

# Practice Nursing

## Understanding HPV and Cervical Screening

--Manuscript Draft--

<b>Manuscript Number:</b>	pnur.2021.0053
<b>Full Title:</b>	Understanding HPV and Cervical Screening
<b>Short Title:</b>	
<b>Article Type:</b>	Professional
<b>Keywords:</b>	Cervical screening; HPV; HPV Primary Screening; cervical cancer; HPV vaccination
<b>Corresponding Author:</b>	Sarah Butler, MSc University of Hull Hull, UNITED KINGDOM
<b>Corresponding Author Secondary Information:</b>	
<b>Corresponding Author's Institution:</b>	University of Hull
<b>Corresponding Author's Secondary Institution:</b>	
<b>First Author:</b>	Sarah Butler, MSc
<b>First Author Secondary Information:</b>	
<b>Order of Authors:</b>	Sarah Butler, MSc Yvonne Wilkinson, MSc
<b>Order of Authors Secondary Information:</b>	
<b>Abstract:</b>	<p>Abstract</p> <p>Screening for Human Papillomavirus is now the primary test for cervical screening in England, Wales and Scotland. Cervical screening for those individuals with a cervix, routinely occurs every 3 years for those aged 25-49 (24½ in England) and every 5 years for those aged 50-64. Over 99.7% of cervical cancers are caused by Human Papillomavirus. Cervical cancer is preventable and curable, primary HPV screening can detect early changes in cervical cells allowing for effective monitoring and treatment.</p>
<b>Additional Information:</b>	
<b>Question</b>	<b>Response</b>
Please enter the word count of your manuscript <b>excluding references and tables</b>	1909

This document is the Accepted Manuscript version of a Published Work that appeared in final form in Practice Nursing, copyright © MA Healthcare, after peer review and technical editing by the publisher. To access the final edited and published work see <https://doi.org/10.12968/pnur.2022.33.1.14>.

## Understanding HPV and Cervical Screening

Sarah Butler, Lecturer<sup>1</sup>

Yvonne Wilkinson, Senior Lecturer<sup>2</sup>

<sup>1</sup>Faculty of Health Sciences, University of Hull, Hull, HU6 7RX

<sup>2</sup> Faculty of Health Sciences, University of Hull, Hull, HU6 7RX

Corresponding author: Sarah Butler, [s.l.butler@hull.ac.uk](mailto:s.l.butler@hull.ac.uk) 01482 465237

### Abstract

Screening for Human Papillomavirus is now the primary test for cervical screening in England, Wales and Scotland. Cervical screening for those individuals with a cervix, routinely occurs every 3 years for those aged 25-49 (24½ in England) and every 5 years for those aged 50-64. Over 99.7% of cervical cancers are caused by Human Papillomavirus. Cervical cancer is preventable and curable, primary HPV screening can detect early changes in cervical cells allowing for effective monitoring and treatment.

## Introduction

Cervical cancer is the 4<sup>th</sup> most prevalent form of cancer among women worldwide; in 2018 an estimated 570,000 women were diagnosed with cancer and it was responsible for the death of 300,000 women worldwide with almost 90% of the deaths occurring in low and middle income countries (World Health Organisation 2020). Within the United Kingdom (UK) cervical cancer is the 14<sup>th</sup> most common form of cancer in women, around 3,200 women each year are diagnosed with cervical cancer, which equates to over 8 new diagnoses each day (Cancer Research UK 2020). The World Health Organisation estimates that without any action being taken, incidence rates will increase, with new cases of cervical cancer rising to 700,000 and the number of deaths rising to 400,000 by 2030. However cervical cancer is a preventable disease and is curable if detected early and managed effectively. The National Cervical Screening Programme has been in force within the UK since 1988 and is estimated to have saved 5000 lives each year (Stubbs 2018) and the introduction of the Human Papillomavirus (HPV) vaccination in 2008 within the UK has been a further significant step in preventing cervical cancer. A recent study by Falcaro et al. 2021, suggests the HPV vaccine is reducing cases of cervical cancer by almost 90% in England. This study showed both a reduction in pre-cancerous growths and an 87% reduction in cervical cancer (Gallagher 2021). The World Health Organisation have recently launched a Global Strategy to Accelerate the Elimination of Cervical Cancer (WHO 2020). It identifies three key steps; vaccination, screening and treatment. Whilst it is acknowledged that vaccine uptake is relatively good within the UK with almost 84% coverage in females completing a 2-dose schedule in 2018/2019 (Public Health England 2020) the estimated number of eligible women who attend for regular cervical screening remains low with only 70.9% of eligible women aged twenty-five to forty-nine and 76.4% of eligible women aged fifty to sixty-four attending cervical screening as of March 2020 (Public Health England 2021). The number of completed vaccination schedules and attendance for cervical screening are expected to be lower following the Covid 19 pandemic with school closures and the reduction in face to face appointments at General Practice surgeries during the national lockdown (Public Health England

2021 and NHS Digital 2021). It is essential that this downturn is reversed both in terms of vaccination and cervical screening as we move towards the Global Strategy to Accelerate the Elimination of Cervical Cancer (WHO 2020).

From December 2019 the cervical screening process was changed in England, Scotland and Wales, this involved transitioning from a cytology based test to HPV primary screening within primary care (Stubbs 2020). For all healthcare professionals working within General Practice and specifically those undertaking cervical screening it is essential that they have a sound knowledge base of what is HPV, how common it is, how it can increase the risk of cervical cancer developing and what the results of primary screening mean and how the risk of HPV can be reduced.

### **What is HPV?**

HPV is a group of viruses that most sexually active people come into contact with during their lifetime, it is estimated approximately 8 in 10 people will be infected with HPV at some point in their lives (Cancer Research UK 2020). There are over 100 different types of HPV that are categorised as low or high risk (Public Health England 2019). At least 14 types of HPV are cancer causing and these are known as high risk HPV types (WHO 2020). These can cause cancer of the vagina, vulva, penis and anus however these cancer types are less common than cervical cancer. High risk types 16 and 18 are responsible for more than 70% of cervical cancers and pre-cancerous cervical lesions worldwide (WHO 2020). HPV has been detected in more than 99.7% of cervical cancers (Jo's Trust 2018; WHO 2020). It is estimated that 80% of sexually active adults will become infected during their lifetime, with the peak time for contracting the infection shortly after they have become sexually active (WHO 2020). HPV is sexually transmitted however it is worth noting that penetrative sex is not required for transmission, skin to skin genital contact can also lead to transmission of the virus. For most individuals, the body's immune system will naturally clear the HPV infection within two years, however for a small number, the immune system will not be able to effectively clear this virus. This leads to a persistent infection which causes the epithelial cells of the cervix to change (Jo's Trust

2018). However, this change in cells does not always result in cervical cancer as screening can identify these changes early which can be monitored and treated effectively. If not treated effectively these pre-cancerous lesions can progress to invasive cervical cancer (WHO 2020). Other types of HPV virus are identified as non-cancerous and are identified as low risk, types 6 and 11 especially are responsible for 90% of genital warts.

### **HPV sampling**

Although the screening process has changed from cytology to HPV primary screening, the training requirements for cervical screeners remain the same. Trainee cervical screeners are required to complete a minimum of 12 hours initial training, this must include at least 3 hours of practical training, where the trainee can practice their technique on a pelvic model. Trainees are supported within their practice by a trained cervical screening mentor, who will undertake an interim assessment which the trainee must complete satisfactorily before starting their unsupervised samples. Trainees must take 20 acceptable samples before undertaking a final clinical assessment (Public Health England 2020).

With the introduction of HPV screening, cervical screening laboratories no longer provide feedback to trainees on their transformation zone (TZ) sampling. This quality marker was previously used to assess that trainees and trained cervical cytology takers were accurately sampling the cervix to retrieve adequate cells to perform a cytology test on. Due to the move to primary HPV screening this is no longer required as a quality marker, however all trainees and trained cervical screeners will receive feedback on their sample acceptance.

### **Results of Screening**

With the launch of HPV primary screening, it is essential health care professionals are able to explain the results and the significance of these to their patients. Patients will usually receive their screening results in the post however a number of patients may contact the surgery to ask for further

explanation or information. Some patients may see a positive HPV result as a cancer diagnosis (American Cancer Society 2020), and whilst a positive HPV test does require a cervical cytology test (which will be conducted on the same sample), a positive HPV test on its own does not indicate cervical cancer, the changed cells often revert to normal by themselves (Cancer Research UK 2020). Please see Table 1 for a further explanation of cervical screening results.

*Table 1 Cervical Screening Results*

Result	What does it mean?
Inadequate sample	The sample does not contain enough material to test for a result
HPV negative	Human papillomavirus is not found within the sample suggesting the risk of developing cervical cancer is low, depending on the age of the individual, they will be invited for routine screening in either 3 or 5 years.
HPV positive with negative cytology	Human papillomavirus is found within the sample but there are no abnormal cells present on cytology. The individual will be invited for screening again in 1 year and again in 2 years if they are still positive for HPV. If after 3 years HPV is still present, then the individual should be referred to colposcopy.
HPV positive with positive cytology	Human papillomavirus is found within the sample and there are abnormal cells present too. The individual will be referred to colposcopy. Results of a colposcopy yield two results, either normal which four out of ten people will receive or abnormal which affects about 6 out of 10 individuals. For those normal results, there are no abnormal cells and individuals are to continue with their cervical screening at the correct interval for their age. For those individuals with abnormal results, they will need treatment to remove them. Following biopsies individuals will hear the term CIN or CGIN followed by a number 1-3, this number identifies the chances of those cells turning cancerous (Cancer Research UK 2020).

## **How to reduce the risk of high risk HPV**

Once an individual is sexually active, they are at risk of HPV. However, there are measures that individuals can take to reduce the risk. Cervical screening is a key intervention in reducing the risk of high-risk HPV developing into cervical cancer. The HPV vaccine is also a safe and effective intervention in the prevention of HPV infection and associated cancers (Sisson and Wilkinson 2018; WHO 2020). In excess of 280 million doses of the vaccine have been given worldwide with over 10 million of those given in the UK. Within the UK the HPV vaccine programme has been offered to all girls aged 12 or 13, since 2008 and this has been widened to include boys aged 12 or 13 since 2019 (UK Health Security Agency 2021). The vaccine is given intramuscularly into the arm and 2 doses are required usually 6 -12 months apart. To provide the best protection the vaccine should ideally be given before individuals are sexually active hence the age the vaccination is offered. If an individual is sexually active then they should still have the vaccination (UK Health Security Agency 2021).

Within the UK people are eligible to receive the vaccination up to the age of 25. Whilst it is estimated that the vaccination will prevent up to 90% of cervical cancer cases it is important that people who have a cervix and are fully vaccinated attend regular routine cervical screening when invited (Falcaro et al. 2021; UK Health Security Agency 2021).

Although approximately 80% of individuals will contract HPV within their lifetime, there are other factors that can increase the risk of developing HPV persistence and the potential development of cervical cancer. These include having a weakened immune system, having multiple sexual partners and co-infection with other sexually transmitted infections, parity and being of a young age at first birth and smoking (WHO 2020). Individuals with Human Immunodeficiency Viruses (HIV) which affects the immune system are more likely to have persistent HPV infections which leads to a more rapid progression to pre-cancerous and cancerous lesions. For individuals with normal immune systems, it takes 15 to 20 years for cervical cancer to develop compared to just 5 to 10 years for those with weakened immune systems, such HIV. Individuals with HIV are six times more likely to

develop cervical cancer compared to individuals without HIV. Therefore, individuals with HIV are recommended to have more regular cervical screening which should be performed annually (WHO 2020). Cigarette smoking increases the risk of HPV infection, if a person smokes, they are estimated to be twice as likely to get HPV or develop an HPV-related cancer as a non-smoker (Mzaico et al. 2015; Sugawara et al. 2019). It is unclear as to the exact way that smoking increases the risk but it is known that smoking makes your immune system weaker which could cause a persistent HPV infection (White et al. 2020).

Individuals can further lower their risk of developing HPV by having fewer sexual partners, using condoms or other types of barrier contraception when they have any type of sex, whilst this does not mitigate the risk completely it does reduce it (Macmillan 2021). Health promotion is a key element in reducing the risk factors associated with HPV and healthcare professionals should include this as part of their consultation.

### **Self-testing for HPV next steps**

With the introduction of HPV primary screening there is an opportunity for individuals to self-sample in the privacy and convenience of their own home. Both Australia and the Netherlands have incorporated this into their cervical screening programmes and have seen an increase in women being screened (Fedyanova 2018). Self-testing for HPV screening is currently being piloted within the UK and has been since January 2021 in North and East London (NHS England 2021). If the home test detects HPV, the individuals will be invited to attend their GP practice for a standard smear test. This initiative aims to increase the number of individuals completing cervical screening by making screening easier and more accessible for individuals who may not attend routine screening within primary care.



## **Conclusion**

Cervical cancer is preventable and curable, with the continued HPV vaccination programme and the recent change from cervical cytology to primary HPV screening the UK are well placed to meet the World Health Organisations global strategy to accelerate the elimination of cervical cancer (WHO 2020). The early detection of HPV positive samples allows for timely and effective monitoring and treatment and health care professionals have a key role within this.

## **Key points**

- The National Cervical Screening Programme and the introduction of the Human Papillomavirus (HPV) vaccination in 2008 within the UK has been a further significant step in preventing cervical cancer
- From December 2019 the cervical screening process changed from a cytology based test to HPV primary screening within primary care
- HPV has been detected in more than 99.7% of cervical cancers
- The World Health Organisation have recently launched a Global Strategy to Accelerate the Elimination of Cervical Cancer and identifies three key steps; vaccination, screening and treatment
- Self-testing for HPV screening is currently being piloted within the UK and has been since January 2021 in North and East London

**Reflective points**

- Consider your cervical screening consultations. What information do you currently give to individuals about HPV and the significance of cervical screening results? Having read the article, are there any gaps in the information you give and if so, how will you address these?
- What questions about lifestyle and health promotion would you want to ask an individual to advise them about reducing risks of HPV infection

## References

American Cancer Society. 2020. HPV and Cancer [Internet]. [cited 2021 Nov 10]. Available from:

<https://www.cancer.org/cancer/cancer-causes/infectious-agents/hpv/hpv-and-cancer-info.html>

Cancer Research UK. 2020. Cervical cancer statistics [Internet]. [cited 2021 Nov 07]. Available from:

<https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/cervical-cancer>

Cancer Research UK. 2020. Screening results [Internet]. [cited 2021 Nov 08]. Available from:

<https://www.cancerresearchuk.org/about-cancer/cervical-cancer/getting-diagnosed/screening/results>

Falcaro M, Castañón A, Ndlela B, Checchi M, Soldan K, Lopez-Bernal J, Elliss-Brookes L, Sasieni P.

2021. The effects of the national HPV vaccination programme in England, UK, on cervical cancer and grade 3 cervical intraepithelial neoplasia incidence: A register-based observational study.

The Lancet [Internet]. [cited 2021 Nov 08]; Available from

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)02178-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02178-4/fulltext).

Fedyanova Y. 2018. Canada isn't making the most of DIY tests for HPV. Canadian Medical Association

Journal 190(10):304-304.

Gallagher, J. 2021. HPV vaccine cutting cervical cancer by nearly 90% [Internet]. [cited 2021 Nov 8].

Available from: <https://www.bbc.co.uk/news/health-59148620>

Jo's Trust. 2018. HPV and cervical cancer [Internet]. [cited 2021 Nov 07]. Available from:

<https://www.jostrust.org.uk/information/hpv/hpv-cervical-cancer>

Macmillan. 2021. Human papilloma virus (HPV) [Internet]. [cited 2021 Nov 09]. Available from:

<https://www.macmillan.org.uk/cancer-information-and-support/worried-about-cancer/causes-and-risk-factors/hpv>

Mzarico E, Gomex-Roig MD, Guirado L, Lorente N., Gonzalez-Bosquet E. 2015. Relationship between smoking, HPV infection, and risk of cervical cancer. *European Journal of Gynaecological Oncology* 36(6):677-80

NHS Digital. 2021. Appointments in General Practice- Weekly MI [Internet]. [cited 2021 Nov09].

Available from: <https://digital.nhs.uk/data-and-information/publications/statistical/appointments-in-general-practice--weekly-mi/current#>

Public Health England. 2020. Guidance Education pathway [Internet]. [cited 2021 Nov 09]. Available

from: <https://www.gov.uk/government/publications/cervical-screening-cervical-sample-taker-training/training-for-cervical-sample-takers-education-pathway>

Public Health England. 2020. Human papillomavirus (HPV) vaccination coverage in adolescent females and males in England: Academic year 2019 to 2020. [Internet]. [cited 2021 Nov 09].

Available from:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/927694/hpr1920 HPV-vc.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/927694/hpr1920 HPV-vc.pdf).

Public Health England. 2020. Significant landmark as primary HPV screening is offered across England

[Internet]. [cited 2021 Nov 10]. Available from:

<https://phescreening.blog.gov.uk/2020/01/23/significant-landmark-as-primary-hpv-screening-is-offered-across-england/>

Public Health England. 2021. Cervical standards data report: 1 April 2019 to 31 March 2020

[Internet]. [cited 2021 Nov 11]. Available from:

<https://www.gov.uk/government/publications/cervical-screening-standards-data-report/cervical-standards-data-report-1-april-2019-to-31-march-2020>

Sisson H and Wilkinson Y. 2019. An integrative review of the influences on decision-making of young people about human papillomavirus vaccine. *The Journal of School Nursing* 35(1):39-50

Stubbs, R. 2018. PHE to launch national cervical screening campaign in March 2019 [Internet]. [cited 2021 Nov 09]. Available from: <https://phescreening.blog.gov.uk/2018/11/30/phe-to-launch-national-cervical-screening-campaign-in-march-2019/>

Sugawara Y, Tsuji I, Mizoue T, Inoue M, Sawada N, Matsuo K, Ito H, Naito M, Nagata C, Kitamura Y, et al. 2015. Cigarette smoking and cervical cancer risk: an evaluation based on a systematic review and meta-analysis among Japanese women. *Japanese Journal of Clinical Oncology* 49(1):77-86

UK Health Security Agency. 2019. Chapter 18a: Human papillomavirus (HPV) [Internet]. [cited 2021 Nov 09]. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/828868/Greenbook\\_chapter\\_18a.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/828868/Greenbook_chapter_18a.pdf)

UK Health Security Agency. 2021. Information on HPV vaccination [Internet]. [cited 2021 Nov 09]. Available from: <https://www.gov.uk/government/publications/hpv-vaccine-vaccination-guide-leaflet/information-on-hpv-vaccination>

White CM, Bakhiet S, Bates M, Ruttle C, Pilkington LJ, Keegan H, O'Toole S, Sharp L, Tewari P, et al. 2020. Exposure to tobacco smoke measured by urinary nicotine metabolites increases risk of p16/Ki-67 co-expression and high-grade cervical neoplasia in HPV positive women: A two-year prospective study. *Cancer Epidemiology* 68(1)

World Health Organisation. 2020. Cervical Cancer Elimination Initiative [Internet]. [cited 2021 Nov 08]. Available from: <https://www.who.int/initiatives/cervical-cancer-elimination-initiative>

World Health Organisation. 2020. Human papillomavirus (HPV) and cervical cancer [Internet]. [cited 2021 Nov 09]. Available from: [https://www.who.int/news-room/fact-sheets/detail/human-papillomavirus-\(hpv\)-and-cervical-cancer](https://www.who.int/news-room/fact-sheets/detail/human-papillomavirus-(hpv)-and-cervical-cancer)

Table 1 Cervical Screening Results

Result	What does it mean?
Inadequate sample	The sample does not contain enough material to test for a result
HPV negative	Human papillomavirus is not found within the sample suggesting the risk of developing cervical cancer is low, depending on the age of the individual, they will be invited for routine screening in either 3 or 5 years.
HPV positive with negative cytology	Human papillomavirus is found within the sample but there are no abnormal cells present on cytology. The individual will be invited for screening again in 1 year and again in 2 years if they are still positive for HPV. If after 3 years HPV is still present, then the individual should be referred to colposcopy.
HPV positive with positive cytology	Human papillomavirus is found within the sample and there are abnormal cells present too. The individual will be referred to colposcopy. Results of a colposcopy yield two results, either normal which four out of ten people will receive or abnormal which affects about 6 out of 10 individuals. For those normal results, there are no abnormal cells and individuals are to continue with their cervical screening at the correct interval for their age. For those individuals with abnormal results, they will need treatment to remove them. Following biopsies individuals will hear the term CIN or CGIN followed by a number 1-3, this number identifies the chances of those cells turning cancerous (Cancer Research UK 2020).