

**KNOWLEDGE, ATTITUDES AND AWARENESS OF THE HUMAN  
PAPILLOMAVIRUS AMONGST PRIMARY CARE PRACTICE NURSES: AN  
EVALUATION OF CURRENT TRAINING IN ENGLAND**

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## **ABSTRACT**

**Background** The incorporation of Human papillomavirus (HPV) testing into the English cervical screening programme has been met with fear and anxiety. Healthcare professionals need to be adequately informed about HPV to help alleviate patient concerns.

The aim of this study was to evaluate the HPV training provided to practice nurses (PN) and determine their level of HPV knowledge.

**Method** A web-based survey was distributed to 147 General Practice surgeries in the Leicester, Leicestershire & Rutland regions, between May-July 2015. The survey explored four broad areas; demographics/level of experience, HPV knowledge, attitudes towards the HPV vaccine and self-perceived adequacy of HPV knowledge.

**Results** 128 surveys were completed, with 94 complete responses. Overall awareness of basic HPV facts was adequate, however detailed and in some basic knowledge was lacking. 9.6% failed to identify that HPV can cause cervical cancer and 62.8% believed that HPV requires treatment. Not all PN felt adequately informed about HPV and a need to improve the provision of training was identified.

**Conclusion** PN play a key role in increasing public awareness of HPV and implementing cervical cancer screening. The provision of education to PN needs to be a priority and current methods of training need to be re-evaluated.

## **INTRODUCTION**

Since Professor Zur Hausen first identified the role of human papillomavirus (HPV) in the development of cervical cancer over 3 decades ago<sup>1, 2</sup>, knowledge of the relationship between the two has increased multi-fold. It is now known that HPV is implicated as a causative factor in 99.7% of all cervical cancers<sup>3</sup> and as a consequence HPV has been incorporated into both primary and secondary cervical cancer prevention strategies.

The introduction of prophylactic vaccines against high-risk HPV represents the first step in reducing disease burden. The two most widely used HPV vaccines globally are the bivalent and the quadrivalent vaccines<sup>4</sup>, which provide protection against the high-risk HPV types 16 and 18, reported to account for 70% of all cervical cancers<sup>5</sup>. In areas of high vaccine uptake the benefits are already evident with decreases in the incidence of high-grade cervical abnormalities and the prevalence of vaccine HPV types<sup>6</sup>.

HPV testing is also pivotal in secondary prevention in the form of HPV triage and test of cure (TOC), which were introduced into the English Cervical Screening Programme (CSP) in 2011<sup>7</sup>. The use of HPV testing to triage low-grade cytological abnormalities has been shown to be more sensitive for earlier detection of cervical intraepithelial neoplasia grade (CIN) II+, compared to standard liquid based cytology alone<sup>8</sup>. Furthermore it permits earlier return to routine recall in those with mild cytological abnormalities who are negative for high-risk HPV; and similarly for those testing negative post treatment, follow-up is considerably shortened<sup>9</sup>.

Despite the benefits, the integration of HPV into the CSP in England has posed many challenges for healthcare professionals. Firstly there was a need to update the provision of training to ensure effective dissemination of the new protocol, in addition to providing HPV-related education. Previous studies have demonstrated that HPV knowledge amongst healthcare professionals is variable and in some even deficient<sup>10-15</sup>. Secondly there is the challenge of communicating these substantial changes to the women in a clear and non-judgemental manner. Evidence thus far has shown that service users have met this new protocol with anxiety, confusion and embarrassment due to the stigma associated with HPV<sup>16</sup>.

In England practice nurses (PN), perform the majority of cervical smears and will often represent the first and only point of contact women have with the CSP. Consequently it is essential that PN are adequately informed about the new screening protocol and are able to convey information to women, regarding HPV, its role in cervical cancer aetiology and its natural history, without creating anxiety or confusion.

With the introduction of HPV triage and TOC in England, the National Health Service (NHS) CSP developed a HPV training package for all cervical smear sample takers. This consisted of an information pack that was sent out to all General Practice surgeries included in this study in February 2012 and incorporation of HPV education into the 3 yearly updates, which are recommended by the NHS CSP for nurses or one off face to face HPV-specific training sessions. Training could be undertaken face to face or via an internal general practice “cascade” system. The aim of this study was to evaluate the effectiveness of current HPV training and to determine the level of HPV knowledge in PN cervical smear sample takers.

## **METHODS**

An anonymous cross sectional survey was conducted between May-July 2015 to evaluate our aims. The web-based survey was distributed via a regional mailing list to 147 General Practice surgeries in the Leicester, Leicestershire and Rutland area, in the UK. The practice managers were asked to cascade the survey to all registered PN cervical smear takers working within their surgery. There were a total of 479 PN cervical smear takers registered for this area. Two reminder emails were sent during the study period and a built in mechanism in the online survey tool “smart survey” prevented double entries.

### **Survey development**

Following an extensive literature search, the authors (HP, KAS), in collaboration with the local screening co-ordinator from Public Health England, developed the survey. The NHS CSP HPV training package was used as a guide from which to develop and set standards for the questions. Pre-existing validated HPV knowledge questions were incorporated into the survey where appropriate<sup>17</sup>. This survey tool has been previously used to assess the level of HPV knowledge in the lay population and therefore it was felt that this is the minimal level of knowledge that healthcare

professionals should have. The survey was pre-tested on a convenience sample of 15 PN from outside the study area for content validity and relevance. It was estimated that the survey would take approximately 10 minutes to complete.

The final 12-point survey explored four broad categories: demographics and level of experience, HPV knowledge (general HPV knowledge, HPV triage/TOC knowledge, HPV vaccine knowledge), attitudes towards the HPV vaccine and self-perceived adequacy of HPV knowledge. The knowledge questions were assessed using a “select all that apply” format and 5-point Likert scales were used to measure attitudes and perceptions.

### **Data analysis**

Statistical analysis was performed using Statistical Package for Social Sciences, IL, USA, version 22. Descriptive statistics were generated for the responses and correlation co-efficients to describe relationships between two continuous variables. For independent samples the Chi square and Kruskal-Wallis test were used to compare categorical and continuous variables, as the data was non-normally distributed. P-values of 0.05 or less were considered to be significant. Free text was analysed using NVivo qualitative research software, examining for common themes. This study was performed in accordance with the local clinical governance, audit and service evaluation guidelines.

## **RESULTS**

A total of 128 PN completed the online survey. Of these 94 were complete responses. Only the complete responses were used for data analysis. The age of the respondents ranged from 27 to 61years (median 50years) and all the PN were females. The median number of years that the PN had been performing cervical smears was 10.5 years (range <1 to 36 years). The majority of the PN (53.2%, n=50) last attended a HPV training session more than 12 months ago and 3.2% (n=3) had never attended despite the fact they have been performing cervical smears for between 2 to 12 years (**Table 1**).

### **General HPV knowledge**

Out of a maximum knowledge score of fifteen, the median score achieved by the participants was 13(range 7-15). All of the PN answered more than 50% of the

questions correctly and furthermore 83% (n=78) correctly answered 80% or more. Confusion existed regarding the need for treatment for HPV; with only 37.2% (n=35) correctly identifying that HPV does not require any treatment. There was greater appreciation for the association between HPV and cervical cancer than that between HPV and genital warts (p=0.03). However, 9.6% (n=9) failed to recognise that HPV can cause cervical cancer and of these 3.2% (n=3) were not aware of either of the two associations (**Table 2**).

### **HPV triage and TOC knowledge**

Overall PN had a sound understanding of the HPV triage and TOC pathways, achieving a median score of 9 (range 5-10) out of 10. However, some uncertainty existed concerning the timing of the HPV test and its interpretation; 17% (n=16) did not believe that the HPV test could be done at the same time as the smear test and 22.3% (n=21) failed to accept that if a woman does not have HPV then her risk of developing cervical cancer is low. Moreover the role of HPV testing post-treatment (TOC) was misinterpreted, with only 66% (n=62) acknowledging that all normal, borderline nuclear and mildly dyskaryotic samples are tested for high risk HPV post-treatment and 8.5% (n=8) believed that annual follow for ten years was still required despite a negative TOC result. (**Table 2**)

### **HPV vaccine knowledge**

This section was scored out of 7; the participants achieved a median score of 6 (range 4-7), with responses from three participants missing. Although the overall HPV vaccine knowledge score was good, detailed knowledge appeared to be lacking: 37.2% (n=35) were not aware that the vaccine protects against most cervical cancers and only 60.6%(n=57) knew that one of the vaccines provides protection against genital warts. However, importantly all correctly acknowledged the need for continued cervical screening post-vaccination. (**Table 2**)

### **Factors influencing level of HPV knowledge**

PN age and the number of years of experience did not correlate with HPV knowledge in any of the three tested knowledge categories (**Table 3**). Timing of the last HPV training session also did not have a significant influence on knowledge scores, and

even those who had never attended a HPV training session achieved comparable knowledge scores (**Table 4**).

### **Attitudes towards HPV vaccine**

Almost all the PN (98.9%, n= 93) either strongly agreed or agreed that they would recommend the HPV vaccine and 88% (n= 83) felt that the vaccine should be offered to boys as well. Those who were undecided or disagreed with boys being offered the HPV vaccine had a significantly lower overall general HPV knowledge score compared to those who agreed/strongly agreed (p=0.02).

### **Self-perceived adequacy of HPV knowledge**

Only 68% (n=64) stated that they felt adequately informed about HPV with the rest undecided, disagreeing or strongly disagreeing (19.1% (n=18), 10.6% (n=10), 2.1% (n=2)). However, 33% of those who did not feel adequately informed still felt that they were confidently able to answer all questions asked by service users.

The HPV knowledge scores did not significantly vary between self-perceived awareness of HPV or ability to answer questions posed by women.

### **Improving training**

It emerged from the free text that PN felt that the delivery of HPV training could be improved. They expressed that there was a requirement for continued HPV education, with the provision of regular updates. It was proposed by some that this could be achieved with the use of emails or newsletters featuring salient HPV facts along with notification of new developments. The most popular recommendation was for the development of an online training programme, with an assessment component and commonly asked questions by women. It was believed that online resources would be easier to access and therefore likely to increase participation. Key barriers to attending educational meetings were stated as travel distance and lack of time in which to attend.

## **DISCUSSION**

### **Main findings of this study**

The results of this study support that PN overall, have adequate levels of HPV knowledge. On average they correctly answered 86% of the knowledge-based

questions across the three categories. It was however, evident that key basic facts were missed by some; 9.6% failed to identify that HPV can cause cervical cancer and over 30% did not recognise sexual intercourse at an early age as a risk factor or that most sexually active women will acquire HPV. It has been shown that simply informing women that HPV is common can help reassure them<sup>18</sup>. The most poorly answered question was regarding the treatment of HPV, a majority of 62.8% erroneously stated that HPV requires treatment. Furthermore detailed awareness across all three HPV knowledge categories was lacking. Just over a fifth were unaware that HPV could be passed on by genital skin to skin contact or that it is responsible for genital warts and confusion existed regarding the role of TOC and the impact it has on follow-up post-treatment. PN lacked up-to-date HPV vaccine information, 24.5% were not aware of the new two dose vaccine schedule<sup>19</sup> and 35.1% did not know of the added protection provided by the quadrivalent vaccine against genital warts. The quadrivalent vaccine has been in use in England since September 2012. This is likely to be reflective of the fact that the majority of PN in our cohort had not attended a HPV training session for over 12 months.

Clinical experience did not correlate with increased HPV knowledge, it may be inferred from this finding that clinical experience alone is not adequate to obtain sufficient awareness of HPV and that there is a requirement for formal HPV education.

It emerged that PN felt that the provision of HPV training needed to be improved. The majority of the respondents stated that the development of an online e-learning programme could be a way of achieving this.

### **What is already known on this topic**

There is abundant research demonstrating poor awareness of HPV amongst different groups within the lay population<sup>20-23</sup>. Evaluation of HPV knowledge in physicians, from across the globe, in countries with differing cervical screening programmes, has shown that knowledge levels are variable and may differ between specialities<sup>24-28</sup>.

In the England, PN have not previously been investigated but HPV knowledge in other groups of healthcare professionals (General Practitioners, Paediatricians and Obstetricians and Gynaecologists) has been shown to be low<sup>29</sup>. In New Zealand and Ireland where the majority of cervical smears are performed in primary care, studies exploring awareness of HPV in PN, have also found that detailed HPV knowledge



was deficient<sup>30, 31</sup>. PN and General Practitioners were unclear on the role of HPV testing and how it is done<sup>31</sup>. Level of HPV knowledge in school nurses, who are responsible for the administration of the HPV vaccine in many countries<sup>32</sup>, is also variable<sup>15, 33-35</sup>. HPV knowledge in nurses has been identified as an important precursor for a positive attitude towards the vaccine<sup>33, 36</sup>.

It is acknowledged that there are challenges of communicating HPV related information to women<sup>37</sup> and healthcare providers have self-reported feeling uncomfortable answering HPV-related questions<sup>38</sup>. The exact reasons for this have not been established but one may argue that this is reflective of their own lack of HPV awareness, given the results of the previously mentioned HPV knowledge studies in this group.

The provision of education to women has been shown to be key in increasing knowledge of HPV, cervical cancer and significantly decreasing concerns about receiving a positive HPV test result<sup>39</sup>. In addition the value of participation with cervical cancer screening, in women, is positively associated with education<sup>40</sup>.

The content and the quality of the information shared needs to be accurate and clear to avoid misunderstandings<sup>16</sup>. Patients have erroneously believed that HPV testing is a test of fidelity<sup>41</sup>.

These findings emphasise the central role of HPV education in the uptake of preventative health measures.

With regards to improving HPV education, the use of e-learning within medical education is increasing and it has been shown to be a useful adjunct to traditional teaching methods<sup>42</sup>. PN identified lack of time and travelling distance as barriers to attending training sessions. One of the benefits of e-learning is that it permits learner centred education which transcends geographical boundaries<sup>43</sup> and therefore is likely to result in increased participation. Previous studies that have explored the role of web based continued medical education in the context of cervical cancer screening have shown favourable results, particularly in terms of increasing knowledge levels and enhancing the adoption of clinical guidelines<sup>44</sup>.

### **What this study adds**

The changes in the CSP, which have resulted from the implementation of HPV testing, have had a significant psychological impact on women<sup>45</sup>. Women look to

healthcare professionals for HPV-related information<sup>46</sup> and therefore it is imperative that they are able to provide patients with clear, consistent and accurate information to help relieve their anxieties<sup>16</sup>. This study highlights the gaps in the basic HPV knowledge of PN. They are not adequately informed about HPV and some lack familiarity with the new management pathways. Majority of the knowledge questions used in this study have previously been used to assess HPV knowledge in the lay population<sup>20</sup>; therefore one may debate that if lay women are accepted to have this level of knowledge, knowledge levels in PN should be greater. The results of this study are concerning as PN perform the majority of the 3,500,000 + cervical smears performed annually in England<sup>47</sup>. PN are central to the CSP and are in a powerful position to impart knowledge to women.

### **Limitations of this study**

The overall response rate appeared to be low (19.6% for complete responses), although it was difficult to accurately determine. The number of PN currently working in the region is thought to be below the 479 on the register, since the register does not account for nurses who have moved out of area or who are no longer practising. An up to date register is vital for ensuring that all PN are adequately trained and the lack of one may provide an explanation as to why three PN in our cohort had never attended a HPV training session.

We only sampled one region within England, however PN of varying degrees of experience are represented and the guidance on training for cervical cancer screening is standardised across the country, although delivery may differ. Therefore we believe that our data may be extrapolated to other regions within England but to obtain truly representative data the survey would need to be rolled out nationally. Although the results of this study are not directly internationally applicable, it provides an insight into the challenges of making major changes to a well organised and highly successful cervical screening programmes that others can learn from. It draws attention to the fact that increased emphasis needs to be placed on the education of healthcare professionals, who's knowledge is often taken for granted.

Our study revealed that the PN scored highly on the HPV knowledge assessments; however there is some debate that the use of online survey tools compared to paper versions may result in falsely elevated knowledge scores. It has been argued that

when using online surveys the participants have access to additional resources, for example the internet, which they may use to search for information<sup>48</sup>. This could explain why, despite the PN achieving high knowledge scores, 32% felt inadequately informed about HPV and 22% felt that they could not confidently answer HPV-related questions posed by women.

Cervical cancer prevention is increasingly focusing on HPV and it is likely that in the near future primary HPV testing will be the default methodology for cervical cancer screening. Consideration needs to be given to re-evaluating the delivery of HPV related health education to PN. Training needs to be provided in a more effective and efficient manner to ensure that professional understanding it is not lagging behind scientific advancements.

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### **Competing Interests**

The authors have no competing interests.

### **Funding**

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### **Ethical Approval**

This study was performed in accordance with the local clinical governance, audit and service evaluation guidelines and in collaboration with the local Screening and Immunisation Co-ordinator.

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**Table 1- Participant Characteristics**

**Table 2- HPV knowledge questions (Questions used from validated HPV knowledge tool<sup>17</sup>)**

**Table 3- HPV knowledge score against practice nurse age and years of experience**

**Table 4- HPV knowledge score against length of time since last HPV training session**