A Cross-Sectional Survey of Awareness of Human Papillomavirus-associated Oropharyngeal Cancers among General Practitioners in the UK

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Abstract

Objectives: To examine the level of awareness of the link between human papillomavirus (HPV) and oropharyngeal cancer (OPC) and epidemiological trends in HPV-related OPC among General Practitioners (GPs) in the UK.

Design: Cross-sectional survey

Participants: 384 GPs from England, Scotland, Wales and Northern Ireland.

Setting: The survey was administered at GP training courses and via email to lists of training course attendees.

Primary and secondary outcome measures: Proportion of respondents aware of the link between HPV and OPC; respondents' self-rated knowledge of OPC; proportion of participants aware of the epidemiological trends in HPV-associated OPC.

Results: 384 questionnaires were completed with an overall response rate of 72.9%. 74.0% of participants recognised HPV as a risk factor for OPC, which was lower than knowledge about the role of smoking, chewing tobacco and alcohol consumption (all >90% recognition). Overall, 19.4% rated their knowledge of OPC as very good or good, 62.7% as average, and 17.7% as poor or very poor. The majority (71.9%) were aware that rates of HPV-associated OPC have increased over the last two decades. Fewer than half (41.5%) of the participants correctly identified being male as a risk factor of HPV-associated OPC, while 58.8% were aware that patients with HPV-associated OPC tend to be younger than those with non-HPV-associated disease.

Conclusions: The association of HPV infection with OPC is a relatively recent discovery. Although the level of awareness of HPV and OPC among General Practitioners was high, the characteristics of HPV-associated OPC were less well recognised, indicating the need for further education.

Article Summary

Strengths and limitations of this study

- This study is the first to report on awareness of HPV-associated OPC in a sample of UK General Practitioners.
- This study included GPs from a variety of geographical regions with varying levels of experience.
- This study suggests that further education on the epidemiological trends and patient demographics of HPV-associated OPC may be needed to ensure early detection of disease.
- The main limitation is the unknown representativeness of the sample. Although the response rate was good, we used a convenience sample of GPs and trainees attending training updates, who may have higher or lower levels of knowledge than the wider population of GPs in the UK.

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Introduction

Head and neck cancer (HNC) is a significant cause of morbidity and mortality with over 11,000 new cases diagnosed in the UK each year[1]. The most common anatomical sites are the oral cavity, pharynx and larynx, with over 90% of tumours diagnosed being squamous cell carcinomas[2]. Survival rates of HNC are related to histological type, primary tumour site, disease stage at time of diagnosis and aetiology. Knowledge of the symptoms, risk factors and epidemiology both in the general population, and among primary care professionals is key to primary prevention and earlier diagnosis[3].

Research in the past decade has revealed the increasing importance of human papillomavirus (HPV) infection as a major risk factor for the development of HNC, in particular oropharyngeal cancer (OPC)[4 5]. Whilst rates of tobacco-related disease have decreased over the past two decades, there has been a marked increase in HPV-positive OPC in many high-income countries. It is estimated that between 55-95% of OPC in Europe is HPV-positive in younger patients[5 6]. Twenty years ago, this figure stood at just 20%. In this period, the incidence of HPV-associated OPC in the US has increased by 225%[7] and similar trends are observed in the UK. In Scotland the rates of oropharyngeal cancer have increased more than those of any other cancer[8].

Diagnosing HPV-positive OPC presents particular challenges for general practitioners (GPs) who may lack detailed knowledge of the disease. HPV-positive OPC represents a distinct molecular, epidemiologic and clinical entity[9 10]. Compared with non-HPV associated HNC, HPV-positive OPC occurs at a younger age and more often in males compared to non-HPV-associated OPC[11]. In addition, patients presenting with HPV-positive OPC typically lack traditional risk factors such as smoking and alcohol use. Risk factors for HPV-positive OPC include age at first intercourse, number of sexual partners and number of oral sex partners[4]. Early diagnosis is important; HPV-positive OPC is much more responsive to chemotherapy and radiotherapy (82% vs 55%) and has better overall survival rates at 2 years than non-HPV-associated OPC (95% vs 62%)[12]. The increasing rates of head and neck cancers and the fact that their outcome depends on early diagnosis, has been recognised in the GP Curriculum of the Royal College of General Practitioners[13].

Awareness of the changing epidemiological and risk factor profile of OPC among primary care professionals is likely to lead to earlier diagnosis, resulting in improved outcomes, but the HPV-related learning resources recommended by the RCGP Curriculum to GPs and GP Trainees (such as RCGP Learning, e-LfH and BMJ Learning) focus on cervical cancer and cervical screening. Our review of the literature did not identify any learning modules available to UK GPs which focus on HPV-associated OPC. In addition, there has been no research to establish current levels of knowledge about HPV-associated OPC among GPs in the UK, which is an essential first step in identifying additional training needs in this area.

This study represents a first step towards understanding awareness of HPV-associated OPC among GPs in the UK, and to identify areas where further educational resources might lead to more targeted knowledge and improved patient outcomes.

Methods

We carried out a cross-sectional questionnaire survey with GPs in the UK (**Supplementary File 1**; STROBE checklist).

Measures

We developed a short questionnaire (**Supplementary File 2**) assessing demographic characteristics of the participants, self-rated knowledge of OPC, awareness of OPC risk factors, awareness of time trends in smoking- and HPV-related OPC, previous awareness of the link between HPV and OPC and perceptions about the characteristics of patients with HPV-associated as opposed to non-HPV OPC. Demographic characteristics included gender, number of years since graduation and current position. Self-rated level of knowledge and assessment of awareness of OPC was assessed using a Likert scale. Knowledge of the symptoms and risk factors for OCP were assessed using items adapted from the Cancer Awareness Measure[14 15]. Thirteen risk factors (10 true and 3 false) were selected from the epidemiological literature [16 17]. An open question was used to assess knowledge of the symptoms of OPC, using wording from the Cancer Awareness Measure. The items developed for the questionnaire were discussed in a multi-disciplinary team including general practitioners and a behavioural scientist.

Participants and procedure

As the aims of the study were descriptive, we did not carry out a formal sample size calculation but aimed to recruit around 400 participants from a range of geographical locations, with varying amounts of clinical experience, in line with similar studies of this type[18]. Eligibility criteria were defined as being on the General Medical Council's (GMC) GP register and a local performers list or being currently enrolled in a recognised UK GP training post. The questionnaire was administered to a convenience sample of GPs attending courses and training meetings in paper format and via email lists in online format. Survey Monkey online platform was used to administer the survey via email lists. Paper questionnaires were added as separate collectors to the Survey Monkey database to consolidate responses. The sample included three training events for GPs in London and the North West of England, and five web links sent to working groups, local faculties and event administrators. Each collector was sent and tracked separately (**Supplementary Table 1; Supplementary File 3**). Data collection continued over a period of nine months between May 2015 and February 2016.

Analysis

Statistical analysis was conducted using standard measures of central tendency and spread. One-way ANOVA test was used for assessing association between years after graduation and awareness of HPV and OPC link. IBM SPSS® v20.0 software was used for statistical analysis. Descriptive data on the main characteristics of the sample was analysed using Microsoft Excel® version 2013.

Ethical approval

The study was exempt from the requirement for Research Ethics Committee (REC) review on the basis that data collection was anonymised and no vulnerable participants were involved (advice from Harrow NHS REC and UCL REC).

Patient and Public Involvement

No patient and public involvement was sought during the preparation of the questionnaire, as our target group was exclusively medical professionals. However,

general practitioners and a behavioural scientist were involved in the development of the survey and are included in the list of authors.

Results

Sample characteristics

A total of 96 surveys were distributed in printed form and 411 requests were sent by email distribution via online lists. Overall, 385 questionnaires were completed giving an overall response rate of 72.9%. 8 of the 385 responses were disqualified. 340 participants completed all the questions and 35 had missing data on 1 or more question. Each question was analysed individually. The response rate for paper questionnaires was higher (85.4%) compared to online distribution (70.1%) (**Supplementary Table 1; Supplementary File 3**). The demographic characteristics of the sample are shown in **Table 1**. Overall, 59.1% participants were female. The largest proportion of participants were from England (44.2%), but all parts of the UK were included (Scotland 27.6%, Ireland 19.6%, Wales 8.6%). About half (50.3%) of participants had been in practice for over 10 years (18.4% 10-20y and 31.9% >20 years). Just over a third (35.2%) of participants were in training, 33.5% were salaried GPs and 24.5% were GP Partners. 6.1% reported being in a locum post. When asked about their self-rated knowledge of OPC, 19.4% rated their knowledge of OPC as very good or good, and 62.9% rated their knowledge as average. 17.7% reported poor or very poor knowledge of OPC.

Awareness of risk factors for OPC

73.9% of the participants reported being aware of the link between HPV and OPC whilst 16.9% reported not having heard of the association and 9.1% reported being unsure. Participants were asked about 13 exposures and whether they were risk factors of OPC or not (**Figure 1**). Just over three-quarters (77.6% 271 of 349) of the participants who responded to the risk factor question, correctly identified HPV as a risk factor for OPC. Awareness of other well-established risk factors was much higher: smoking (99.4%), chewing tobacco (96.6%), current alcohol consumption (94.3%) and past alcohol consumption (86.5%). Chewing catchu and areca nuts, marijuana use and aflatoxin exposure were less frequently recognised (32.9%, 50.4%, 26.4%, respectively).

Knowledge of the epidemiology of HPV-associated OCP

Most participants (71.9%) correctly stated that the rates of HPV-associated OPC have increased in high incomes countries over the last two decades (**Table 2**). However, fewer than half (41.5%) correctly identified HPV-associated OPC as being more common in males. 58.8% correctly reported the association with younger age. There were no statistically significant differences between years since graduation or post type and awareness of HPV and OPC.

Discussion:

This study is the first to assess the awareness of HPV-associated OPC in a sample of UK GPs. Our results show that more than three-quarters of UK participants who responded to the risk factor question correctly identified HPV as a risk factor for OPC. However, there is limited awareness of the differences in the demographic profiles of patients presenting with HPV-associated and non-HPV-associated OPC as well as a lack of awareness of other risk factors of OPC.

Cancer of the oropharynx is now thought to be associated with HPV in 70-95% of younger patients[5] and disease outcome is related to the stage of disease at diagnosis[3]. It is therefore important that GPs, who are likely to be the first point of contact for patients, are able to recognise the characteristics of patients at risk of HPV-associated OPC in order to refer them on to secondary and tertiary care as early as possible. These patients may be younger and may not have any history of smoking and drinking, in contrast to the risk factor profiles of traditional head and neck cancer patients.

Our study demonstrates that further education on the epidemiological trends and patient demographics of HPV-associated OPC is needed to ensure early detection of disease. We provide a learning module which can be accessed online (**Supplementary File 4**; HPV-associated Oropharyngeal Cancer Module). GP awareness of the role of HPV in OPC may also lead to more support for the continued high uptake of national HPV vaccination programmes, thereby maximising opportunity to ensure both individual and herd protection.

Strengths and limitations

Our study is the first to assess the awareness of HPV-associated OPC in a sample of UK GPs and benefited from the inclusion of participants from all four UK nations. It is of immediate relevance, taking into account that it assesses awareness of a disease which shows a rapidly rising incidence, and a changing epidemiology.

41,985 GPs (82.16% of the total number of registered GPs in the UK) were registered in England in September 2016, 4,953 GPs, excluding locums, in Scotland in January 2017 (9.7%), 2,887 GPs in Wales, including 634 locums, in March 2016 (5.6%) and 1,274 GPs, excluding locums, in Northern Ireland in October 2015 (2.49%), respectively[19]. Comparing these data with our sample, we need to acknowledge that participants from England (n=165; 44.2%) are under-represented and that participants from Scotland (n=103; 27.6%), Wales (n=32; 8.6%) and Northern Ireland (n=73; 19.6%) are over-represented. We instructed all participants to answer the questions consecutively when distributing the paper questionnaires, but they may have looked at subsequent questions which could have influenced their responses leading to an overestimation of knowledge. The online questionnaire only allowed questions to be answered in order. Although the response rate was high for a survey of GPs [20], we do not have data on non-responders so we are unable to test for response bias. The main limitation of the study is the use of a convenience sample, recruited at GP educational events, and via email lists of event attendees and regional faculties. By recruiting participants attending training courses and educational events, we may have included GPs who were more up-to-date, leading to an overestimation of knowledge levels. Training events included GP related topics in general and were not related to head and neck pathology or HPV. In addition, we developed some of the questionnaire items specifically for the study and although they were reviewed by the study team and had good face validity, further psychometric validation would be appropriate prior to further use.

Comparison with existing literature

A recent systematic review by Dodd et al. evaluated the psychosocial impact of HPV-related HNC and investigated the awareness of the link between HPV and HNC among different populations. Forty-one studies were identified which measured knowledge of the link between HPV and HNC, demonstrating the lowest level of knowledge in the general population and highest in medical and dental

professionals[21]. However, Signorelli et al. showed that only 38% of Italian GPs (n=938) recognised the role of HPV in oral disease and oral cancer and concluded that there is a lack of knowledge on HPV infection and vaccination in Italian GPs[22]. Odone et al. explored reasons for non-vaccination against human papillomavirus in Italy[23], providing a useful basis to plan, implement and evaluate targeted educational programmes and training. The link between HPV and OPC was recognised by 43.3% of primary care physicians in Jordan[24] and by 54% of a sample of German physicians[25].

A study of 2126 adults in the United States demonstrated that knowledge of HNC among the general public is low. Whilst 54% of participants identified smoking as a risk factor for HNC, 4.8% identified alcohol use, and just 0.8% recognised HPV infection as a risk factor [14]. Family physicians could play a key role in educating the public and encouraging HPV vaccine uptake.

We report findings of the first study investigating the awareness of HPV-associated OPC risk factors in a sample of UK general practitioners. Awareness in the UK is high but there are gaps in knowledge that should be addressed.

Implications for practice

The failure of 41.2% of participants to recognise younger age as a characteristic of HPV-related OPC patients should be addressed. Good awareness of the fact that there has been a significant rise in younger patients presenting with OPC, often lacking a history of smoking and high alcohol intake, will help ensure that HPV-associated OPC is recognised early. Younger patients with HPV-associated OPC often present with asymmetrical tonsils and without knowledge of this disease and its presentation in the absence of classical risk factors makes it likely that early diagnosis is missed.

Our results clearly demonstrate the need for awareness campaigns to make UK GPs more aware of this rapidly evolving disease. We have created a learning module which can be freely accessed online (**Supplementary File 4**; HPV-associated Oropharyngeal Cancer Module). This includes reference to other risk factors that we showed to be frequently underrecognised, such as chewing betel nuts (also referred

to as catchu or areca nuts) which are traditional among some communities in Indian, Pakistan and Bangladesh.

In conclusion, this study suggests a clear need for further education for GPs on a disease which shows a rising incidence, and a changing epidemiology.

Author's contribution

ML, CV, CK, OJ, RG wrote the first draft of the manuscript with contributions from JH, TF, LM, JW and WY. CV, CK, JH collected the data and analysed these under the guidance of WY, RG and ML. OJ and ML created the online module with advice from LM and TF.

Data Sharing Statement

All data from this study are included in the present work.

Additional information

Ethical approval: The study was exempted from the requirement for Research Ethics Committee (REC) review on the basis that data collection was anonymised and no vulnerable participants were involved (advice from Harrow NHS REC and UCL REC).

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Table 1: Demographic characteristics of the sample and self-rated knowledge of OPC (n=376)

	N	%
Gender		
Male	154	40.9
Female	222	59.1
Stage of training/position		
F2	6	1.6
GPST1	44	11.7
GPST2	36	9.6
GPST3	49	13.1
GP (salaried or partnered)	218	57.9
Locum	23	6.1
Years since graduation		
<2 years	17	4.4
2-5 years	81	21.9
5-10 years	93	24.2
10-20 years	69	17.9
20+ years	124	32.3
Location of current practice (n=373)		
England	165	44.2
Scotland	103	27.6
Wales	32	8.6
Northern Ireland	73	19.6
Self-rated knowledge of OPC (n= 350)		
Very poor	5	1.4
Poor	57	16.3
Average	220	62.9
Good	65	18.6
Very good	3	0.9

Table 2: Knowledge about HPV-associated OPC (n=342)

	N	%
Aware of OCP-HPV link before today?		
Yes	253	73.9
No	58	16.9
Not sure	31	9.1
Over the last 2 decades, have rates of HPV-OPC:		
Increased	246	71.9
Decreased	9	2.6
Stayed the same	29	5.6
Don't know	68	19.9
Compared with non-HPV-OPC, are HPV-OPC patients…		
Male	142	41.5
Female	74	21.6
Same gender	43	5.2
Don't know	83	21.9
Younger	201	58.8
Older	48	14.1
Same age	18	5.3
Don't know	75	21.9

Figure Legends

Figure 1: Participant responses to questions on 10 proven risk factors for OPC, and 3 factors which are not known risk factors.

Supplementary Files

- Supplementary File 1; STROBE checklist
- Supplementary File 2; Copy of the questionnaire handed to UK GPs
- Supplementary File 3; Supplementary Table 1
- Supplementary File 4; HPV-associated Oropharyngeal Cancer Module