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Low uptake of nasal influenza vaccine in Polish and other ethnic minority children in Edinburgh, Scotland

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ABSTRACT

Failure to vaccinate is well-recognised in Europe as a contributing factor to outbreaks of infectious diseases. Low immunisation rates are often associated with religious, social and ethnic minorities, including refugees or migrant groups. Polish people form Scotland's newest and largest migrant group. They have moved to Scotland since 2004, joining established ethnic minorities from China, the Indian subcontinent and Africa.

Scotland has had a seasonal influenza nasal vaccination programme for all primary school children since 2013. We investigated three primary schools in Edinburgh, which had reported low influenza vaccination uptake rates in 2016 and 2017 and found that these schools contained many pupils from ethnic minorities, the majority of whom were Polish. Pupils were categorized as one of three ethnic groupings: White British, Polish and Other Identified Ethnic Minority (OIEM). We ascertained ethnicity using NHS and Education Department information sources and name recognition. We examined vaccine acceptance, declination and non-return of consent forms.

In 2017, nasal influenza vaccine uptake was 70.7% (65.2–75.6%, $p < 0.001$) in White British, 60.9% (53.9–67.6%%, $p < 0.001$) in other identified ethnic minorities and 25.0% (20.9–29.6%, $p > 0.001$) in Polish children. White British children were more likely to return completed forms (78.9%) than other groups (OIEM 68.2% and Polish 61.8%). 36.8% of Polish families completed a consent form declining vaccination compared to 6.2% of White British families.

These findings demonstrate that significant differences exist in nasal influenza vaccination uptake rates, which have important implications for the trans-national study of vaccine hesitancy. Further qualitative work and an investigation of uptake rates of other childhood immunisations in Polish and other migrant groups is required to assess differences in uptake and behaviours.

1. Introduction

Ethnic minorities and migrant populations often have lower immunisation uptake rates than the general population [1–3]. Since 2013, annual vaccination with live attenuated nasal influenza vaccines has been offered at no cost to all children in primary schools in Scotland, [4] a similar programme is being introduced in England [5]. For a child to be vaccinated, a completed consent form needs to be returned to school with parental acceptance – If one is not returned, or consent is declined, vaccination cannot take place. Parents who return a form stating that they have not given consent are described as "declining". A printed information booklet is provided in English and is available online in 27 other languages. The consent form is in English and not translated although there is limited online guidance in other languages highlighting the important sections to complete [6]. The Child Health Surveillance Programme (CHSP) maintains a register of all school pupils and records details about all the children immunised. Returned consent forms are scanned and all are retained electronically.

Strategies for influenza vaccination are controversial and vary between European countries with national public health authorities taking different views about the best policy [7,8]. Opinions vary among the general public and healthcare professionals about the value of influenza vaccination [9].

Since 2016, the National Health Service (NHS) Lothian immunisation team has noticed that Edinburgh schools with low seasonal influenza vaccination uptake also contained large numbers of ethnic minority pupils, many of whom were Polish. Scotland's population is becoming more diverse following the 2004 European Union expansion. Today, there are an estimated 89,000 Poles living

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in Scotland [10]. They form the largest and newest ethnic minority, with the other major groups being Chinese, Indian, Pakistani, Bangladeshi and African, all of which are longer established [11]. The 2011 census recorded 12,820 Polish people living in Edinburgh, comprising 2.7% of the population. During the 2017/18 school year, there were 2805 Polish children enrolled in Edinburgh's state-run primary schools (source: City of Edinburgh Council Education Department).

The vaccination schedule in Poland is similar to that of other European countries, including the UK. Not all vaccines in Poland are state-funded and the government categorises vaccines as either mandatory (state-funded) or recommended (not state-funded) [12–15]. Influenza immunisation is offered to vulnerable groups, but the nasal influenza vaccine is unavailable and there is no school programme. Staff groups involved are also different with extensive medical involvement and, customised vaccination scheduling for children in Poland [14,16].

Childhood immunisation rates in Poland remain high and reports show that there is high awareness of the immunisation programme [13,17]. However, there are concerns about uptake [13,18] and it is noteworthy that there is a strong anti-vaccination movement in Poland, which could have some influence on public opinion [13,17,18]. The proportion of parents in Poland declining any immunisation of their children has risen by 500% from 2006 to 2016, and currently represents about 23,000 children [13]. Outbreaks of seasonal influenza have been a recurrent phenomenon in both Poland and Scotland [19,20].

There is a dearth of studies assessing vaccine uptake in Polish families living in the UK. Notwithstanding, there are two studies involving Polish migrants, which highlight the underlying barriers to healthcare access and reduced ability to obtain preventive services [21,22] One qualitative Scottish study about H1N1 influenza vaccination in pregnant women identified challenges in vaccine uptake due to language barriers, difficulty accessing information, concerns about vaccine safety, lack of evidence on effectiveness, and a lack of confidence in official Government advice as issues for Polish migrants, as well as Scottish women [16].

We hypothesized that uptake of influenza vaccine would be lower in migrant than other children in Edinburgh schools, and that it would be particularly low in Polish children: the newest migrant group. This study aimed to analyse the uptake of influenza vaccines by children of different ethnicities in three schools in Edinburgh, Scotland in 2016 and 2017.

2. Methods

In Scotland, parents of primary school children are given information and consent forms for the annual influenza vaccination programme in August; the vaccines are administered at schools between October and December. Each school receives a pack to help promote the campaign.

The three state-run primary schools in Edinburgh with the largest numbers of Polish pupils were identified by the City of Edinburgh Council Education Department. Data about annual influenza vaccination status was acquired from the CHSP for 2016 and 2017. All children in years 1–7 (ages 5–12) were eligible for influenza vaccination and are the denominator for the study.

CHSP identified the children who had been vaccinated, and the stored consent forms were reviewed to determine who had declined. Cross-referencing this data with the school's enrolment index allowed the researchers to identify the pupils who had not returned a consent form.

Ethnicity and gender was determined for each child in three stages:

1. Matching the CHSP database and TRAKcare (the local NHS electronic health system, which holds ethnicity data, recorded according to census classification) using each child's Community Health Index (CHI) number (the unique personal patient identifier used by NHS Scotland) [23].
2. Extract from the School Education Electronic Management System (SEEMIS) for the three schools, which provided ethnic and gender information for many children, where this was not found in step 1.
3. Finally, consent forms were hand-searched by one Polish speaking study author (KB) to identify any other children as being of 'White Polish' ethnicity through their traditional Polish names and surnames on the CHSP database, or through parental/-maiden names recorded on consent forms.

2.1. Data analysis

1. Annual uptake was compared by ethnicity.
2. Influenza vaccination uptake, decline, and non-return rates of consent form were analysed by ethnicity for each year. Percentage uptake and 95% confidence intervals for differences between proportions were used. Confidence intervals are given for significant findings.

2.2. Ethics

The research was discussed with the Research Ethics Scientific Co-ordinator who ascertained that this was a service evaluation when assessed against the Health Research Agency Criteria. Approval for the use of immunisation and ethnicity data, from the sources described above, to audit the programme was gained from the NHS Lothian Caldicott Guardian.

3. Results

3.1. Study population

In total, 922 pupils attended the three schools in 2016 and 917 in 2017. Overall uptake rose significantly from 43.6% in 2016, to 48.2% in 2017, with a difference of 4.6% (95% CI 0.04–9.16%, $p > 0.05$) as presented in Table 1. Among ethnic groupings, statisti-

Table 1
Percentage nasal influenza vaccine uptake in each year in three primary schools by ethnicity; Edinburgh, Scotland, 2016–2017.

Ethnicity	2016			2017			Difference (95% CI)	P-value
	Pupils in cohort (#)	Pupils vaccinated (#)	Influenza Uptake (%)	Pupils in cohort (#)	Pupils vaccinated (#)	Influenza Uptake (%)		
Total	922	402	43.6%	917	442	48.2%	4.6% (0.04–9.16%)	0.048
Polish	387	86	22.2%	372	93	25.0%	3.8% (−3.24–8.84%)	0.364 (NS)
White British	297	186	62.6%	290	205	70.7%	8.1% (0.47–15.73%)	0.038
Other Identified Ethnic Minority	171	93	54.4%	192	117	60.9%	6.49% (−3.68–16.68%)	0.211 (NS)
Unknown	67	37	55.2%	63	27	42.9%	−12.3% (−4.9–29.5%)	0.161 (NS)

NS – non-significant.

cally significant changes were only seen in the White British children cohort. 51% of females and 48% of males received influenza vaccination each year (NS).

Tables 2 and 4 show that Polish children had a significantly lower uptake of the influenza vaccination, higher levels of both declining vaccination and non-return of the consent form in 2016. Tables 3 and 5 show the same in 2017.

When compared with the Identified Ethnic Minorities, Polish children had a vaccination rate that was significantly lower, a declining rate significantly higher and a similar rate of non-return of consent form in both 2016 and 2017.

Children from Other Identified Ethnic Minorities when compared with White British children had lower vaccination rates higher non-return of consent forms but similar rate of vaccine declination in both 2016 and 2017.

4. Discussion

Although we had hypothesized a low uptake of influenza vaccination among Polish children, we expected this to be due to non-return of consent forms (probably due to language-based issues)

Table 2
Percentage nasal influenza vaccination uptake, active decline, and unreturned consent forms in 2016 (N = 922).

	Polish (N = 387)	% Uptake	White British (N = 297)	% Uptake	Other identified ethnic minorities (N = 171)	% Uptake	Unknown (N = 67)	% Uptake	Total (N = 922)	% Uptake
Immunised	86	22.2	186	62.6	93	54.4	37	55.2	402	43.6
Active decline	104	26.9	20	6.7	17	9.9	3	4.5	144	15.6
Non-returned	197	50.9	91	30.6	61	35.7	27	40.3	376	40.8

Table 3
Percentage nasal influenza vaccination uptake, active decline, and unreturned consent forms in 2017 (N = 917).

	Polish (N = 372)	% Uptake	White British (N = 290)	% Uptake	Other identified ethnic minorities (N = 192)	% Uptake	Unknown (N = 63)	% Uptake	Total (N = 917)	% Uptake
Immunised	93	25	205	70.7	117	60.9	27	42.9	442	48.2
Active decline	137	36.8	18	6.2	14	7.3	3	4.8	172	18.8
Non-returned	142	38.2	67	23.1	61	31.8	33	52.4	303	33

Table 4
Comparisons between proportions of different outcomes of influenza vaccination consent return status by ethnicity in three primary schools in Edinburgh, Scotland in 2016.

Comparison	Percentage of ethnic group (%)		Percentage point difference (95% CI)	P-value
	White British	Polish		
Uptake	62.6%	22.2%	40.4% (33.0–47.8%)	<0.0001
Declined	6.7%	26.9%	20.2% (14.4–26.0%)	<0.0001
Non-return of consent form	30.6%	50.9%	20.3% (12.8–27.8%)	<0.0001
	Polish	**Other Identified Ethnic Minorities**		
Uptake	22.2%	54.4%	32.2% (23.8–40.6%)	<0.0001
Declined	26.9%	9.9%	17.0% (9.58–24.4%)	<0.0001
Non-return of consent form	50.9%	35.7%	15.2% (6.23–24.2%)	0.0009
	White British	**Other Identified Ethnic Minorities**		
Uptake	62.6%	54.4%	8.2% (−1.03–17.4%)	0.0817 (NS)
Declined	6.7%	9.9%	3.2% (−1.87–8.27%)	0.2157 (NS)
Non-return of consent form	30.6%	35.7%	5.1% (	<0.0001

Table 5
Comparisons between proportions of different outcomes of influenza vaccination consent return status by ethnicity in three primary schools in Edinburgh, Scotland in 2017.

Comparison	Percentage of ethnic group (%)		Percentage point difference (95% CI)	P-value
	White British	Polish		
Uptake	70.7%	25.0%	45.7% (38.1–53.3%)	<0.0001
Declined	6.2%	36.8%	30.6% (24.1–37.1%)	<0.0001
Non-return of consent form	23.1%	38.2%	15.1% (7.9–22.2%)	<0.0001
	Polish	**Other Identified Ethnic Minorities**		
Uptake	25.0%	60.9%	35.9% (27.5–43.7%)	<0.0001
Declined	36.8%	7.3%	29.5% (21.7–37.2%)	<0.0001
Non-return of consent form	38.2%	31.8%	6.4% (−1.9–14.8%)	0.134 (NS)
	White British	**Other Identified Ethnic Minorities**		
Uptake	70.7%	60.9%	9.8% (1.2–18.4%)	0.025
Declined	6.2%	7.3%	1.1% (−3.1–5.6%)	0.635 (NS)
Non-return of consent form	23.1%	31.8%	8.7% (0.7–16.9%)	0.034

rather than the high declination rate that was seen. While the consent form return rate was indeed highest in Polish children, it was their declination rate that was the striking feature and was very much higher than both the OIEM and British groups.

The findings about uptake rate are consistent with our original hypothesis, and we confirm that uptake of influenza vaccine is lower in Polish children than OIEM and that both these groups have lower uptake than British children in these three Edinburgh schools (25.0%, 60.9% and 70.7% respectively).

As new migrants, Polish nationals will bring their attitudes, beliefs, experiences, and expectations of influenza immunisation to Scotland [21,22]. In addition to the language barrier, we suggest that unfamiliarity with the NHS and differences in the way vaccinations are provided, as well as a low perceived importance of protection against influenza in Poland, mentioned above, are other potential reasons for low uptake in Polish children. Doctors, nurses, and teachers in Edinburgh regularly report that Polish people seek the familiarity of a healthcare system and practitioners they know by having treatment in Poland (all authors – personal communications). They can consult Polish practitioners on the telephone or online and also potentially access the recently established Polish-run clinics in the UK [24,25]. There is evidence that Polish women, living in Scotland, access cancer screening services in Poland and, especially as a high proportion of Polish migrants report that they intend to return to Poland to live, [26] it is possible the Polish families choose to have vaccinations there.

The Polish immunisation programme does not include influenza vaccination as recommended for healthy children, just for people with "occupational, clinical or epidemiological risk" [27,28] so any parents consulting Polish sources about it would be told it is not recommended and if they wanted it, it would have to be paid for. While 77.9% of parents in Poland are reported as paying for some vaccines, only 14.3% included influenza vaccine amongst those purchased [29]. Polish people have ready access to, and may be influenced by, the high volume of "anti-vax" material available online and in the Polish media [13,14,17,18]. Poland historically has had one of the lowest influenza vaccination rates in Europe for vulnerable groups [30,31] with low awareness of influenza vaccination being reported among healthcare professions in the country [32]. Taken together, this evidence points towards a lack of concern about influenza in Poland and given that Polish families in Scotland maintain close links with home it seems unlikely that Polish migrants in Scotland will be encouraged to have influenza vaccination by friends, family or professionals in Poland.

As new arrivals, Polish migrants would be expected to retain their attitudes and health behaviours from Poland, and for acculturation to take place over time [15]. Acculturation could explain the different uptake rates seen in these ethnic groups because they have lived in Scotland for different lengths of time. For example, South and East Asian people have usually lived there for many decades and have thereby become more familiar with public services [15]. Therefore, they are likely to know about, and be more compliant with, the Scottish immunisation programme.

Analyses of Vaccine Confidence Programme figures (referring to vaccination in general) from 2016, comparing UK and Poland, show that 7.3% of Polish respondents disagree or strongly disagree with the statement "vaccination is important for children" versus 5.7% in the UK while when the question "is vaccination effective" is asked, the corresponding figures are 11.25% vs. 7.0% and when "is vaccination safe" is asked, they are 11.95% vs. 8.69% [33]. A 2018 Polish paper from the Silesian Voivodeship (region of Poland) based on a questionnaire to 1187 parents, reported that 35.7% regarded vaccination as "Not Safe" [15]. These population-based surveys suggest that people living in Poland may be more sceptical about vaccination in general than United Kingdom citizens.

The consent form may not be returned for a number of reasons simply not getting it (it should be delivered home by the children), not understanding it, or forgetting about it. Parents will know that their child cannot be vaccinated without a completed affirmative consent form, so may use non-return as a method of declining. However, the high rate of declining consent contributes as much as the non-return of consent forms to Polish children's very low vaccination uptake: 130 of the 230 Polish children (59.6%) who returned consent forms, declined vaccination. This is the only occurrence we are aware of where more parents decline than accept an element of the UK vaccination programme.

Clearly, this low uptake cannot be simply explained by the poor language competencies of the recently arrived Polish group. The SAGE working group by highlighting that vaccine hesitancy 'is complex and context specific, varying across time, place and vaccines' describes the challenges in researching behaviour in this migrant group [34]. This study does not put forth an explanation for this low uptake rate phenomenon, but rather, emphasises the importance of finding out – both for the influenza and for other immunisation programmes. We speculate that the reasons may include the following: some families discarding English language material; others access and study the online NHS-provided Polish language material and make the informed decision not to vaccinate; while others may make a decision based on their beliefs about immunisation or opinions about the Scottish healthcare system in general.

5. Limitations and strengths

Ethnicity was determined for 94% of participants in the study by using multiple methods and uptake was calculated using clinical records rather than self-report to establish vaccination. The NHS data systems and recording of ethnicity data and education data are robust and we believe we have attributed ethnicity accurately. We also utilised name searching of consent forms by a Polish-native researcher, which is an option not available in all locations. Using a programme such as Onomap to attribute ethnicity based on names could be used as an alternative [35,36].

Study participants were from three schools in one area of Scotland. While we have no reason to believe that these children from Edinburgh are atypical of Polish migrants in general, studies in other areas would be useful to confirm that our findings apply elsewhere. Larger studies would allow disaggregation of our other identified ethnicities (such as Chinese, Pakistani or Indian groups), which could give useful information to the vaccination programme. Following vaccination behaviour by ethnicity over a longer period, especially where a Polish-specific intervention, such as Polish language consent forms, or customised training for Polish speaking school staff were implemented would be of value in evaluation.

6. Conclusion

We show high rates of declining consent and associated low uptake of the nasal influenza programme in Polish migrants living in Edinburgh. Evidence from the literature and these findings points towards the three Cs of vaccine hesitancy - complacency, convenience and confidence - all likely being to be represented in the behaviour of Polish families in the nasal influenza programme [34,37]. Further quantitative work investigating the uptake of other childhood vaccinations in this cohort is under way and will prove enlightening, as could interrogating Scottish national databases to confirm this low uptake and the active decline of this vaccination country-wide.

Qualitative studies looking in detail at any differing beliefs, cultural norms and concerns in Polish migrant populations are also crucial, especially if we are to successfully implement multicomponent and targeted strategies [38–40]. NHS Health Scotland will be updating the series of public information leaflets and working with minority populations to include answers to questions that minority groups want answered. The information, consenting and delivery of the entire vaccination programme may potentially be altered to improve the level of informed consent and will hopefully lead to enhanced uptake.

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Declarations of interest

None.

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