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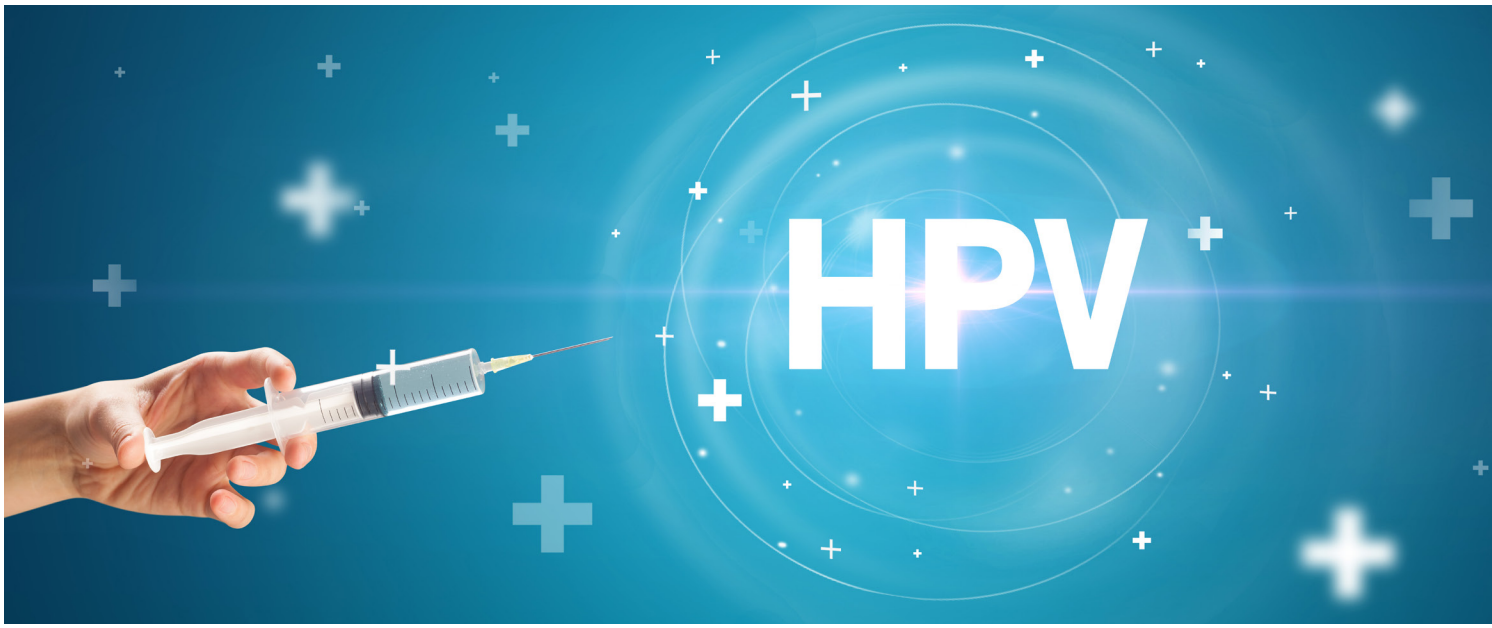

British Columbia Dentists' Perceptions and Practices Regarding HPV Vaccinations: A Cross-sectional Study

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ABSTRACT

Introduction: Human papillomavirus (HPV), as the most common form of sexually transmitted infection, has been implicated in almost one-third of oropharyngeal cancers. One way to prevent HPV infections is through vaccination. This study aimed to investigate whether dentists in British Columbia (BC) were willing to discuss, refer and administer the vaccine in a dental practice setting.

Methods: Our cross-sectional study used a survey consisting of 14 questions pertaining to demographics, scope of practice, barriers to discussing the HPV vaccine and willingness to engage in HPV vaccination. On 1 April 2021, the survey was distributed to all practising dentists in BC via a URL link; the link remained active for 30 days. Descriptive and inferential statistics were used to analyze results, and statistical significance was set at $p < 0.05$.

Results: Of the 201 respondent who completed a survey, 168 (84%) agreed that discussing the link between HPV and oropharyngeal cancer falls within their scope of practice. Fewer agreed that recommending (74%) and administering (39%) the HPV vaccine were within their scope of practice. Barriers that may contribute to this unwillingness included lack of professional policies and guidelines. Although a significant proportion of respondents were willing to educate patients on HPV, they were unwilling to discuss sexual history in a dental setting ($p = 0.02$).

Conclusion: Despite a willingness to discuss and refer patients for HPV vaccination, most respondents were unwilling to administer the vaccine in a dental setting, as they perceived the act to fall outside their scope of practice. There remains a reluctance to engage in vaccination activities in dental settings in BC.

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In 2021 in Canada, an estimated 7400 or more people were diagnosed with head and neck malignancies, particularly squamous cell carcinoma; 2100 likely succumbed to the disease.[1] Approximately 70% of these cases were in the oral cavity and oropharynx, an increased incidence of almost 14% in 2020 compared with 2015–2019 rates.[2] For all stages of oral cavity and pharynx cancers, 5-year survival rates are estimated to be 65%,[3] and 17–30% of those who survive are likely to develop a secondary tumour later in life, even after successful treatment.[4] In 2021, it was estimated that 960 British Columbians would be diagnosed with oral cancer.[5] Males are almost 3 times more likely than their female counterparts to be diagnosed with oral and oropharyngeal cancer.[5] Given the devastating outcome of squamous cell carcinoma in the oral cavity and oropharynx, prevention is of significant importance, in addition to early detection and treatment to avoid the destructive nature of the disease and prevent invasive life-altering treatment sequelae.[6,7]

Human papillomavirus (HPV) emerged as a strong risk factor not only for oropharyngeal cancers, but also for cervical and anal malignancies largely attributed to HPV 16 and 18 subtypes; those infected with these HPV subtypes have been found to be 15 times more likely to develop oropharyngeal cancer than their counterparts.[8,9] Such increased risk is tied to sexual practices, including oral sex, leading to contracting oral HPV, the most common form of sexually transmitted infection.[10] Although most HPV infections remain asymptomatic and are cleared by the body's immune system,[10,11] some will progress into invasive carcinomas over a period of several decades.[10]

Despite the potential HPV-oral sex-oral cancer triad, a study involving the public in British Columbia (BC) found that nearly 35% of participants believed that oral sex has little or no risk of HPV transmission and that 82% never discussed oral sex practices with their dentists.[12] In turn, measures should be taken to prevent, delay or reduce HPV transmission in the population, including vaccination as a form of primary prevention.[13] The HPC vaccines Ceravix (HPV2; GlaxoSmithKline, Brentford, UK) and Gardasil 9 (HPV9; Merck & Co., Kenilworth, NJ, USA) have been approved by Health Canada for this purpose. Gardasil 9, in particular, has been approved for both sexes and protects against multiple strains (6, 11, 16, 18, 31, 33, 45, 52, 58) that cause 15–20% of cervical cancers and 11% of anal cancers in women and 4% of anal cancers in men.[14] In April 2022, the use of Gardasil 9 was also approved by Health Canada for the prevention of oropharyngeal cancers and recommended for youths aged 9–12 years going through puberty and for adults.[15]

Regarding the administration of vaccinations in a dental setting, studies show that the first concern of clinicians pertains to the scope of practice,[16] which in BC does not include vaccinations.[17] But scope of practice aside, the extent to which dentists in BC would be interested in offering vaccinations of any kind to their patients while likely having to discuss sexually transmitted infections and sexual behaviour as a mode of HPV transmission, in particular, is underreported.[12] Studies involving dentists in other jurisdictions have discussed barriers around vaccinations in dental offices, including storage and shelf life,[16] and have highlighted the need to develop communication strategies (policies and guidelines) around HPV vaccinations in particular.[18]

Although it is unknown whether these same barriers and strategies would resonate with BC dentists, momentum was built following the deployment of dental professionals in administering COVID-19 vaccines in 2021.[19] It also remains unknown whether BC dental professionals would be comfortable administering the HPV vaccine in a dental setting if it was allowed by their scope of practice. A milestone in attempting to normalize HPV vaccine administration among dentists was recently showcased in Alberta, where Dr. Lee Darichuk, a member of the Alberta Head and Neck Leadership Team, was the first Canadian-registered dentist to administer the HPV vaccine in a dental office setting.[20]

This study aimed to investigate whether BC dentists were willing to discuss, refer and/or administer the Gardasil 9 vaccine to the target demographic in their practices and to explore their attitudes and practice regarding discussing HPV in dental practice settings. We hypothesised that BC dentists are unwilling to administer the HPV vaccine in the practice setting, as they perceive the act to fall outside their scope of practice.

Methods

A brief 14-item survey was developed based on a larger, validated survey by Harris et al.[21] following the recommended validation process.[22] It consisted of selected questions covering demographics (e.g., age and sex), scope of practice (e.g., age range of patients), barriers to discussing the HPV vaccine (e.g., policies and guidelines), willingness to engage in HPV vaccine practices and willingness to collaborate with primary care providers. Answers included yes/no choices and 5-item Likert scales for levels of agreement and willingness. After piloting the survey with 5 practising dentists at the University of British Columbia and modifying the order of the questions as suggested by these dentists, the survey was imported into the REDCap Flex online platform, licensed under the University of British Columbia. A full description of the process of developing and piloting the survey can be found elsewhere.[23]

The survey was voluntary, anonymous and non-identifiable. On 1 April 2021, it was disseminated by the British Columbia Dental Association (BCDA) as a URL link in the bi-weekly electronic email update to members; the survey link was deactivated on 30 April 2021. A consent form affixed to the beginning of the survey could be downloaded and reviewed before participation. The minimum sample size was 200 responses based on the assumption of an effect size of 0.2 (Pearson correlation) and a power of 0.9 (90%) for testing the hypothesis. BCDA reported 3615 active members in April 2021.

The demographic information was used to explore possible influences on participants' responses. Our outcome variable was willingness to administer the HPV vaccine mediated by age and gender, the presence or absence of polices and guidelines and scope of practice, patients' age and willingness to discuss sexual practices in a dental setting and to refer patients to primary care for vaccination. All data were exported into SPSS (v. 27) software for statistical analysis. Descriptive statistics were used to report frequencies (e.g., percentages) of the most-reported answer. Pearson X^2 tests of independence were conducted, and statistical significance was set at $p < 0.05$. Bonferroni p-value correction was applied in post-hoc analysis to control for type-I error inflation when comparing mean differences within responses grouped according to **Tables 1, 2** and **3**.

Results

Of the 3615 BCDA members, 201 (7.7%) returned fully completed surveys, satisfying the minimum sample size (**Table 1**); 4 surveys were incomplete and were not considered in the analysis. The largest proportion of respondents were in the 41–50 year age group. In terms of gender, 56% of respondents self-identified as male, 41% as female and 1% as non-binary/gender fluid, while 1.5% preferred not to self-identify. Given the small number of transgender, non-binary/gender fluid, prefer not to say and other categories, these were removed from the inferential analyses shown in Tables **1, 2** and **3**. For over half of the respondents (n = 105, 52%), patients 11–26 years of age made up more than 20% of their practice population; this is the target age bracket for HPV vaccine uptake.

Participants were asked their level of agreement in discussing, recommending and administering the HPV vaccine in a dental setting. Most agreed to discuss (84%, n = 169) and recommend (74%, n = 149) the vaccine, whereas almost 40% (n = 78) considered themselves neutral about administering it.

One question outlined potential barriers to discussing HPV vaccines in a dental setting. For 56% (n = 113) of respondents, a lack of policies and guidelines was a barrier. In terms of discussing sexual history in a dental setting as a potential barrier, 41% (n = 83) of respondents did not feel comfortable doing so; male dentists (64%) were more uncomfortable discussing sexual history than female dentists.

Most respondents, regardless of age, gender or their target-patient pool, agreed that discussing the link between HPV and oropharyngeal cancer falls within the scope and role of being a dental professional. There was no statistically significant difference for age, gender or target-patient pool in terms of whether recommending or administering HPV vaccinations would fall within the scope and role of a dental professional (data not shown). However, more dentists in the 61–70-year category disagreed that there was a lack of policies and guidelines that pertain to the recommendation of HPV vaccines (p = 0.03); that is, they might have thought that there were such policies and guidelines in place (**Table 1**).

Most respondents were willing to refer patients for the HPV vaccine with their primary care provider regardless of age, gender or target-patient demographics of their practices. Almost 88% of respondents were willing to educate their patients about HPV; moreover, a larger proportion of dentists who were neutral about educating their patients about HPV agreed to discuss sexual history (p = 0.002) (**Table 2**). More than 91% of respondents were willing to refer patients for vaccinations, while those who were more apt to discuss sexual history (63%) were neutral about referring. Only 54% of respondents were willing to administer the HPV vaccine. Of interest, the highest proportion of dentists willing to discuss sexual history were not willing to administer the vaccine ($p < 0.001$) (**Table 2**).

We looked at associations between dentists' perception of discussing, recommending or administering the HPV vaccine as being within their scope of practice and their willingness to refer patients to a primary care provider (PCP). Dentists who agreed that discussing the HPV vaccine was within their scope of practice were significantly more likely to be willing to refer a patient than those who did not agree ($p < 0.001$) (**Table 3**). In addition, 96% of the dentists who agreed that recommending the vaccine was within their scope of practice were significantly more likely to refer patients to a PCP ($p <$ 0.001) That is, those who believed discussing and recommending the HPV vaccine fell within their scope of practice were also likely to refer patients to PCPs for the HPV vaccine. There was no significant difference between dentists who agreed that administering HPV vaccines was within their scope of practice and those who would refer the patient to a PCP (p = 0.351).

Table 1: Survey participants' response to the statement: There are no established policies/guidelines for recommending HPV vaccines.*

	Total (%)	Disagree (%)	Neutral (%)	Agree (%)	*p*
Educate patients					
≤ 30	15 (7.5)	0 (0.0)	10 (66.7)	5 (33.3)	0.03†
31–40	50 (24.9)	0 (0.0)	17 (34.0)	33 (66.0)	
41–50	58 (28.9)	6 (10.3)	19 (32.8)	33 (56.9)	
51–60	48 (23.9)	6 (12.5)	16 (33.3)	26 (54.2)	
61–70	24 (11.9)	7 (29.2)‡	4 (16.7)	13 (54.2)	
≥ 71	6 (3.0)	0 (0.0)	3 (50.0)	3 (50.0)	
Total	201	19 (9.5)	69 (34.3)	113 (56.2)	
Gender§					
Male	113 (57.7)	9 (8.0)	44 (38.9)	60 (53.1)	0.221
Female	83 (42.3)	10 (12.0)	23 (27.7)	50 (60.2)	
Total	196	19 (9.7)	67 (34.2)	110 (56.1)	
Target demographic¶					
≤ 20%	96 (47.8)	13 (13.5)	34 (35.4)	49 (51)	0.413
21–40%	90 (44.8)	6 (6.7)	32 (35.6)	52 (57.8)	
41–60%	12 (6.0)	0 (0.0)	2 (16.7)	10 (83.3)	
61–80%	1 (0.5)	0 (0.0)	0 (0.0)	1 (100)	
≥ 81%	2 (1.0)	0 (0.0)	1 (50.0)	1 (50.0)	
Total	201	19 (9.5)	69 (34.3)	113 (56.2)	

** Lack of established policies and guidelines was considered a barrier in this study.*

† Significant difference between variables: Pearson's X^2 test of independence with 2-tailed significance determined by $p \leq 0.05$.

‡ Significant difference within variable: Pearson's X^2 tests of independence with right-tailed distribution of the adjusted standardized residuals (using Bonferroni p-value correction).

§ The categories transgender, non-binary/gender fluid, prefer not to say/other were removed from results as these constituted only 5 of 201 responses (2.5%).

¶ Percentage of patients aged 11–26 years.

Table 2: Survey participants' level of comfort discussing sexual history in a dental setting and willingness to educate about, refer for and administer HPV vaccines.

	Uncomfortable discussing sexual history				
	Total (%)	Disagree (%)	Neutral (%)	Agree (%)	*p*
Age					
Unwilling	2 (1.0)	0 (0.0)	0 (0.0)	2 (100)	0.004*
Neutral	23 (11.4)	0 (0.0)†	7 (30.4)	16 (69.6)†	
Willing	176 (87.6)	53 (30.1)†	58 (33.0)	65 (36.9)†	
Total	201	53 (26.4)	65 (32.3)	83 (41.3)	
Refer patients					
Unwilling	1 (0.5)	0 (0.0)	0 (0.0)	1 (100)	0.193
Neutral	16 (8.0)	1 (6.3)	5 (31.3)	10 (62.5)	
Willing	184 (91.5)	52 (28.3)	60 (32.6)	72 (39.1)	
Total	201	53 (26.4)	65 (32.3)	83 (41.3)	
Administer vaccine					
Unwilling	37 (18.4)	4 (10.8)	8 (21.6)	25 (67.6)†	0.001*
Neutral	56 (27.9)	12 (21.4)	18 (32.1)	26 (46.4)	
Willing	108 (53.7)	37 (34.3)	39 (36.1)	32 (29.6)†	
Total	201	53 (26.4)	65 (32.3)	83 (41.3)	

** Significant difference between variables: Pearson's X^2 test of independence with 2-tailed significance determined by $p \leq 0.05$.*

† Significant difference within variable: Pearson's X^2 tests of independence with right-tailed distribution of the adjusted standardized residuals (using Bonferroni p-value correction).

Table 3: Belief of survey participants that discussing, recommending and/or administering HPV vaccinations are within the scope of practice and participants' willingness to refer patients for HPV vaccination.

	Refer patients to primary care provider				
	Total (%)	Disagree (%)	Neutral (%)	Agree (%)	*p*
Discussing					
Disagree	3 (1.5)	1 (33.3)*	1 (33.3)	1 (33.3)*	< 0.001†
Neutral	30 (14.9)	0 (0.0)	5 (16.7)	25 (83.3)	
Agree	168 (83.6)	0 (0.0	10 (6.0)	158 (94.0)*	
Total	201	1 (0.5)	16 (8.0)	184 (91.5)	
Recommending					
Disagree	7 (3.5)	1 (14.3)*	2 (28.6)	4 (57.1)*	< 0.001†
Neutral	45 (22.3)	0 (0.0)	8 (17.8)*	37 (82.2)	
Agree	149 (74.1)	0 (0.0)	6 (4.0)*	143 (96.0)*	
Total	201	1 (0.5)	16 (8.0)	184 (91.5)	
Administering					
Disagree	45 (22.4)	1 (2.2)	5 (11.1)	39 (86.7)	0.351
Neutral	78 (38.8)	0 (0.0)	6 (7.7)	72 (92.3)	
Agree	78 (38.8)	0 (0.0)	5 (6.4)	73 (93.6)	
Total	201	1 (0.5)	16 (8.0)	184 (91.5)	

** Significant difference within variable: Pearson's X^2 test of independence with right-tailed distribution of the adjusted standardized residuals (using Bonferroni p-value correction).*

†Significant difference between variables: Pearson's X^2 test of independence with 2-tailed significance determined by $p \leq 0.05$.

Discussion

Our study found that dentists who participated in the survey would be unwilling to administer the HPV vaccine in a dental setting, as they may perceive the act to fall outside their scope of practice, despite efforts to appeal to these providers to administer vaccines.[24] The results also indirectly corroborate the findings of Brondani and colleagues,[25] who concluded that most BC patient participants never discussed oral sex practices with their dentists, a topic that would have surfaced when talking about HPV prevention and vaccinations. Although a willingness to administer the HPV vaccine was observed, only about half the participants supported administering HPV vaccines themselves, which is in agreement with the findings of Patel et al.[18] and Walker.[26]

We found a high level of agreement among respondents that discussing the link between HPV and oropharyngeal cancer falls within the scope and role of a dental professional. Such strong agreement may be because dentists are highly aware of this link. However, the level of agreement declined sharply as the depth of the questions increased, from discussing to recommending and, finally, to administering HPV vaccine. Only 39% of respondents believed that HPV vaccination falls within the scope and role of a dental professional. An additional 39% of respondents remained neutral on this point, while 22% disagreed. These results likely indirectly corroborate the study by Harris et al.,[20] which found an overall lack of interest in administering the HPV vaccine.

Most respondents to our survey believed that discussing the link between HPV and oropharyngeal cancer and recommending the vaccine fell within the scope of practice of a dental professional, and those who agreed to discuss HPV and oropharyngeal cancer were also more apt to recommend the vaccine. Our data also confirms the findings from Guadiana et al.[27] where nearly all their respondents willing to refer patients elsewhere to receive the vaccine, despite being unwilling to administer it themselves.

Before the COVID-19 pandemic, subdermal injections were not common in dental settings. However, in 2021 while the survey was being disseminated, Canadian dentists were given the opportunity to participate in administering COVID-19 vaccines in mass-vaccination clinics.[28] As such, if the survey had taken place later, there may have been an increase in dentists' perceived responsibility to undertake public health measures, including administering the HPV vaccine. In addition, several studies have suggested that providers who seek vaccination themselves are more likely to recommend vaccines to patients[29,30]; however, this question was not posed to our BC participants and should be considered for future studies.

Overall, participants in our study were willing to educate patients and refer them for HPV vaccination, but were unwilling to administer the vaccine. In combination with perceiving this act to fall outside the scope of practice, other barriers that may contribute to this reluctance include a lack of professional policies and guidelines pertaining to recommendation of the HPV vaccine. The fact that most participants were willing to address the issues at hand but felt uncomfortable doing so corroborates similar findings involving other health care providers.[31]

A 2021 study by Guadiana et al.[25] found that most dentists, hygienists and dental students would be willing to administer HPV vaccines if they were permitted by law, with dental students significantly more willing than their graduate counterparts. Perhaps this is an opportunity to educate the next generation of Canadian dental professionals on HPV vaccine implementation and administration in dental settings. In fact, Torres et al.[32] highlight the gaps in HPV knowledge among current dental students in the United States despite HPV curricula being taught in over 40 courses. Further work is needed in dental education to bridge this gap.

Our study was not without limitations. It was conducted during the COVID-19 pandemic (albeit a year after the first cases were confirmed in BC), and potential participants might have been too preoccupied with their livelihoods and practice uncertainties to engage in a survey not related to the current pandemic situation.[33] On the other hand, the low response rate might have been a result of "survey fatigue," a phenomenon emphasized by the COVID-19 pandemic,[34] when associations and licensing bodies were routinely conducting surveys of their members. The low response rate prevents generalization of the findings to the whole population of dentists in BC. However, the sample might still be representative of those who are more engaged in HPV-related cancer care, showing an upward trend in terms of willingness to intervene. Nonetheless, future research in this field ought to be conducted outside a global pandemic.

As with all electronically delivered email correspondence, there is the risk that the email address used to reach practising dentists corresponds to the office rather than the individual dentist. This may result in responses submitted by support staff on behalf of the dentist or failure of the questionnaire to reach the dentist altogether. The survey was focused on willingness, not actual behaviour; that is, it did not explore whether respondents were actually discussing, educating and referring their patients. Scope of practice aside, one may wonder if there would be other reasons for respondents to be unwilling to provide the HPV vaccine, including vaccine storage or payment and billing for such services, that were not explored in this study.

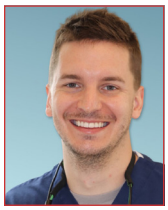
Future research should include qualitative inquiries to explore the reasoning behind the ideas and/or intentions of respondents, to explore other facilitators or barriers and to highlight the stage of

change of respondents and the likelihood that they would indeed engage in future vaccination efforts. Perhaps the recent Health Canada approval of the Gardasil brand of vaccines for the prevention of HPV-related oropharyngeal cancer will encourage governing bodies, including regulatory and licensing bodies, to integrate HPV vaccination into the current scope of practice of a dentist.

Conclusion

Results from 201 BC respondents highlighted unwillingness to administer the HPV vaccine in a dental setting, with most perceiving the act to fall outside their scope of practice. Despite willingness to educate patients about HPV and oropharyngeal cancer and willingness to refer patients for the HPV vaccine with their primary care provider, there remains a reluctance to engage in the overall vaccination effort. Lack of comfort discussing sexual history and related topics in a dental setting and lack of professional policies and guidelines pertaining to the recommendation of the HPV vaccine were highlighted as contributing barriers to the perceived responsibilities of respondent dentists.

The Authors



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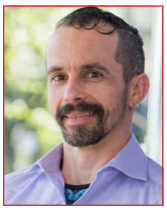

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