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UK Immunization Programme for the Human Papillomavirus: Parental Attitudes and Uptake of the first two Doses at two Schools in Scotland

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Abstract: From September 2008, all UK schoolgirls aged 12−13 are being offered free routine vaccination against the human papillomavirus, and girls aged 14−18 a limited catch−up vaccination. The effectiveness of a national immunization programme depends on high uptake rates and schoolgirls receiving all three doses. Two studies on parental attitudes and one prospective cohort study on uptake of the first two doses have predicted uptake rates of about 70−80%. The aim of this study is to examine uptake rates of the first two doses of the actual vaccine programme and parental attitudes. A questionnaire was distributed to three schools in October and completed by school nurses. Data from two schools was used for analysis. Results showed 91.1% of parents consented to the vaccine and uptakes rates were 95.3% for both doses in school A and 85.6% and 85.2% for school B. Girls not being vaccinated on schedule was a problem, but overall the results are encouraging. However ultimate success depends on uptake of the third dose.

Key words : cervical cancer, HPV vaccine, national vaccination programme, uptake rates, schoolgirls

Introduction

Cervical cancer is one of the most preventable and curable of all cancers. However, with about 510,000 newly diagnosed cervical cancer cases and 288,000 deaths yearly, it is the second most common cancer in women worldwide. Attempts to eradicate cervical cancer began over 50 years ago with secondary prevention in the form of the "Pap Smear" or "Pap Test" and it is estimated that systematic cytology−based screening can reduce deaths from cervical cancer by around 70%.[1] In the 1980s, the next major breakthrough was made by zur Hausen, who discovered a link between cervical cancer and HPV.[2] During the following 20 years many epidemiological studies were undertaken and at the beginning of the 1990 s, results clearly demonstrated that specific "high−risk" types of HPV were carcinogenic and persistent infection with these "high−risk" types was necessary for the development of cervical cancer.[3]

Identification of a virus also implies that successful prophylactic or therapeutic prevention should prevent the disease(s) that it causes. Identification of "high−risk" types of HPV led the way for the development of vaccines against primary high risk HPV infections and consequently against specific cancers, and in particular cervical cancer. Large scale clinical trials by two major pharmaceutical companies led to the development of two safe and highly effective prophylactic virus−like particle (VLP) vaccines, *Gardasil* (Merck) and *Cervarix* (GlaxoSmithKline).[4,5,6] Both vaccines are effective against the 2 most common oncogenic types of HPV, HPV 16 and HPV 18, responsible for about 70% of all cases of cervical cancer. Furthermore, *Gardasil* also offers protection again low−risk HPV 6 and HPV 11, responsible for 90% of all cases of genital warts. For maximum pro-

Table 1
Age Recommendations for HPV Vaccines[7,8]

North America	Routine Vaccination	Catch–Up Vaccination	Australasia	Routine Vaccination	Catch–Up Vaccination
USA	11–12	13–26	Australia	12–13	14–26
Canada	9–13	14–26	New Zealand	12–13	14–18
Western Europe	Routine Vaccination	Catch–Up Vaccination	Western Europe	Routine Vaccination	Catch–Up Vaccination
Austria	9–15	16–26	Lithuania	Not stated	–26
Belgium	10–13	14–26	Luxembourg	11–12	13–18
France	14	15–23	Netherlands	12	13–16
Denmark	12	13–15	Portugal	12	17
Germany	12–17	Dr. decides	Spain	11–14	not stated
Greece	12–15	not stated	Switzerland	11–14	15–19
Italy	12	none	Sweden	13–17	none
Norway	11–12	13–16	UK	12–13	14–18

tection, three doses of the vaccine need to be administered over a six month period before the recipient becomes sexually active.

As of December 2008, HPV vaccines have been licensed in 109 countries worldwide. A total of 20 countries: 2 in North America, 16 in Western Europe, and 2 in Australasia have issued formal recommendations regarding their large scale use in national health systems, immunization programs or public sector health systems[7,8] (Table 1). All these countries are wealthy with well developed health systems and national immunization policies. All have moderate to high population coverage in opportunistic or organized screening programs. This means the burden of cervical cancer is relatively low compared to those countries, especially third world countries, with poor or no screening coverage. The recommended age of vaccination varies from country to country. However, with the exception of Austria, which also recommends vaccinating males, the target population, including limited "catch–up" programs, is females aged between 9 and 26 years.[7,8]

While one Canadian study reported a first dose uptake rate of 53%, there is little data on HPV vaccination uptake in countries where the vaccination has already been introduced.[9] Several countries, including the United Kingdom (UK), have introduced free school–based vaccination programmes. The effectiveness of a national immunization programme depends on high coverage.[10] Two UK studies on parental attitudes to the vaccination have predicted an uptake rate of about 70–80% and one prospective cohort study in Manchester, England, reported uptake rates of 70.6% and 68.5% for the first and second doses, respectively.[9,11,12] However 20% of parents did not respond to the invitation to have their daughter vaccinated, and of the 8.1% of parents who refused to have their daughters vaccinated, 23% did so not because they were against the vaccination per se, but because it was a research study and not the actual national vaccination programme.

The aim of this study is therefore to examine uptake rates of the first two doses of the actual HPV vaccine programme at two secondary schools in the UK as well as parental attitudes to the vaccine.

Materials and Methods

2.1 The UK National Vaccination Programme

In June 2006, after recommendations from the Joint Committee on Vaccines and Immunisations (JCVI), the Department of Health (DoH) announced that a free, school－based vaccination programme would be available on the National Health Service (NHS) from September 2008. The DoH decided to fund the vaccine for the following two cohorts:

1. An ongoing school－based vaccination (routine vaccination) for girls aged 12－13, generally administered in the second year of secondary school (S2).
2. A predominantly school－based 2 year catch－up vaccination programme for girls aged 13－18.

In Scotland the catch－up programme will last for 3 years starting in 2008, while in the rest of the UK, the catch－up programme was to be for 2 years starting in 2009. However, due to the savings the government made on the "price－war" they invoked between the two pharmaceutical companies manufacturing the vaccine, a catch－up vaccination of girls aged 17－18 was also started in 2008 in other parts of the UK.

Unlike Australia, a free catch－up programme for women up to the age of 26 was not found to be cost－effective, but the DoH did admit it may be beneficial for some women and the issue is under review.

2.2. Participants

A total of 661 school girls, 330 in year S2 (12－13yr) and 331 in years S5 and S6 (16－18yr) at three secondary schools in central Scotland were included in the study. However, only 411 school girls, 200 in year S2 and 211 in years S5 and S6 were used in the data analysis. To take part in the routine national vaccination programme, girls in year S2 were expected, but not compelled, to obtain informed written consent from their parents and to return the consent form to the school nurse. Girls in years S5 and S6 taking part in the catch－up vaccination programme did not require parental consent and could fill out the consent form by themselves.

2.3 Schools

Three small to medium sized schools participated in the study. Since the three doses required for the complete vaccination programme have not yet been completed, information on uptake rates is regarded as "sensitive" and has not yet been released to the public by the local health boards. Four schools were contacted and the rectors of three schools initially agreed to participate in the research. However, the rector of school C was not given permission from the local health board to release the data, so the results of two schools could only be included in the analysis.

School A is a small school with a student role of around 850. Almost 25% of student live outside the catchment area and place a request to attend the school. The academic level is high with around 50% of students going on to 4 year public universities. Both discipline problems and attendance problems are few and parents take an active role in their child's education as well as the running of the school. The number of students receiving free school meals is 7.7%

School B is a medium sized school with a student role of around 1250 students. Many of the students' parents are unemployed so the students themselves see no value in education. Around 40% leave school as soon as it is legally possible at the age of 16. Discipline, truancy and in more recent years drug use are also a problem. The number of students receiving free school meals is 13.5%

Neither of the schools has a high rate of ethnic

minority students. A factor that was significant in vaccination refusal in the Manchester study.

2.4 Study procedure

A letter explaining the purpose of the study and a questionnaire was sent to the rector of four schools in Scotland in September 2008, one week before the start of the national vaccination programme. Three rectors agreed to their school taking part in the research and stated that the questionnaire would be filled out by the school nurse after the 2nd immunization had taken place in October. Follow−up telephone calls took place if the data received was unclear or incomplete.

2.5 Ethics

Participation in the study was approved by senior staff members of each school and anonymity was assured. The school was free to refuse disclosing why parents did not agree to have their daughter vaccinated.

Results

3.1 Compliance and Consent

While 20.3% of parent did not respond to the invitation to have their daughters vaccinated in the Manchester pilot study, no parents in school A and only 8.6% of parents in school B did not respond. The percentage of parents who refused to have their daughter vaccinated was 8.1% in the Manchester study, but 6.9% (n=5) and 2.3% (n=3) in schools A and B, respectively. So compared to the overall parental consent of 71.6% in Manchester, 91.1% of parents agreed to have their daughter vaccinated in this study (Table2). With the exception of one parent in school B stating her child had contra−indications to the vaccine, no other parent stated a reason for refusing to have his or her daughter vaccinated. There was also no case where the parent refused consent, but the child insisted on being vaccinated.

3.2 Uptake rates

While 2.1% of students who completed the first dose in the Manchester study, did not go on to have the second dose, all students in the routine vaccination of this study and all students in the catch−up programme of School A completed both doses (Table 3). In school B, 0.8% (n=1) of the students in the catch−up programme did not have the second vaccination. However, the proportion of schoolgirls in both age groups who were absent on the scheduled vaccination day of the first dose in school A was significantly higher than School B, 19.4% and 16%, compared to 5.3% and 5.5%, respectively. The absence rates of School A are similar to the Manchester

Table 2
Number and proportion of schoolgirls receiving first two doses of the HPV vaccine

	Manchester	School A		School B	
	12−13yr (n=2817)	12−13yr (n=72)	16−18yr (n=77)	12−13yr (n=128)	16−18yr (n=134)
Response to invitation (%)	79.7	100	100	91.4	82.1
Parental Refusal of Vaccination (%)	8.1	6.9	NA	2.3	NA
Overall acceptance rate (%)	71.6	93.1	100	89.1	82.1
Uptake Rate for 1st Vaccination (%)	70.6	93.1	97.4	89.1	82.1
Uptake Rate for 2nd Vaccination (%)	68.5	93.1	97.4	89.1	81.3

Table 3
Proportion of schoolgirls who were vaccinated on schedule and absentee rates

	Manchester	School A		School B	
	12–13yr	12–13yr	16–18yr	12–13yr	16–18yr
Received first dose (%)	70.6	93.1	97.4	89.1	82.1
On schedule	59.1	85.0	81.8	84.4	77.6
Later	11.5	18.1	15.6	4.7	4.5
Absence rate for scheduled 1st dose (%)	16.3	19.4	16	5.3	5.5
Received second dose (%)	68.5	93.1	97.4	89.1	81.3
On schedule	52.3	93.1	97.4	77.4	71.6
Later	16.2	0	0	11.7	9.7
Missed second dose	2.1	0	0	0	0.8
Absence rate for scheduled 2nd dose (%)	25.9	0	0	13.1	12.8

study (16.3%). Regarding the second dose, the proportion of girls who failed to have the vaccination on time in School B doubled, however the absence rate in the Manchester study was still twice that of School B.

3.3 Catch–Up Vaccination

In the catch–up vaccination, 17.9% of girls in the catch–up programme of school B did not return the consent form, compared to 0% of girls in school A. However, while all girls consented to the vaccine in School A, two girls were absent on both the scheduled and re–scheduled vaccine days for both doses, resulting in failure to be vaccinated.

Discussion

Several studies have shown that an uptake rate of 66% is necessary to significantly reduce rates of cervical cancer and when vaccinating girls alone an uptake rate of at least 80% has to be obtained to get the same results as vaccinating both sexes.[13] This was achieved in this study. For the vaccine to be effective girls have to receive all three doses. Health officials have expressed fears that girls may not continue to have all three vaccinations, and thus reduce the effectiveness of the vaccine. In this study, all students in the routine vaccination who gave consent received both doses and only one student in the catch–up programme failed to have the second dose. Since she was in the catch–up group it is possible she may have left school between the first and second dose and would need to continue the programme with her GP.

While compliance with both doses was high, compliance with the vaccine schedule was not. If we look at the proportion of girls vaccinated on time, we can see that in School A which has an unauthorized absence rate of just 3.3%, almost 20% of the girls in the routine vaccination programme were absent on the scheduled day of the first dose. In the catch–up programme at school A, while the consent rate was 100%, only 97.4% of girls received the first and second dose. This was because 2 girls were absent an all 4 set days for the vaccinations. This means that students who were studying for university entrance exams missed 4 days of classes presumably because they were afraid of having an injection. Research conducted in the UK one year before the national vaccination programme commenced regarding atti-

tudes to the HPV vaccination showed that the main concern of girls having the vaccination was fear of pain.[14] Influenza vaccination is not common in the UK, so most children have no routine vaccinations after the age of 5.[15] The results of this study suggest that more effort needs to be taken to reassure those girls who are afraid of having the vaccine. Furthermore, since the third vaccine dose is schedule for March one month before the beginning of university entrance exams, re-scheduling a make-up day for those girls who missed the vaccination may be difficult since girl do not attend school from April and they may be more concerned with studying for their exams than completing the vaccination schedule.

In school B, 17.9% of girls did not return their consent form. This may be due to the fact that after the age of 16 students are not required by law to attend school and absences are common. Many students leave school during the academic year, so it will be essential that girls who do not attend school regularly are identified and those who do not receive all or some of their vaccinations at school get the proper follow-up with their GP.

Conclusion

In this study 91.1% of parents consented to having their daughter vaccinated against HPV. This is consistent with other routine childhood vaccination rates in the UK. The fear of HPV vaccination inducing early onset of sexual activity or vaccination safety do not seem to be not an issue. Similarly the problem of a parent refusing consent but her daughter wanting to be vaccinated did not arise.

Uptake rates for both the first and the second vaccines were high and with the exception of one student all students who had the first vaccination also underwent the second one. However to achieve this schools had to set a make-up day for a significant number of students who were absent of the scheduled day and this may be disruptive to both the school calendar and the girls' studies, especially in the older age group of the catch-up vaccination. More time needs to be spent with girls who fear injections.

The results of this study are encouraging for the success of the UK national vaccination programme to eradicate cervical cancer. However, the ultimate success depends on the uptake rates of the third dose, scheduled to be given in March 2009.

Study Limitations

This study examined uptake rates at two schools in Scotland, neither of which were large inner-city schools where the number of ethnic minority students and those receiving free school meals tend to be higher. Both of these factors were quoted as being significant with regards to low-up take rates in the Manchester study.

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