccination coverage was already above 45% for both the 70 and 79 year old cohorts (Figure 2).

A very small proportion (1%) of individuals in cohorts who will become eligible for vaccination in future years (67-69 year olds and 71-78 year olds) across England also received the shingles vaccine in the first year of the programme (Appendix 1). This represents approximately 8.9% of all vaccine administered since the start of the campaign. Vaccine coverage among non-eligible cohorts was highest in the 69 (4.0%) and 78 year olds (5.4%). This is probably due to the fact that individuals in these cohorts had their 70th or 79th birthday during the course of the campaign year and were vaccinated at an early opportunity. Since only one dose of shingles vaccine is recommended, these patients will not require vaccination in future years.

Figure 1: Percentage of the routine (70 years) and catch-up (79 years) cohorts receiving shingles vaccine between 1st September 2013 and 31st August 2014 by area team



Using the PRIMIS Read Codes for clinical risk groups in whom shingles vaccine may be contraindicated, an estimated 2.9% of the routine cohort and 3.6% of the catch-up cohort fall into this category. The proportion of patients in clinical risk groups varied only marginally by AT for both cohorts (routine: 2.2% to 3.7%, catch-up: 2.7% to 4.8%). Vaccine coverage in these clinical risk groups for both cohorts was about 64%. However, the proportion of patients in a clinical risk group who were vaccinated

varied considerably between different GP IT suppliers. This suggests that coding inconsistencies impacted on this collection and further investigations into the quality of these experimental data are underway.

Nationally, 8.5% of those aged 70 years and 10.7% of those aged 79 years were recorded as having declined or refused the vaccine.

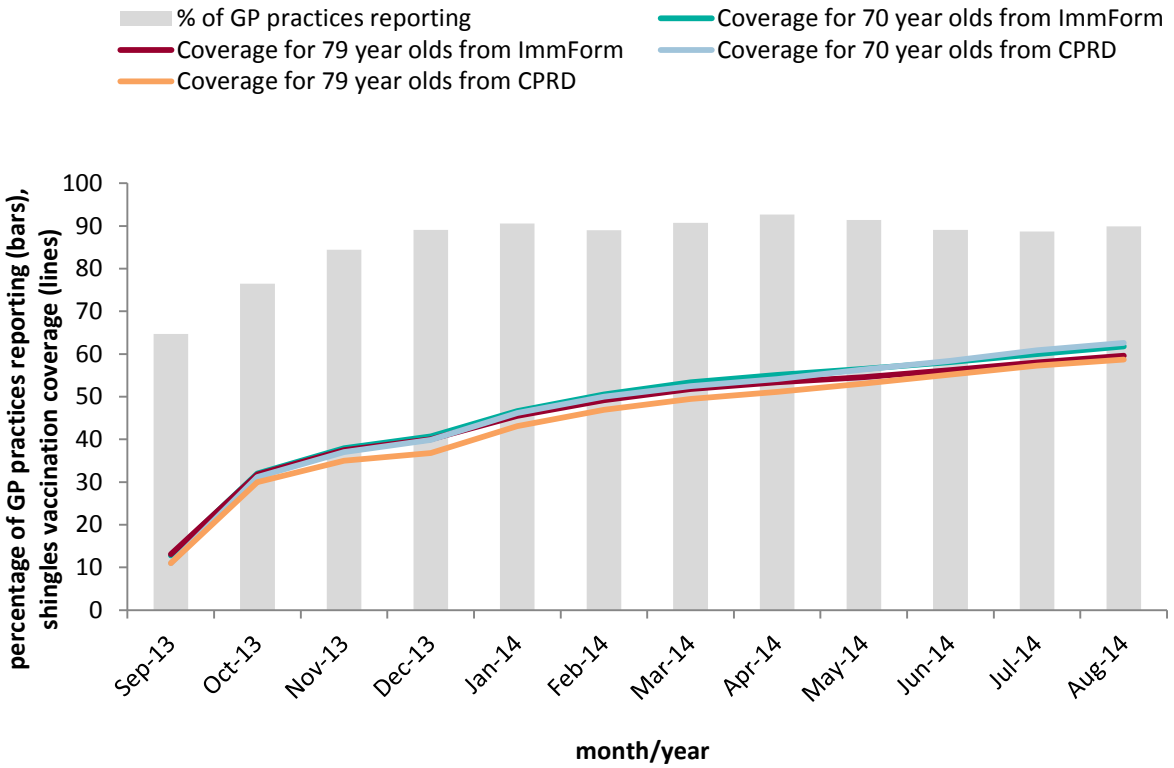
Vaccination coverage was slightly higher for men when compared to women in both routine (62.1% vs 61.5%) and catch-up (62.5% vs 57.2%) cohorts.

Only two (EMIS and Microtest) out of four GP IT suppliers were able to extract complete ethnicity data for both routine (Appendix 2) and catch-up (Appendix 3) cohorts, representing 52% of all the patients for each of the cohorts surveyed. However, ethnic group was only recorded for 64% of patients in the routine cohort, representing only 34% of patients aged 70 years overall. Similarly, ethnic group was only available for 61% of patients in the catch-up cohort, representing only 32% of patients aged 79 years overall. Due to these limitations the ethnicity data should be interpreted with caution. Despite this, the proportion of the routine and catch-up cohorts that were recorded as being of White ethnicities (92%, 92%) was in line with estimates from the 2011 national census for persons aged 70-74 years (94%) and 75-79 years (95%) [8].

The data suggests that shingles vaccine coverage in the routine cohort varied by ethnicity with the White-British and Indian ethnic groups having the highest coverage at 65.7% and 64.0%, respectively, and the Black or Black British - Any other Black background, and Mixed-White and Black African ethnic groups having the lowest coverage at 41.7% and 43.6%. A similar pattern was observed in the catch-up cohort with the highest coverage recorded in the White-British and Indian ethnic groups at 62.6% and 62.4%, respectively, and the lowest coverage seen in the Other – any other, and Black or Black British - African ethnic groups with 43.5% and 44.1% coverage, respectively.

In addition to the routine collection via ImmForm, vaccine coverage data was also extracted from a primary care dataset, the Clinical Practice Research Datalink (CPRD), which collects anonymised information on over 12.5 million UK patients registered at over 650 practices [9]. For each patient, basic demographic information, details of every consultation and diagnosis, and vaccination history is recorded. The geographical distribution and size of the 520 English general practices represented in the CPRD are representative of the population of England. Figure 2 shows a remarkably similar trend in cumulative coverage during the first year of the programme for both the routine and catch up cohorts based on the routine ImmForm collection and using data extracted from the CPRD.

Figure 2: Cumulative provisional monthly shingles vaccination coverage estimates and the percentage of GP practices reporting September 2013 to July 2014 and annual shingles vaccination coverage data and the percentage of GP practices reporting for August 2014, England. *Provisional Cumulative coverage estimates from CRPD to cover Sept 2013 to August 2014 also shown.*



Vaccine impact and effectiveness

Impact on the incidence of shingles

Data on clinically diagnosed shingles will be extracted from the CPRD from January 2000 onwards in order to assess the impact of vaccination. Monthly aggregated counts based on Read Codes for shingles disease will be extracted in yearly age groups from 65 to 84 years. Events within a year of a previous episode will be excluded. Date of birth is not available in the CPRD, and so the individuals eligible for vaccination in the first year of the programme could be among those aged aged 70 or 71 years (if born between 2 September 1942 and 1 September 1943), or aged 79 or 80 years (if born between 2 September 1933 and 1 September 1934). Counts will also be stratified by gender and geographic region. Although CPRD data will initially be extracted to assess the impact of the first year of the vaccination programme, it is anticipated that follow up over an extended period of time will be required to provide definitive evidence of a direct impact of the programme.

Impact on the incidence of post-herpetic neuralgia (PHN)

The impact of the programme on the incidence of PHN will be monitored using data extracted via CPRD and will require longer term follow up. Although many patients with PHN are managed in primary care, those with more severe disease are referred to specialist pain clinics for expert advice on pain control. In order to supplement the proposed monitoring of PHN via CPRD, PHE, with the support of the British Pain Society (BPS) has set up a surveillance network across 74 pain clinics in England. Pain Management Solutions, an independent pain provider, is also reporting to this programme, supplying data at an aggregate level for 37 clinical commissioning groups (CCGs). Participating clinics are requested to report on a quarterly basis, any new cases of PHN aged 70 years and above, referred from primary care. Detailed information is being collected on all referred cases including vaccine history, comorbidity and treatment.

Given the time lag between the development of PHN and referral to a pain clinic, it is anticipated that the data collected in the first year of the programme will serve as baseline data to monitor future trends.

Vaccine effectiveness

Vaccine effectiveness (VE) against clinically diagnosed shingles and PHN will be calculated using the CPRD. A cohort design will be used with those aged 65 to 79 years at the start of the vaccine programme included. Potential confounding variables for adjustment will include age, sex, period since vaccine introduction and being in a clinical risk group [5]. This analysis will require a longer follow-up period as reliable effectiveness estimates can only be calculated once the programme has been in place for a number of years.

Assessing the specificity of a clinical diagnosis and validity of an oral fluid assay

The specificity of a clinical diagnosis of shingles will be evaluated through a primary care sentinel surveillance scheme with GP practices recruited from the Primary Care Research Network (PCRN) and the Royal College of General Practitioners' (RCGP) network. This will be assessed by collecting a vesicle swab of the lesion site from shingles cases reported in participating practices. This information will be used to adjust the efficacy estimates obtained from the CPRD and will allow for the discrimination between wild-type and vaccine strains of shingles in those with a clinical diagnosis of shingles following recent vaccination.

In addition, as oral fluid (OF) sampling is often more acceptable, and less invasive, OF samples will also be collected and evaluated for the detection of VZV DNA. OF and vesicle sample collection kits with instructions have been distributed to 143 GP practices (118 from PCRN and 25 from RCGP), with the intention that an oral fluid sample and vesicle fluid be collected from every patient aged 70 and over who presents with shingles (irrespective of vaccination status). Information collected from the patients at the time of sample collection, includes, date of sample, date of onset of shingles, site of lesions, and whether the patient has previously received shingles vaccine. The samples are then packaged up and returned to the PHE Virus Reference Department (VRD), Colindale for testing. Samples are tested for the presence of VZV DNA by a probe-based real-time PCR. In addition, samples are tested for the presence of B2 actin DNA as a marker that the sample has been collected appropriately, and is suitable for testing.

Between September 2013 and August 2014, vesicle fluid or swabs were received from 75 patients, aged between 70 and 95. None of the patients had received previous shingles vaccination. Of these, 57 (76%) had detectable VZ DNA, confirming the clinical diagnosis. Of the 18 samples that were negative, 10 samples had no cellular DNA, suggesting that the sample was not suitable for testing. Overall, shingles could be confirmed in 57/65 (88%) of the suitable samples.

OF samples were received from 78 patients. Of these, VZV DNA was only detected in 25 (32%) of the samples, and all of the samples had cellular DNA present. All of the OF positive samples were from patients whose vesicle swab also tested positive (apart from two patients for which we only received OF samples).

Testing of OF samples for VZV DNA does not appear to be suitable for confirmation of recent shingles.

Discussion

In the first year of the shingles vaccination programme in England, vaccine coverage of almost 62% was achieved for the routine cohort, and almost 60% for the catch-up cohort. This demonstrates the successful implementation of the programme across England and is a testament to all the health professionals involved in its implementation. The high coverage achieved is particularly encouraging given the vaccine supply restrictions that were encountered at the beginning of the programme and the fact that during 2013, there was a parallel expansion of the routine immunisation programme with the introduction of rotavirus vaccination for infants and influenza vaccination for children aged two and three years.

In the first year of the shingles programme, vaccine supply was subject to temporary restrictions due to limited vaccine availability [10-12], requiring capping of orders from GP practices between September and December 2013 [13]. This temporary supply problem did not appear to have had a major impact because a significant quantity of vaccine was already available in practices from pre-orders, and because eligible patients could continue to be vaccinated up until the 31 August 2014.

Experience from other vaccination programmes targeting this age group have demonstrated that it can take several years for a programme to become established and high coverage to be achieved. For example, for the influenza vaccination programme offered to all patients aged 65 years and over, an increase in coverage in England was observed once the programme had become established, increasing from 65.4% in 2000/01 (the first year of the programme) to over 70% from 2003/04 onwards [14]. Because the shingles vaccine can be offered to patients alongside seasonal influenza vaccine, most of the eligible cohorts were vaccinated in the first few months of the programme, thus helping to embed the programme and achieve high coverage in this first year.

England is one of the few countries to introduce a shingles vaccination programme for older adults and to produce comprehensive coverage data. The vaccine coverage in England is considerably higher than that reported in the United States (US) in 2012, where 20.1% of adults aged ≥60 years reported receiving herpes zoster vaccination to prevent shingles [15] (in the first year of the US programme, 2007, coverage was 1.9% [16]). Australia and Canada also recommend the shingles vaccine for older adults, but the vaccine is not publically funded, hence coverage is low (estimated coverage in Alberta, Canada was 8.4% for those aged 60+ years from 2009 to 2013) [17][18].

This is the first time that shingles vaccine coverage data has been published by ethnicity and gender. The findings highlight the importance of collecting these data in order to describe health inequalities and help target communication and interventions to improve uptake among, for example, Black or Black British - Any other Black background, and Mixed-White and Black African ethnic groups who had about 20% lower coverage than White-British and Indian ethnic groups. However, it should be noted that these ethnicity data are experimental and based on only two IT suppliers. Patient records for older patients are generally not as well completed for fields such as ethnicity compared to records for children born since 2010, when recording ethnicity became routine [19].

In this report, we also present data collected on the estimated proportion of patients within the routine and catch-up cohorts who are in clinical risk groups in whom shingles vaccine may be contraindicated. We would expect the majority of patients identified to (i) have a primary or acquired immunodeficiency state due to a medical condition or (ii) receive immunosuppressive therapy [5]. Patients in these clinical risk groups would be

expected to have lower vaccination coverage than the rest of the cohort (rather than the higher coverage presented here). Read Codes can broadly identify patients with particular conditions listed in their medical records, without detailing the severity necessary to fully evaluate whether they meet the criteria to contraindicate the shingles vaccine. Whether or not a person with a listed clinical risk group on their medical record (as defined by the Read Codes) should receive the shingles vaccine requires a clinical assessment. In some instances these patients are also at particular risk of severe shingles disease and the clinician may decide that the vaccine would be beneficial. It is also possible that although a patient may have a relevant Read Code in their record the condition that this refers to may have subsequently resolved. Similarly, the patient could at one time have been on a drug that would place them in a risk group, but even though this may no longer be the case the medical record may not have been updated to reflect this. Additionally, Codes relating to clinical risk groups may not always be on a patient's record, for example, if information from a specialist is not fed back and entered by their general practice. In light of these initial findings, we are reviewing and validating the extraction process to improve the quality and accuracy of these data for future collections.

The surveillance systems established by PHE in collaboration with a range of partners will be essential to effectively monitor the impact and effectiveness of the shingles vaccine programme in England. After the successful introduction, it is hoped that the coverage achieved in the first year can be maintained and improved upon in order to prevent the significant burden of disease associated with shingles among older adults in England.

Acknowledgements

We would like to acknowledge the contribution and efforts of all of the health professionals who contributed to the information provided here. In particular, we would like to thank the Medicines and Healthcare products Regulatory Authority (MHRA), Clinical Practice Research Datalink (CPRD), GP practices in the Primary Care Research Network (PCRN) and the Royal College of General Practitioners' (RCGP) network, Pain Clinics in England and the British Pain Society as well as Pain Management Solutions. Finally, we would like to thank ImmForm and all of the area teams who report vaccination coverage data to the programme via ImmForm.

Appendices

Appendix 1: Shingles vaccine coverage in England by age cohort and area team - 1 September 2013 to 31 August 2014

Area team (code)	Per cent of practices reporting annual data	Percentage of age cohort vaccinated to end August		
		Routine 70 years	Catch-up 79 years	Future cohorts (67-69 years and 71-78 years)
Cheshire, Warrington and Wirral (Q44)	94.7	63.9	61.9	0.9
Durham, Darlington and Tees (Q45)	89.0	65.8	63.3	0.9
Greater Manchester (Q46)	77.6	58.7	55.1	1.1
Lancashire (Q47)	96.1	61.5	58.0	0.6
Merseyside (Q48)	84.1	57.7	54.3	1.0
Cumbria, Northumberland, Tyne and Wear (Q49)	78.9	63.6	61.7	1.0
N Yorkshire and Humber (Q50)	91.5	62.2	58.5	1.0
S Yorkshire and Bassetlaw (Q51)	93.5	66.9	62.7	1.4
W Yorkshire (Q52)	99.7	67.6	67.0	1.2
Arden, Herefordshire and Worcestershire (Q53)	93.9	65.4	62.8	0.6
Birmingham and Black Country (Q54)	84.4	57.0	54.4	0.9
Derbyshire and Notts. (Q55)	95.3	69.5	65.8	0.8
East Anglia (Q56)	91.0	65.1	62.4	0.9
Essex (Q57)	92.6	52.2	51.1	1.1
Hertfordshire and the S Midlands (Q58)	92.7	63.3	60.4	1.1
Leicestershire and Lincolnshire (Q59)	97.2	66.4	66.2	1.1
Shropshire and Staffordshire (Q60)	82.2	60.4	57.2	0.6
Bath, Gloucestershire, Swindon and Wiltshire (Q64)	93.2	63.2	60.1	0.9
Bristol, N Somerset, Somerset and S Gloucestershire (Q65)	83.9	61.2	58.2	0.6
Devon, Cornwall and Scilly Isles (Q66)	91.7	64.6	62.8	1.3
Kent and Medway (Q67)	85.8	57.7	56.8	0.6
Surrey and Sussex (Q68)	89.6	60.7	59.0	0.9
Thames Valley (Q69)	90.5	66.8	65.4	0.9
Wessex (Q70)	89.4	66.4	63.9	0.9
London (Q71)	92.7	51.3	50.9	1.4
ENGLAND	89.9	61.8	59.6	1.0

Appendix 2: Shingles vaccine coverage by ethnic group for the routine cohort aged 70 years, 1 September 2013 to 31 August 2014

Ethnic group	70 year cohort (routine)	Number vaccinated	% coverage
White - British	127,707	83,946	65.7
Asian or Asian British - Indian	2,998	1,919	64.0
White - Any other White background	7,380	4,387	59.4
White - Irish	1,934	1,122	58.0
Asian or Asian British - Any other Asian background	1,248	724	58.0
Asian or Asian British - Pakistani	1,222	685	56.1
Asian or Asian British - Bangladeshi	536	291	54.3
Other ethnic groups - Chinese	359	194	54.0
Mixed - Any other mixed background	198	106	53.5
Mixed - White and Asian	148	76	51.4
Mixed - White and Black Caribbean	346	173	50.0
Other ethnic groups - Any other ethnic group	660	328	49.7
Black or Black British - African	1,124	522	46.4
Black or Black British - Caribbean	1,885	861	45.7
Mixed - White and Black African	149	65	43.6
Black or Black British - Any other Black background	283	118	41.7
Ethnicity not stated	1,830	978	53.4
Ethnicity not recorded	80,143	46,303	57.8
Ethnicity not given - patient refused	216	112	51.9
Total	**230,366**	**142,910**	**62.0**

Appendix 3: Shingles vaccine coverage by ethnic group for the catch-up cohort aged 79 years, 1 September 2013 to 31 August 2014

Ethnic group	79 year cohort (catch-up)	Number vaccinated	% coverage
White - British	73,062	45,735	62.6
Asian or Asian British - Indian	1,886	1,176	62.4
Asian or Asian British - Pakistani	840	495	58.9
White - Any other White background	4,479	2,623	58.6
White - Irish	1,369	795	58.1
Mixed - Any other mixed background	103	59	57.3
Mixed - White and Black Caribbean	285	163	57.2
Asian or Asian British - Bangladeshi	390	219	56.2
Asian or Asian British - Any other Asian background	561	307	54.7
Black or Black British - Caribbean	1,676	841	50.2
Mixed - White and Asian	79	39	49.4
Mixed - White and Black African	81	38	46.9
Black or Black British - Any other Black background	175	79	45.1
Other ethnic groups - Chinese	225	101	44.9
Black or Black British - African	444	196	44.1
Other ethnic groups - Any other ethnic group	294	128	43.5
Ethnicity not stated	1,168	642	55.0
Ethnicity not recorded	54,422	30,679	56.4
Ethnicity not given - patient refused	152	90	59.2
Total	**141,691**	**84,405**	**59.6**

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