Public Health England

Protecting and improving the nation's health

Human papillomavirus (HPV) vaccination uptake in gay, bisexual and other men who have sex with men (MSM)

National programme: 2018 annual report

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Contents

Executive summary

In November 2015, the Joint Committee on Vaccination and Immunisation (JCVI) advised that a targeted Human papillomavirus (HPV) vaccination programme should be introduced in England for gay, bisexual and other men who have sex with men (MSM) aged up to 45 years attending sexual health and HIV clinics. The implementation of this recommendation in England started with a pilot programme that ran from June 2016 to April 2018 for MSM attending selected specialist sexual health services (SSHS) and HIV clinics.

Following this successful pilot, NHS England rolled out a national HPV vaccination programme on a phased basis between April 2018 and March 2019. It has been reported that the HPV vaccination programme for MSM was being delivered in all SSHS and HIV clinics across England by 1 April 2019. This report includes data from 50% and 33% of all SSHS and HIV clinics, respectively, that reported HPV vaccination activity by end December 2018.

This report presents HPV vaccination first dose initiation data from the first 9 months of the HPV MSM national programme, to end December 2018. Additionally, the report provides an update on HPV vaccination uptake (initiation and completion) in clinics that originally participated in the HPV MSM pilot and have since transitioned to the national programme. Vaccination initiation is reported overall for all clinics by calendar year.

Reported vaccination initiation and completion are also reported separately for pilot and non-pilot clinics in order to accurately compare activity levels due to differences in the maturity of services. Specifically, results from non-pilot clinics are derived from a maximum of 9 months of activity, with over 60% of these clinics only having 3 months of activity by end December 2018.

Overall, recorded first dose initiation of eligible MSM at pilot and non-pilot SSHS was 29.8% (16,269/54,590) in 2018. At pilot and non-pilot HIV clinics, recorded initiation was 11.3% (140/1,235) in 2018. In pilot clinics only, recorded first dose initiation of eligible MSM between pilot start and end December 2018 was 42.8% (32,562/76,033) and 46.7% (783/1,677) in SSHS and HIV clinics, respectively. Second and third dose completion at pilot SSHS was 54.1% (17,609/32,562) and 31.2% (10,168/32,562), respectively.

At pilot HIV clinics, second and third dose completion was 72.4% (567/783) and 57.2% (448/783), respectively. At non-pilot clinics, who began offering vaccination at various times during this first 9 months of the national programme, initiation was recorded at 30.0% (3,753/12,491) and 25.2% (104/412) in SSHS and HIV clinics, respectively.

However, the proportion of eligible MSM with no HPV vaccination code was still high, suggesting reported uptake may still be an underestimate.

Vaccination initiation, and second and third dose completion, in MSM attending SSHS and HIV services will continue to be monitored and reported annually. Future analyses are expected to provide a more accurate picture of vaccination uptake across all clinics implementing the national HPV MSM programme.

Key points

The main findings of this report are:

- at pilot and non-pilot SSHS, recorded first dose initiation of eligible MSM was 29.8% in 2018, with over 16,000 eligible MSM receiving a first dose
- at pilot and non-pilot HIV clinics, recorded first dose initiation was 11.3% in 2018, with 140 eligible MSM receiving a first dose
- the proportion of MSM offered and declining vaccination in 2018 was 1.9% in SSHS and 4.5% in HIV clinics
- between pilot start (earliest 6 June 2016) and end December 2018, recorded initiation was 42.8% at pilot SSHS and 46.7% at pilot HIV clinics
- second and third dose completion at pilot SSHS was 54.1% and 31.2%, respectively
- second and third dose completion at pilot HIV clinics was 72.4% and 57.2%, respectively
- between national programme start (1 April 2018) and end December 2018, recorded initiation was 30.0% and 25.2% at non-pilot SSHS and HIV clinics, respectively
- the proportion of eligible MSM with no HPV vaccination code was still high, 40-80%, suggesting some missed opportunity to vaccinate and that reported uptake may still be an underestimate.

Background

The disease

Human papillomavirus (HPV) is a sexually transmitted virus known to cause cancers of the cervix, anus, penis, vulva, vagina and oropharynx [1, 2]. There are over 100 different types of HPV, of which 13 have been shown to be associated with approximately 99% of cervical cancers with the majority caused by HPV types 16 and 18 [3]. In males, HPV is associated with 80-85% of anal cancers, 6-71% of oropharyngeal cancers and 50% of penile cancers [4, 5]. Additionally, HPV types 6 and 11 cause approximately 90% of genital warts in both males and females [6]. HPV-associated cancers, particularly anal cancer, disproportionately affect and are more common in MSM compared to heterosexual males. HIV positive MSM in particular have a higher risk of HPV-related disease [7]. Further information about the disease can be found in the 'Human papillomavirus (HPV): the green book, chapter 18a' [5].

HPV vaccination in the UK

A national HPV Vaccination Programme for females was introduced in the UK in September 2008. In 2019, this programme was extended to include males. This programme offers HPV vaccination routinely to males and females entering year 8 of school (aged 12-13 years) and is almost exclusively delivered in schools. There was a catch-up programme in the first 2 years of the programme to offer vaccination to all females aged up to 18 years old in 2008. Vaccination coverage has been consistently high, above 80% for routine vaccination. Since the introduction of the programme, there is evidence of substantial declines in HPV types included in the vaccine and some other closely related types in sexually active young females [8, 9]. In addition, there is evidence of declines in diagnoses of genital warts among young females as well as in young heterosexual males, showing substantial herd protection [10, 11].

In 2015, the JCVI recommended the implementation of a targeted HPV vaccination programme for unvaccinated MSM aged up to and including 45 years, to be delivered in specialist sexual health services (SSHS) and HIV clinics subject to procurement of the vaccine and delivery of the programme at a cost-effective price [12].

This recommendation was made with recognition of the higher risk of infection and disease in MSM, the ongoing nature of this risk into later decades of life for MSM attending SSHS and HIV clinics and the lower herd protection to MSM from the years of female-only vaccination [13]. This rationale remains valid since extension of the national school-based programme to males: prior HPV vaccination is recorded as a reason for not vaccinating otherwise eligible MSM in the SSHS/HIV programme, and this will

become far more common in years to come. Following the JCVI's recommendation in November 2015, a 2-year pilot was introduced in England that ran from June 2016 to April 2018.

During the pilot, excluding clinics with known poor quality of data recording, around 50% of eligible MSM initiated HPV vaccination and less than 5% refused vaccination [14]. Along with other factors evaluated during the pilot [15], this evidence of uptake and acceptability supported the decision to proceed to a phased national rollout of a HPV vaccination programme for MSM attending SSHS and HIV clinics from April 2018 [15, 16]. Phased rollout in England was complete by the end of April 2019, with all SSHS and HIV clinics providing a vaccination service by this date.

The vaccine

At the time of writing this report, the recommended vaccination course for use in the programme for MSM (aged 15 years and above) is 3 doses of the quadrivalent vaccine (Gardasil®), ideally administered within 1 year. However, it is clinically acceptable to administer the course over a period of 2 years. Second and third doses should be given at least 1 month and 3 months after the first and second doses, respectively. This schedule allows for opportunistic delivery of the vaccine as per the British Association for Sexual Health and HIV (BASHH) recommended attendance of MSM in SSHS (all sexually active MSM advised to be tested for STIs annually, and high-risk MSM to be tested every 3 months).

Aims

This report provides an update on HPV vaccination uptake (first dose initiation and second and third dose completion) in the SSHS and HIV pilot clinics that have been delivering the vaccine since June 2016. Additionally, this report provides early first dose initiation figures in non-pilot clinics during the first 9 months of the national HPV MSM vaccination programme.

Methods

Data collection

Vaccination uptake and completion in SSHS and HIV clinics have been monitored since the start of the HPV MSM pilot via 2 pre-existing surveillance and reporting systems: the GUMCAD STI Surveillance System (GUMCAD) for SSHS and the HIV and AIDS Reporting System version 1.2 (HARS) for HIV clinics.

SSHS

GUMCAD is a mandatory reporting system that collects disaggregate records of all attendances, tests and diagnoses at all specialist (SSHS and integrated SSHS/sexual and reproductive health services) services in England. GUMCAD also collects and records from non-specialist (sexual and reproductive health services, young people's services, online sexual health services and enhanced general practice) services: these are not included in HPV vaccination delivery or this report. Data have been submitted to GUMCAD on a quarterly basis since 2008, with full data completeness since 2009. HPV vaccination uptake is recorded using Sexual Health and HIV Activity Property Type (SHHAPT) codes W1, W2 and W3 for first, second and third doses, respectively. Additionally, W4 records if vaccination was offered and declined and W5 records if the vaccine was not offered due to being previously received in full.

HIV clinics

HARS is a mandatory reporting system that collects data on all patients diagnosed with HIV infection attending NHS HIV outpatient services in England since 2008. HARS is a consultation-based, disaggregate dataset submitted to PHE quarterly. Two HPV vaccination reporting fields OfferStatusHPV and HPVDoseGiven are recorded in HARS v1.2, although incorporation into working systems across all clinics is still pending at approximately 20% of clinics. OfferStatusHPV is coded as follows: 01: offered and undecided, 02: offered and declined, 03: offered and accepted, 05: not offered as HPV vaccination was previously received in full, 06: not offered (other reason) and 09: not known (not recorded). HPVDoseGiven is coded 1, 2, and 3, which captures first, second and third HPV vaccination dose, respectively. During the HPV MSM pilot, bespoke collection of these fields was implemented at participating clinics because integration of vaccination codes into HARS v1.2 was not yet complete at that time. Bespoke data from pilot HIV clinics were merged to routine HARS data using a unique clinic-specific patient identifier.

Data analysis

Clinic selection and start dates

Data were extracted from the start date of vaccination for each clinic reporting to GUMCAD (SSHS and HIV clinics) and for each clinic reporting to HARS (HIV only clinics) to 31 December 2018. The earliest start date was 6 June 2016 for original pilot clinics and 1 April 2018 for non-pilot clinics.

The national HPV vaccination programme was rolled out on a phased basis from April 2018, with individual clinics starting to offer the vaccine to eligible MSM at different times. The start date was taken as the date that HPV vaccination of MSM was first recorded in GUMCAD/HARS unless a later programme implementation start date for a SSHS and/or HIV clinic had been provided by local areas via NHS England (i.e. to exclude data for periods prior to starting the programme when some vaccinations had nevertheless been delivered). Clinics with no doses recorded in GUMCAD or HARS (i.e. those who started since end December 2018) were therefore excluded from the analysis: this means data about attendances and denominators may be different to those in other GUMCAD/HARS outputs.

Vaccination uptake

Eligible individuals were defined as MSM aged up to and including 45 years attending a SSHS or HIV clinic on or after the implementation start date at the clinic. In GUMCAD, MSM were defined as male clinic attenders who had self-reported as being gay or bisexual at any point (ie at any attendance at the same clinic since 2008). MSM in HARS were defined as male clinic attenders aged up to and including 45 years who had a route of exposure recorded as sex between males. MSM who had initiated vaccination prior to the start of the pilot were excluded from the analysis.

Vaccination initiation was calculated as the proportion of eligible MSM with a recorded first HPV vaccine dose. Second dose completion was calculated as the proportion of eligible MSM with a first dose who had a second dose recorded. Third dose uptake was calculated as the proportion of eligible MSM with a first dose recorded, and third dose completion as the proportion of eligible MSM with a first and second dose recorded. Initiation figures were reported for both pilot and non-pilot clinics. However, second and third dose completion was only reported for pilot clinics, as non-pilot clinics had a maximum of 9 months (and the majority far less) since implementation started, which is insufficient for reliable completion estimates on the recommended schedule. Initiation figures were stratified by clinic type (SSHS and HIV), age group, HIV status (for SSHS; defined as known HIV positive for MSM with a positive HIV diagnosis and/or attendance for HIV care, and HIV negative/unknown for MSM with no HIV code recorded), clinic geographical type (‘Urban major conurbation’, ‘Urban city and town’ and ‘Rural village

and dispersed' based on the classification of the lower super output area of the clinic), ethnicity, patient residence Index of Multiple Deprivation (IMD), and country of birth.

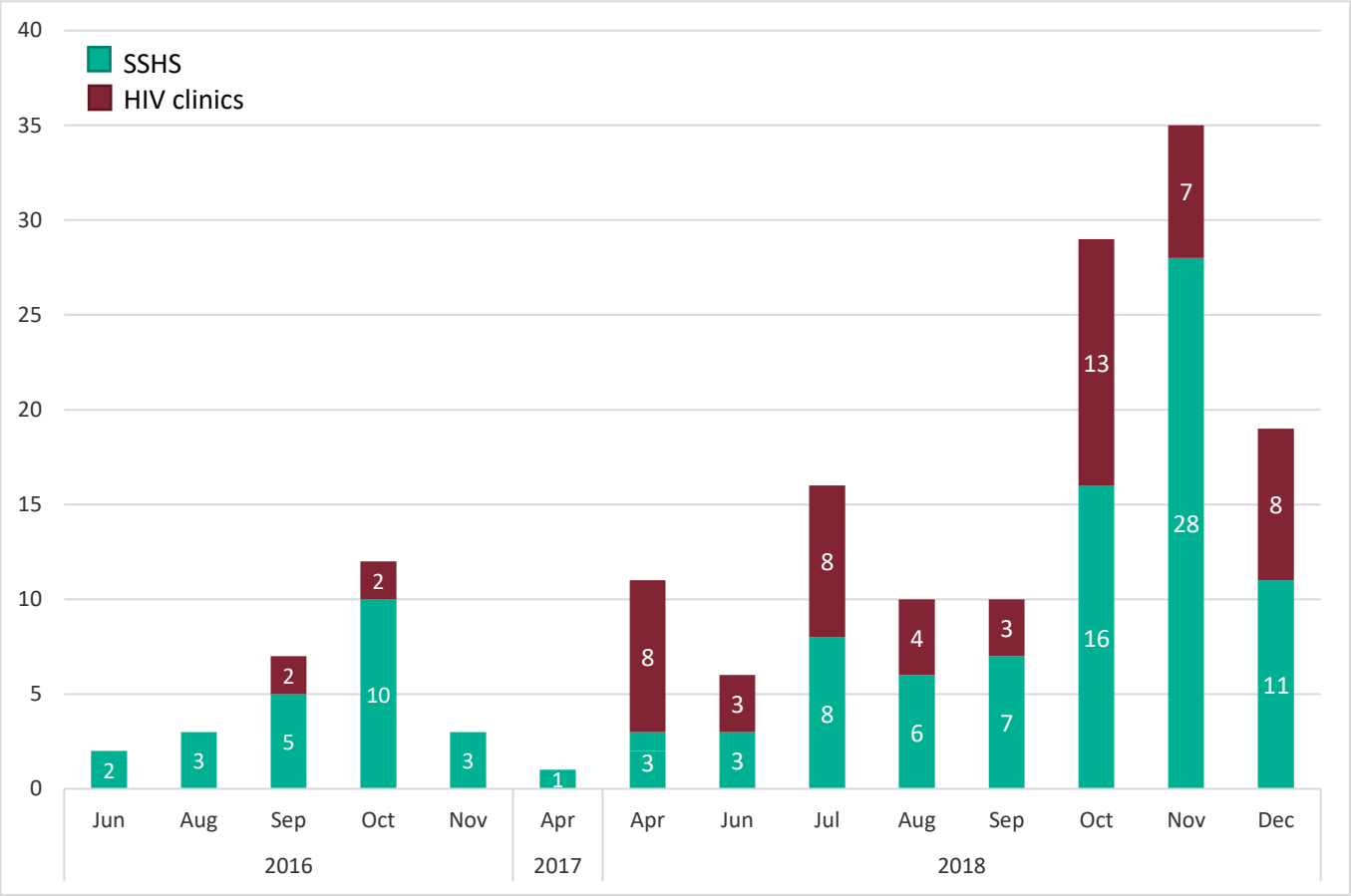
Results are presented both overall and stratified by pilot and non-pilot clinics. Overall results at both pilot and non-pilot clinics are presented by calendar year: initiation figures from 2016 and 2017 represent pilot clinics only, while 2018 figures include both pilot and non-pilot clinics. Stratified results are presented for the full data period available at either pilot or non-pilot clinics. It is not possible to combine and deduplicate data from HARS and GUMCAD to give uptake at all sites.

Results

Implementation timelines at SSHS and HIV clinics

Of a total 214 SSHS across England, 106 (50%) had started MSM HPV vaccination by the end of December 2018. Of these, 23 were clinics that originally participated in the pilot. Of 174 HIV clinics across England, 58 (33%) had started by the end of December 2018: 4 of these were in the pilot.

Figure 1. Vaccination implementation start times by clinic type



A further 57 SSHS and 40 HIV clinics have started HPV vaccination since the end of December 2018: no data are included from these clinics. An additional 50 SSHS and 79 HIV clinics were excluded from the analysis due to having no recorded vaccination doses in GUMCAD or HARS.

Vaccination uptake in SSHS

Initiation: pilot and non-pilot SSHS

Overall recorded vaccination initiation figures in eligible MSM attending pilot and non-pilot SSHS by calendar year are reported in Table 1. In 2018, overall first dose initiation was 29.8% (16,269/54,590). Initiation decreased with increasing age, with the highest figures seen in MSM aged 25 years or younger, at 34.4% (5,130/14,892). Vaccination initiation during the HPV MSM pilot years is presented for pilot clinics only and was recorded at 37.3% (4,731/12,680) and 46.5% (15,288/32,901) in 2016 and 2017, respectively (Table 1). Recorded refusal of vaccination in all SSHS overall was 1.9% (1,054/54,590) in 2018. The remainder of eligible MSM in 2018, 68.3% (37,267/54,590) had no HPV MSM vaccination code recorded (Table 1).

Initiation figures in eligible MSM were also stratified by pilot and non-pilot SSHS (Appendix 1 and 3). Vaccination initiation in MSM attending pilot SSHS between pilot start (earliest 6 June 2016) and end December 2018 was 42.8% (32,562/76,033). First dose initiation was 50.0% (5,234/10,468) in known HIV positive MSM attending SSHS compared to 41.7% (27,328/65,565) in HIV negative MSM or MSM with unknown HIV status attending SSHS. The highest first dose initiation was recorded in the youngest HIV positive MSM (aged 25 years or younger), at 58.0% (466/803) (Appendix 1). Refusal of vaccination at pilot clinics was 2.6% (1,941/76,033) and decreased with increasing age. The overall proportion of MSM offered and declining vaccination was lowest in HIV positive MSM at 0.8% (79/10,468). Only 0.6% (481/76,033) of MSM were not vaccinated because they were already fully vaccinated. The remainder of eligible MSM, 54.6% (41,530/76,033) had no HPV MSM vaccination code recorded (Appendix 1).

In SSHS that implemented HPV vaccination as part of the national programme, overall recorded initiation was 30.0% (3,753/12,491) from start (earliest 1 April 2018) to end December 2018. Initiation figures decreased with increasing age (from 33.6% in MSM aged 25 years or younger to 23.5% in MSM aged 41-45 years). Unlike in pilot SSHS, initiation was lower in HIV positive MSM (16.9%; 304/1,797) compared to HIV negative MSM (32.3%; 3,449/10,694) (Appendix 3). Overall recorded refusal of vaccination was 0.6% (73/12,491). The proportion of MSM offered and declining vaccination in non-pilot clinics was lowest in HIV positive MSM. Less than 5 MSM were recorded as already fully vaccinated. The remainder of eligible MSM, 69.4% (8,665/12,491) had no HPV MSM vaccination code recorded (Appendix 3).

Recorded initiation in pilot and non-pilot SSHS stratified by clinic geography and patient ethnicity, IMD and country of birth are presented in Appendix 2 and 4.

Table 1. Initiation of HPV vaccination in pilot and non-pilot SSHS by calendar year (6 June 2016-31 December 2018)

	2016 (pilot only)		2017 (pilot only)		2018 (pilot and non-pilot)	
	Eligible MSM	*Vaccinated with 1st dose (%)*	*Eligible MSM*	*Vaccinated with 1st dose (%)*	*Eligible MSM*	*Vaccinated with 1st dose (%)*
All ages	12,680	4,731 (37.3%)	32,901	15,288 (46.5%)	54,590	16,269 (29.8%)
<25	3,031	1,199 (39.6%)	8,644	4,290 (49.6%)	14,892	5,130 (34.4%)
26-30	2,829	1,105 (39.1%)	7,729	3,584 (46.4%)	13,529	4,019 (29.7%)
31-35	2,586	953 (36.9%)	6,581	3,105 (47.2%)	11,271	3,247 (28.8%)
36-40	2,237	779 (34.8%)	5,466	2,486 (45.5%)	8,668	2,348 (27.1%)
41-45	1,997	695 (34.8%)	4,481	1,823 (40.7%)	6,230	1,525 (24.5%)

	2016 (pilot only)		2017 (pilot only)		2018 (pilot and non-pilot)	
All ages	*Eligible MSM*	*No recorded doses*	*Eligible MSM*	*No recorded doses*	*Eligible MSM*	*No recorded doses*
Offered vaccine and declined (%)	12,680	472 (3.7%)	32,901	1,444 (4.4%)	54,590	1,054 (1.9%)
No HPV-MSM vaccination code (%)	12,680	7,477 (59.0%)	32,901	16,169 (49.1%)	54,590	37,267 (68.3%)

Completion: pilot SSHS only

Among MSM attending SSHS pilot clinics who received a first dose, completion of second and third doses was 54.1% (17,609/32,562) and 31.2% (10,168/32,562), respectively, by end of December 2018 (ie 31 months after first vaccination given as part of the pilot). Second dose completion was higher among MSM who had between 1-12 months of follow-up time since their first dose, at 77.1% (11,267/14,612). Among those receiving a second dose, 57.7% (10,168/17,609) had received a third dose.

Again, third dose completion was higher among MSM who had between 3-12 months of follow-up time since their second dose, at 78.8% (4,513/5,727). Second and third dose completion has therefore continued to accrue on target with clinically recommended intervals between vaccination doses (ie second dose at least 1 month after first and third dose at least 3 months after second; Figure 2).

However, figures showed some evidence of missed opportunities to deliver second and third doses to MSM attending within the window for recommended vaccination. Of 13,511 MSM who had received a first dose but not a second dose, 2,609 (19.3%) had attended a clinic within 2-12 months after receiving their first dose. Similarly, of 8,883 patients who received a second dose but not a third dose, 1,635 (18.4%) had subsequently attended a clinic 4-12 months after receiving their second dose.

Figure 2. Vaccination uptake (1st, 2nd, and 3rd doses) in pilot SSHS (6 June 2016-31 December 2018)

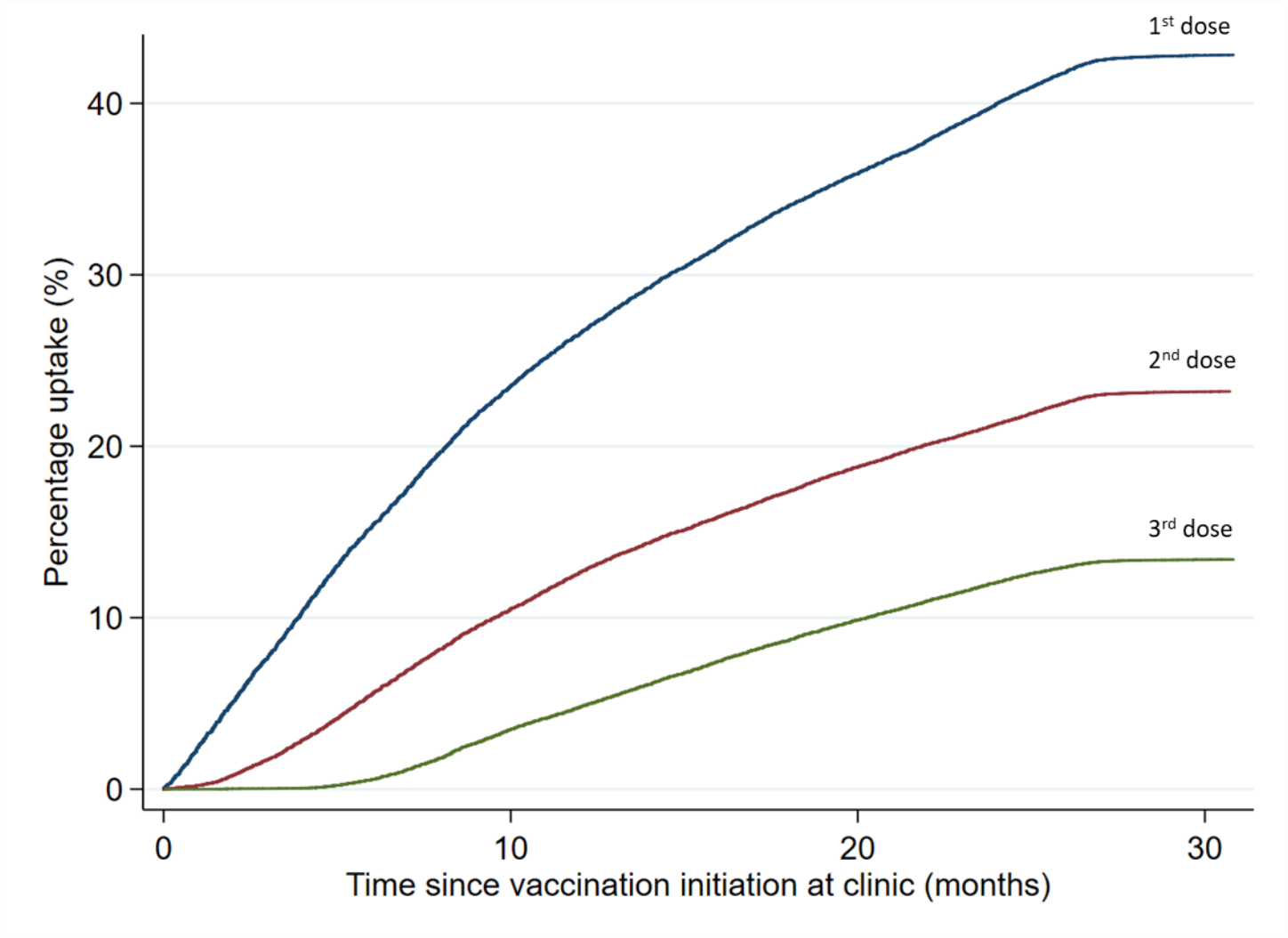
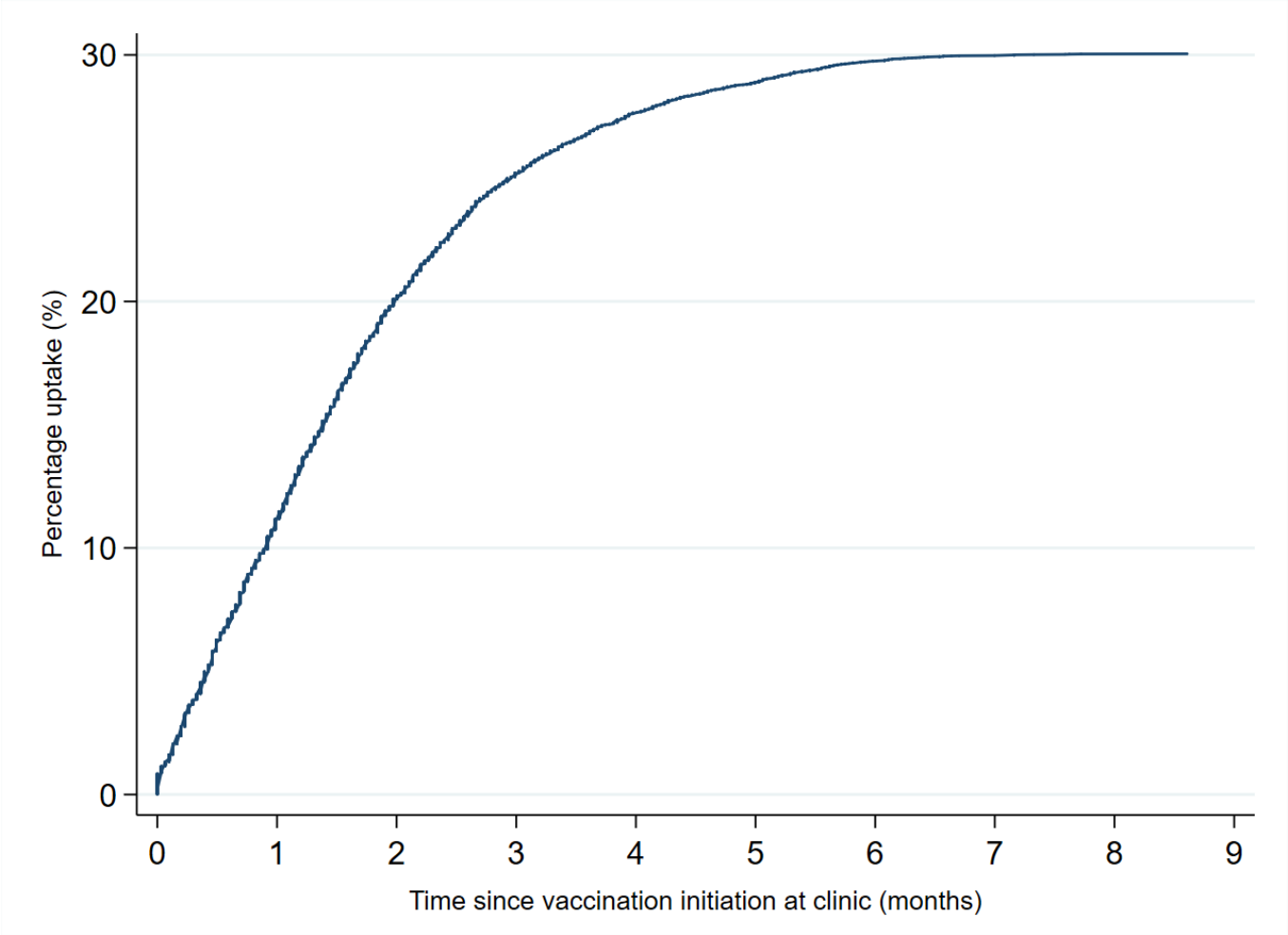


Figure 3. Vaccination initiation in non-pilot SSHS (1 April 2018-31 December 2018)



Vaccination uptake in HIV clinics

Initiation: pilot and non-pilot HIV clinics

Overall recorded vaccination initiation figures in eligible MSM attending pilot and non-pilot HIV clinics by calendar year are reported in Table 2. In 2018, overall first dose initiation was 11.3% (140/1,235). As in SSHS, initiation decreased with increasing age: 18.2% (24/132) MSM aged 25 years or younger received a first dose in 2018. Vaccination initiation during the HPV MSM pilot years is presented for pilot clinics only and was recorded at 91.5% (421/460) and 31.1% (326/1,048) in 2016 and 2017, respectively (Table 2). Recorded refusal of vaccination in all SSHS overall was 4.5% (56/1,235) in 2018. The remainder of eligible MSM in 2018, 84.1% (1,039/1,235) had no HPV MSM vaccination code recorded (Table 2).

Initiation figures in eligible MSM were also stratified by pilot and non-pilot HIV clinics (Appendix 5). Vaccination initiation in MSM attending pilot SSHS between pilot start (earliest 6 June 2016) and end December 2018 was 46.7% (783/1,677). Overall

recorded refusal of vaccination in pilot HIV clinics was 2.3% (38/1,677) and did not differ considerably by age. Among all attending MSM, 7.4% (124/1,677) were reported as fully vaccinated. The proportion of eligible MSM with no HPV MSM vaccination code recorded was 43.6% (732/1,677) (Appendix 5).

Recorded initiation in pilot HIV clinics stratified by clinic geography and patient ethnicity, IMD and country of birth are presented in Appendix 6. Initiation was lowest in MSM of black and mixed ethnicity (Appendix 6).

In HIV clinics that began delivering vaccination as part of the national programme, overall initiation was 25.2% (104/412) from rollout start (earliest 1 April 2018) to end December 2018. The highest figures were recorded in the youngest MSM (aged under 25 years), at 32.8% (21/64) (Appendix 7). The proportion of MSM who were offered and declined the vaccine in non-pilot HIV clinics was 6.1% (25/412). In non-pilot HIV clinics, 11.9% (49/412) of all attending MSM were reported as fully vaccinated. Finally, the proportion of eligible MSM with no HPV MSM vaccination code recorded was 49.3% (203/412) (Appendix 7).

Recorded initiation was highest at ‘Urban city and town’ non-pilot HIV clinics, at 27.6% (58/210). Numbers of attending MSM receiving a first dose in non-pilot HIV clinics were still too small to report any differences in initiation by ethnicity or deprivation levels (Appendix 8).

Table 2. Initiation of HPV vaccination in pilot and non-pilot HIV clinics by calendar year (6 June 2016-31 December 2018)

	2016 (pilot only)		2017 (pilot only)		2018 (pilot and non-pilot)	
	Eligible MSM	*Vaccinated with 1st dose (%)*	*Eligible MSM*	*Vaccinated with 1st dose (%)*	*Eligible MSM*	*Vaccinated with 1st dose (%)*
All ages	460	421 (91.5%)	1,048	326 (31.1%)	1,235	140 (11.3%)
<25	46	43 (93.5%)	89	30 (33.7%)	132	24 (18.2%)
26-30	80	72 (90.0%)	154	47 (30.5%)	237	31 (13.1%)
31-35	113	101 (89.4%)	253	96 (37.9%)	290	38 (13.1%)
36-40	112	103 (92.0%)	257	76 (29.6%)	280	26 (9.3%)
41-45	109	102 (93.6%)	295	77 (26.1%)	296	21 (7.1%)

	2016 (pilot only)		2017 (pilot only)		2018 (pilot and non-pilot)	
All ages	*Eligible MSM*	*No recorded doses*	*Eligible MSM*	*No recorded doses*	*Eligible MSM*	*No recorded doses*
Offered vaccine and declined (%)	460	37 (8.0%)	1,048	36 (3.4%)	1,235	56 (4.5%)
No HPV-MSM vaccination code (%)	460	<5	1,048	686 (65.5%)	1,235	1,039 (84.1%)

Completion: pilot HIV clinics

Among MSM attending HIV pilot clinics who received a first dose, completion of second and third doses was 72.4% (567/783) and 57.2% (448/783), respectively, by end of December 2018 (ie 31 months after first vaccination as part of the pilot). Among those receiving a second dose, 78.7% (446/567) had received a third dose. As in pilot SSHS, second and third dose completion is accumulating on target with clinically recommended intervals between vaccination doses (ie second dose at least 1 month after first and third dose at least 3 months after second; Figure 4).

Figure 4. Vaccination uptake (1st, 2nd, and 3rd doses) in pilot HIV clinics (6 June 2016-31 December 2018)

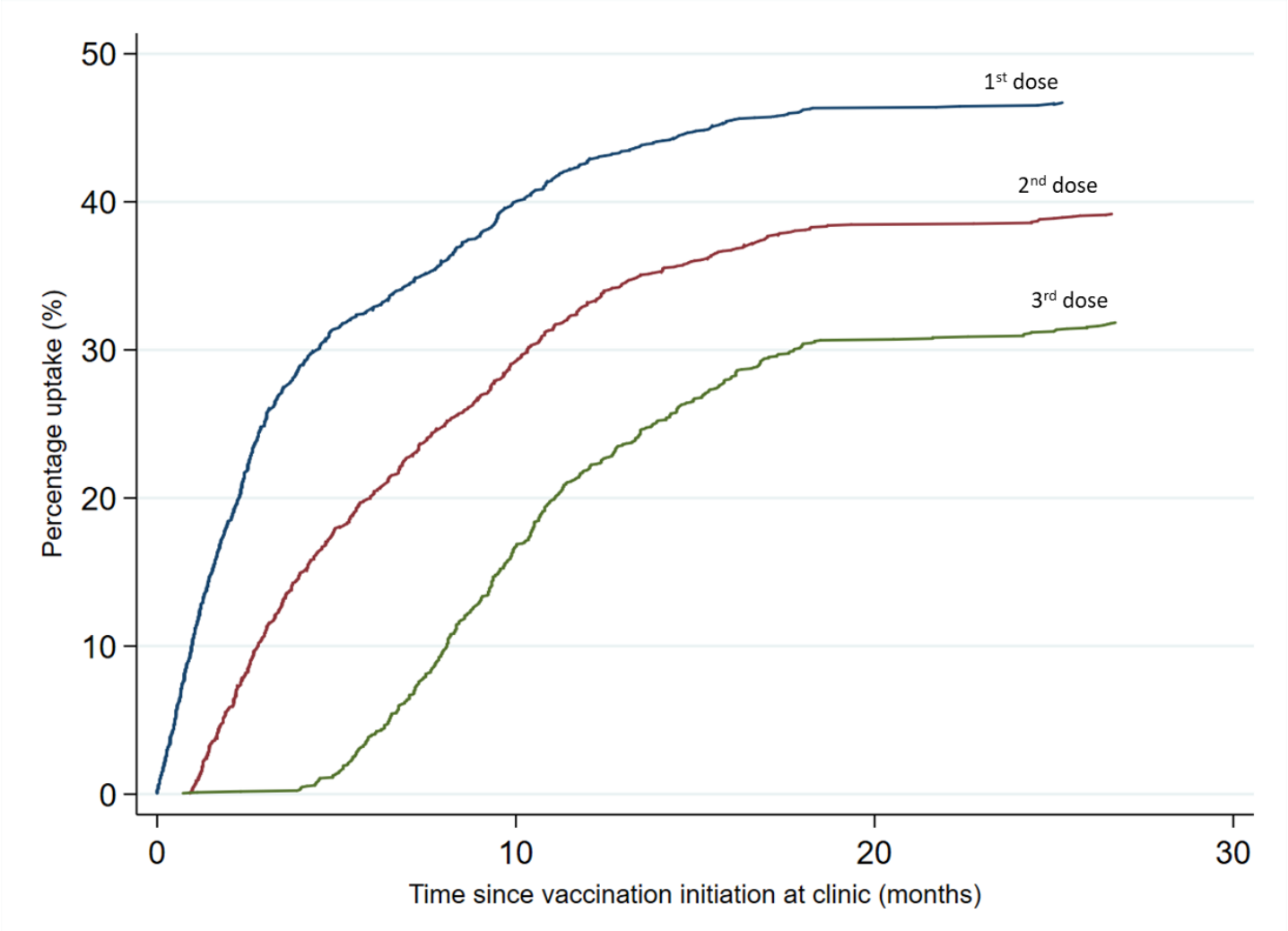
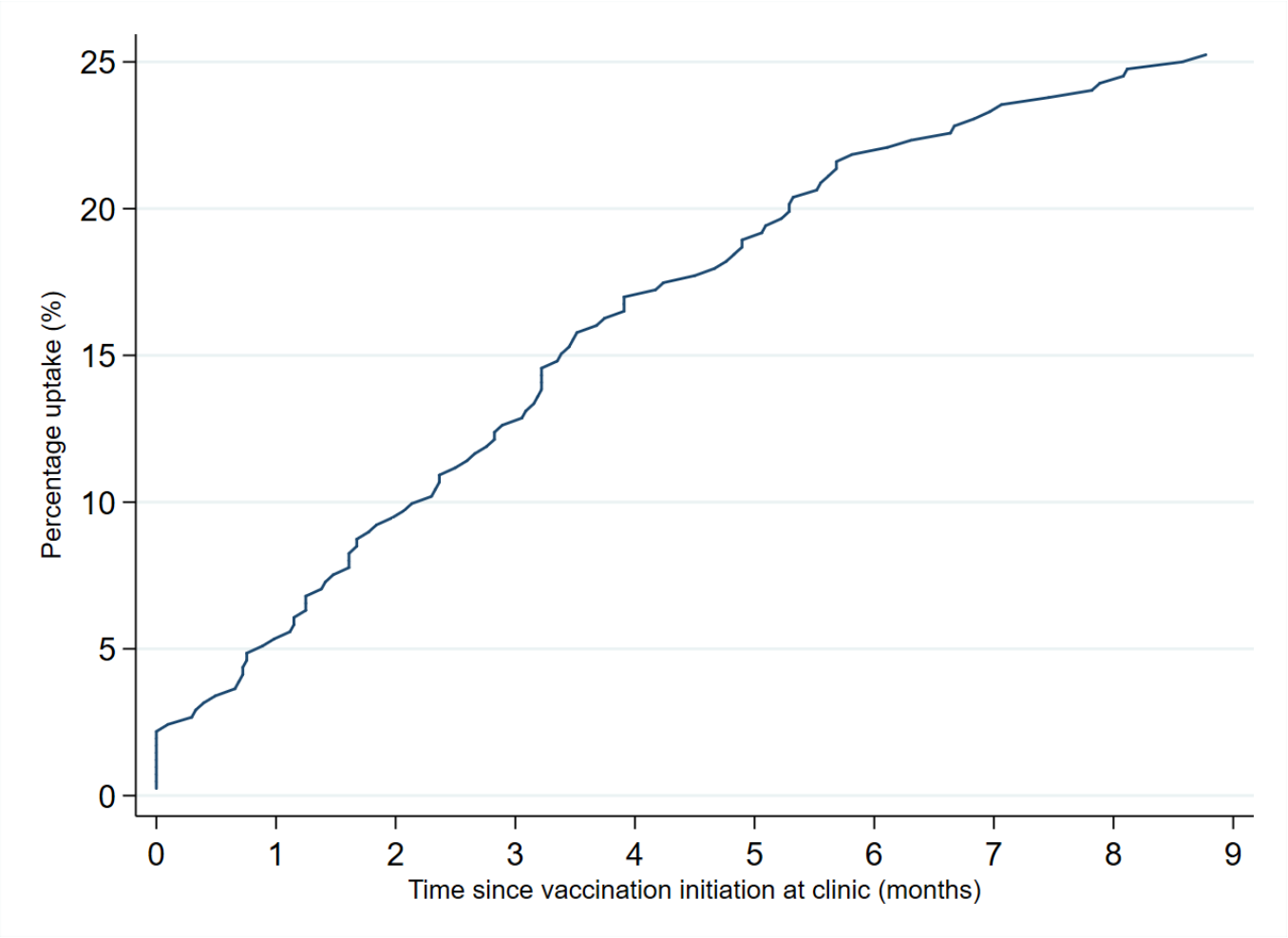


Figure 5. Vaccination initiation in non-pilot HIV clinics (1 April 2018-31 December 2018)



Discussion

Since the start of the HPV MSM pilot in June 2016, we have successfully monitored HPV vaccination uptake (initiation and completion) using routine surveillance data collections at SSHS and HIV clinics. As of April 2018, this surveillance now includes clinics that have newly implemented vaccination as part of national programme rollout.

In 2018, 30% of MSM attending both pilot and non-pilot SSHS services were recorded as having initiated the HPV vaccination course. In HIV pilot and non-pilot services overall, initiation was just over 10% in 2018. Results were reported separately for pilot and non-pilot services over the full implementation period to accurately compare activity levels despite the difference in maturity of these services (a maximum of 31 months vs 9 months of data for pilot and non-pilot clinics, respectively).

Between pilot start and end December 2018, over 40% of MSM attending pilot SSHS and HIV services had initiated the HPV vaccination course. Recorded second and third dose completion among MSM who received a first dose was over 50% and 30%, respectively, at pilot SSHS. At pilot HIV clinics, course completion was even higher, at over 70% (second dose) and nearing 60% (third dose) among MSM who had received a first dose. Results to date have shown that completion has accrued on target with clinically recommended intervals between vaccination doses. At non-pilot SSHS and HIV clinics, respectively, 30% and 25% of attending MSM had initiated HPV vaccination to end December 2018.

However, vaccination initiation to end December 2018 in pilot SSHS and HIV clinics appear lower compared to results from previous analyses [14, 15]. This is due to 3 pilot clinics previously excluded due to known data recording issues (mainly operational HPV vaccination coding delays) now being included in this updated analysis for all data extracted from pilot start to end December 2018.

Vaccination uptake across all clinics is also still likely to be an underestimation due to the variation of coding practices in clinics offering HPV vaccination for MSM. Results for non-pilot clinics are still preliminary and were derived from a maximum of 9 months of data, with over 60% of these clinics only having 3 months of data available by the data cut-off. 66 clinics with official start dates in 2018 had not reported any vaccination by end of 2018. Non-pilot clinics have not yet had sufficient time to investigate recorded completion. Results presented in this report therefore reflect a transitional period for national programme implementation, and uptake figures are expected to increase over time.

Refusals among MSM attending pilot and non-pilot clinics were low at under 5%. However, the proportion of eligible MSM with no HPV vaccination code recorded was

still high (approximately 40-80% depending on clinic type). As reported in prior HPV MSM vaccination reports, this is likely due to delays in offering the vaccine following implementation and incomplete use of new codes for recording the offer or act of vaccination [14]. Ongoing upgrades to both surveillance systems (new GUMCAD specification and HARS v1.2) may also have contributed to delays in accurate HPV vaccination recording. This is evidenced by the observed drop in recorded initiation in HIV clinics from over 90% in 2016 when a bespoke collection system was used, to just over 10% in 2018.

Webinars to improve recording of vaccination for MSM in GUMCAD (including Hepatitis A, Hepatitis B and HPV) were offered to all SSHS staff in summer 2019. Additionally, workshops introducing SSHS to the new GUMCAD specification and accompanying SNOMED codes were conducted in late 2019. These outreach strategies will hopefully lead to substantial improvements in recording of HPV vaccination in future.

The surveillance systems used for these analyses include a number of limitations and caveats. Firstly, GUMCAD and HARS collect data on gender and sexual orientation only. For this analysis, attendees were identified as eligible for vaccination if their sexual orientation was recorded as homosexual or bisexual at any visit in their clinic attendance history. At most clinics, these data are likely to reflect a patient's sexual behaviour (rather than their sexual identity). However, assessment of sexual risk at clinic level may differ, and could therefore lead to underestimation or overestimation of vaccination uptake due to errors in denominator.

Additionally, in clinics reporting to GUMCAD, patient identifiers are unique within each clinic and patients cannot be tracked between clinics. HPV vaccination completion therefore cannot be monitored across clinics. For the purposes of second and third dose completion analyses in this report, the assumption was made that most attendees will attend the same clinic rather than move between clinics. At pilot SSHS, 3,123 second doses without a first and 1,255 third doses without a first or second were recorded. If these indicate completion of courses started in other clinics the overall completion rate (3 doses) increases by 4% to 35.1%. Finally, results could not be de-duplicated between GUMCAD and HARS attendees, and there may therefore be some overlap between MSM attending SSHS and HIV services. As a result, total number of attendances and/or doses delivered will not be the sum of reported data from SSHS and HIV clinics.

Conclusions and future work in progress

Vaccination initiation, and second and third dose completion, in MSM attending SSHS and HIV services is good, but could be better. Missing data about the offer of, and uptake of, HPV vaccination continues to be a major limitation. Analyses in future years will provide a more accurate reflection of vaccination uptake across all clinics implementing the national HPV MSM programme.

Surveillance activities will continue to evaluate the HPV vaccination programme for MSM against its expected aims to improve health outcomes in this at-risk population. In 2020 we will begin collection of residual serum specimens from MSM attending SSHS for HIV and/or syphilis testing in order to check immunological evidence of immunisation by unlinked anonymous HPV antibody testing (type-specific for HPV 16/18). A baseline collection of residual rectal specimens from MSM attending SSHS for chlamydia testing was completed in 2018 and will be tested for type-specific HPV DNA prevalence.

Follow-up collections in future years will undergo similar testing to monitor changes in the epidemiology of HPV infection in this population. Genital warts diagnoses will also be monitored using GUMCAD data as a measure of impact on this early disease outcome. Impact of vaccination on anal cancers and precancerous lesions are not expected for several years: analyses of these outcomes will be considered in due course.

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Appendices

Appendix 1. Initiation of HPV vaccination stratified by age and HIV status in pilot SSHS (6 June 2016-31 December 2018)

	Patient HIV status	All ages	≤25	26-30	31-35	36-40	41-45
Attending MSM	All attending MSM	***76,033***	***20,269***	***18,769***	***15,597***	***12,146***	***9,242***
Vaccinated with 1st dose		**32,562 (42.8%)**	**9,287 (45.8%)**	**7,841 (41.8%)**	**6,604 (42.3%)**	**5,102 (42.0%)**	**3,718 (40.2%)**
Unvaccinated							
Offered vaccine and declined		**1,941 (2.6%)**	**673 (3.3%)**	**503 (2.7%)**	**346 (2.2%)**	**263 (2.2%)**	**156 (1.7%)**
Previously received in full		**481 (0.6%)**	**121 (0.6%)**	**116 (0.6%)**	**94 (0.6%)**	**80 (0.7%)**	**70 (0.8%)**
No HPV-MSM vaccination code		**41,530 (54.6%)**	**10,309 (50.9%)**	**10,425 (55.5%)**	**8,647 (55.4%)**	**6,781 (55.8%)**	**5,368 (58.1%)**
Attending MSM	HIV negative	***65,565***	***19,466***	***16,943***	***13,215***	***9,490***	***6,449***
Vaccinated with 1st dose		**27,328 (41.7%)**	**8,821 (45.3%)**	**6,845 (40.4%)**	**5,367 (40.6%)**	**3,756 (39.6%)**	**2,537 (39.3%)**
Unvaccinated							
Offered vaccine and declined		**1,862 (2.8%)**	**655 (3.4%)**	**487 (2.9%)**	**333 (2.5%)**	**246 (2.6%)**	**141 (2.2%)**
Previously received in full		**374 (0.6%)**	**109 (0.6%)**	**88 (0.5%)**	**74 (0.6%)**	**59 (0.6%)**	**44 (0.7%)**
No HPV-MSM vaccination code		**36,375 (55.5%)**	**9,990 (51.3%)**	**9,611 (56.7%)**	**7,515 (56.9%)**	**5,488 (57.8%)**	**3,771 (58.5%)**
Attending MSM	HIV positive	***10,468***	***803***	***1,826***	***2,382***	***2,656***	***2,793***
Vaccinated with 1st dose		**5,234 (50.0%)**	**466 (58.0%)**	**996 (54.5%)**	**1,237 (51.9%)**	**1,346 (50.7%)**	**1,181 (42.3%)**
Unvaccinated							
Offered vaccine and declined		**79 (0.8%)**	**18 (2.2%)**	**16 (0.9%)**	**13 (0.5%)**	**17 (0.6%)**	**15 (0.5%)**
Previously received in full		**107 (1.0%)**	**12 (1.5%)**	**28 (1.5%)**	**20 (0.8%)**	**21 (0.8%)**	**26 (0.9%)**
No HPV-MSM vaccination code		**5,155 (49.2%)**	**319 (39.7%)**	**814 (44.6%)**	**1,132 (47.5%)**	**1,293 (48.7%)**	**1,597 (57.2%)**

Appendix 2. Vaccination initiation in pilot SSHS by sociodemographic and clinic geography stratifications (6 June 2016-31 December 2018)

	Vaccination initiation
Clinic geography classification	
Urban major conurbation	40.3% (25,439/63,193)
Urban city and town	54.0% (5,688/10,538)
Rural village and dispersed	64.6% (587/908)
Missing classification	60.8% (848/1,394)
Ethnicity	
Asian or Asian British	42.9% (1,818/4,235)
Black or Black British	39.2% (1,322/3,376)
Mixed	41.5% (1,436/3,457)
Other ethnic groups	42.0% (1,675/3,989)
White	44.4% (22,698/51,169)
Not specified	36.8% (3,613/9,807)
IMD	
Quintile 5 (least deprived)	46.0% (2,117/4,599)
Quintile 4	43.9% (3,822/8,715)
Quintile 3	42.0% (6,452/15,364)
Quintile 2	42.3% (11,750/27,802)
Quintile 1 (most deprived)	42.4% (8,011/18,888)
Not specified	61.7% (410/665)
Country of birth	
UK born	46.7% (18,375/39,329)
Born outside the UK	40.9% (11,105/27,180)
Not specified	32.4% (3,082/9,524)

Appendix 3. Initiation of HPV vaccination stratified by age and HIV status in non-pilot SSHS (1 April 2018-31 December 2018)

	Patient HIV status	All ages	≤25	26-30	31-35	36-40	41-45
Attending MSM	All attending MSM	***12,491***	***3,965***	***2,845***	***2,407***	***1,837***	***1,437***
Vaccinated with 1st dose		**3,753 (30.0%)**	**1,333 (33.6%)**	**869 (30.5%)**	**701 (29.1%)**	**512 (27.9%)**	**338 (23.5%)**
Unvaccinated							
Offered vaccine and declined		**73 (0.6%)**	**28 (0.7%)**	**21 (0.7%)**	**11 (0.5%)**	**10 (0.5%)**	**<5**
Previously received in full		**<5**	**<5**	**<5**	**<5**	**<5**	**<5**
No HPV-MSM vaccination code		**8,665 (69.4%)**	**2,604 (65.7%)**	**1,955 (68.7%)**	**1,695 (70.4%)**	**1,315 (71.6%)**	**1,096 (76.3%)**
Attending MSM	HIV negative	***10,694***	***3,793***	***2,522***	***2,014***	***1,414***	***951***
Vaccinated with 1st dose		**3,449 (32.3%)**	**1,293 (34.1%)**	**810 (32.1%)**	**620 (30.8%)**	**444 (31.4%)**	**282 (29.7%)**
Unvaccinated							
Offered vaccine and declined		**70 (0.7%)**	**27 (0.7%)**	**20 (0.8%)**	**10 (0.5%)**	**10 (0.7%)**	**<5**
Previously received in full		**<5**	**<5**	**<5**	**<5**	**<5**	**<5**
No HPV-MSM vaccination code		**7,175 (67.1%)**	**2,473 (65.2%)**	**1,692 (67.1%)**	**1,384 (68.7%)**	**960 (67.9%)**	**666 (70.0%)**
Attending MSM	HIV positive	***1,797***	***172***	***323***	***393***	***423***	***486***
Vaccinated with 1st dose		**304 (16.9%)**	**40 (23.3%)**	**59 (18.3%)**	**81 (20.6%)**	**68 (16.1%)**	**56 (11.5%)**
Unvaccinated							
Offered vaccine and declined		**<5**	**<5**	**<5**	**<5**	**<5**	**<5**
Previously received in full		**<5**	**<5**	**<5**	**<5**	**<5**	**<5**
No HPV-MSM vaccination code		**1,490 (82.9%)**	**131 (76.2%)**	**263 (81.4%)**	**311 (79.1%)**	**355 (83.9%)**	**430 (88.5%)**

Appendix 4. Vaccination initiation in non-pilot SSHS by sociodemographic and clinic geography stratifications (1 April 2018-31 December 2018)

	Vaccination initiation
Clinic geography classification	
Urban major conurbation	24.8% (1,535/6,182)
Urban city and town	35.1% (2,216/6,306)
Rural village and dispersed	<5
Ethnicity	
Asian or Asian British	29.0% (201/693)
Black or Black British	24.9% (127/511)
Mixed	26.4% (127/481)
Other ethnic groups	30.1% (133/442)
White	32.6% (3,004/9,218)
Not specified	14.0% (161/1,146)
IMD	
Quintile 5 (least deprived)	35.7% (496/1,389)
Quintile 4	31.5% (572/1,816)
Quintile 3	31.0% (712/2,296)
Quintile 2	28.5% (980/3,435)
Quintile 1 (most deprived)	27.9% (993/3,555)
Country of birth	
UK born	33.9% (2,834/8,354)
Born outside the UK	26.8% (759/2,834)
Not specified	12.3% (160/1,303)

Appendix 5. Initiation of HPV vaccination stratified by age and HIV status in pilot HIV clinics (6 June 2016-31 December 2018)

	Patient HIV status	All ages	≤25	26-30	31-35	36-40	41-45
Attending MSM	All attending MSM	*1,677*	*156*	*274*	*403*	*404*	*440*
Vaccinated with 1st dose		**783 (46.7%)**	**76 (48.7%)**	**128 (46.7%)**	**207 (51.4%)**	**186 (46%)**	**186 (42.3%)**
Unvaccinated							
Offered vaccine and declined		**38 (2.3%)**	**<5**	**7 (2.6%)**	**9 (2.2%)**	**9 (2.2%)**	**9 (2.0%)**
Previously received in full		**124 (7.4%)**	**9 (5.8%)**	**24 (8.8%)**	**31 (7.7%)**	**36 (8.9%)**	**24 (5.5%)**
No HPV-MSM vaccination code		**667 (39.8%)**	**51 (32.7%)**	**98 (35.8%)**	**146 (36.2%)**	**157 (38.9%)**	**215 (48.9%)**

Appendix 6. Vaccination initiation in pilot HIV clinics by sociodemographic and clinic geography stratifications (6 June 2016-31 December 2018)

	Vaccination initiation
Clinic geography classification	
Urban major conurbation	46.8% (601/1,285)
Urban city and town	46.4% (182/392)
Ethnicity	
Asian or Asian British	24.1% (13/54)
Black or Black British	21.5% (20/93)
Mixed	18.6% (8/43)
Other ethnic groups	34.5% (10/29)
White	25.5% (226/885)
Not specified	88.3% (506/573)
IMD	
Quintile 5 (least deprived)	48.8% (41/84)
Quintile 4	49.2% (65/132)
Quintile 3	45.7% (85/186)
Quintile 2	54.1% (310/573)
Quintile 1 (most deprived)	40.2% (282/702)
Country of birth	
UK born	25.3% (203/802)
Born outside the UK	26.1% (75/287)
Not specified	85.9% (505/588)

Appendix 7. Initiation of HPV vaccination stratified by age and HIV status in non-pilot HIV clinics (1 April 2018-31 December 2018)

	Patient HIV status	All ages	≤25	26-30	31-35	36-40	41-45
Attending MSM	All attending MSM	***412***	***64***	***96***	***104***	***84***	***64***
Vaccinated with 1st dose		**104 (25.2%)**	**21 (32.8%)**	**22 (22.9%)**	**28 (26.9%)**	**19 (22.6%)**	**14 (21.9%)**
Unvaccinated							
Offered vaccine and declined		**25 (6.1%)**	**5 (7.8%)**	**9 (9.4%)**	**5 (4.8%)**	**<5**	**<5**
Previously received in full		**49 (11.9%)**	**5 (7.8%)**	**13 (13.5%)**	**12 (11.5%)**	**9 (10.7%)**	**10 (15.6%)**
No HPV-MSM vaccination code		**203 (49.3%)**	**25 (39.1%)**	**41 (42.7%)**	**54 (51.9%)**	**47 (56.0%)**	**36 (56.3%)**

Appendix 8. Vaccination initiation in non-pilot HIV clinics by sociodemographic and clinic geography stratifications (1 April 2018-31 December 2018)

	Vaccination initiation
Clinic geography classification	
Urban major conurbation	23.0% (45/196)
Urban city and town	27.6% (58/210)
Rural village and dispersed	<5
Ethnicity	
Asian or Asian British	<5
Black or Black British	31.3% (5/16)
Mixed	27.3% (6/22)
Other ethnic groups	28.6% (8/28)
White	25.0% (73/292)
Not specified	23.3% (10/43)
IMD	
Quintile 5 (least deprived)	26.7% (8/30)
Quintile 4	35.0% (21/60)
Quintile 3	15.0% (9/60)
Quintile 2	24.1% (34/141)
Quintile 1 (most deprived)	25.0% (27/108)
Not specified	38.5% (5/13)
Country of birth	
UK born	22.9% (52/227)
Born outside the UK	29.5% (52/176)
Not specified	0.0% (0/9)