HPV and Oral Cancer

The need to integrate oral health practices into nursing education

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BACKGROUND: Human papillomavirus (HPV)–associated oropharyngeal cancer has increased in recent decades. With a shortage of dental professionals, nurses may be key in detecting oral cancer and educating patients.

OBJECTIVES: The aim of this study is to assess students in nursing and dental programs for their oral and oropharyngeal cancer knowledge and perceptions of responsibility and capability of performing oral screenings and HPV counseling.

METHODS: 158 surveys were completed by students attending nursing and dental programs at a midwestern university. The chi-squared test and analysis of variance were used to calculate differences in frequencies of categorical and interval data.

FINDINGS: Many students across programs were unaware of the potential effectiveness of the HPV vaccination in reducing oropharyngeal cancer. Nursing and nurse practitioner students were less likely to believe they could perform an examination or that it was within their perceived scope of practice.

KEYWORDS
oropharyngeal cancer; nursing programs; dental programs; human papillomavirus

DIGITAL OBJECT IDENTIFIER
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IN 2017, AN ESTIMATED 49,670 NEW CASES AND 9,700 DEATHS from oral and oropharyngeal cancer occurred (National Cancer Institute Surveillance, Epidemiology and End Results Program, 2017). Although the primary etiologic agents for the development of oral cancer are long-term exposure to tobacco and alcohol alone or in combination, high-risk human papillomavirus (HPV) infection is now recognized as an important etiologic agent in the development of oropharyngeal cancer (Centers for Disease Control and Prevention [CDC], 2018). The CDC reported that HPV-associated oropharyngeal cancer has increased from 21% in 1980 to 65% in 2013 (Stein, Saha, Yu, Kimple, & Lambert, 2014). If this increase continues, the annual number of HPV-associated oropharyngeal cancers will surpass those of HPV-associated cervical cancers by 2020 (Stein et al., 2014).

Given the shortage of dental professionals available to meet the oral health needs of the population, the Committee on Oral Health Access to Services and the Institute of Medicine recognize that nondental providers, including those in nursing professions, can work collaboratively with dental professionals in the prevention, diagnosis, and treatment of oral disease (Institute of Medicine, 2011). However, oral health has not traditionally been a priority in nursing education (Dolce, 2014).

Nurses and nurse practitioners play important roles in public health, and they can influence oral cancer prevention and early detection behaviors at all levels of interaction and in a multitude of settings (Kemppainen, Tossavainen, & Turunen, 2013). The study purpose was to gather preliminary data to assess and compare nursing, nurse practitioner, dental, and dental hygiene students' oral and oropharyngeal cancer knowledge and their perceptions of their perceived scope of practice and level of confidence for counseling patients about oral and oropharyngeal cancer risk and performing oral examinations.

Literature Review

Nursing and dental professions have long embraced cancer prevention as a cornerstone of their respective practice models using primary and secondary preventive measures, but the level of knowledge and training continues to vary widely (Meng, Duncan, Porter, Li, & Tomar, 2007; Yellowitz, Horowitz, Drury, & Goodman, 2000). The nursing profession has counseled and

TABLE 1.
SAMPLE CHARACTERISTICS (N = 158)

CHARACTERISTIC	n	%
Program		
Nurse practitioner	59	37
Dental	58	37
Nursing	29	18
Dental hygiene	12	8
Year		
First	13	8
Second	74	47
Third	36	23
Fourth	35	22
Gender		
Female	123	78
Male	35	22
Age (years)		
18–19	3	2
20–24	48	30
25–29	50	32
30–39	42	27
40 or older	14	9
No response	1	1
Race		
Caucasian	128	81
Asian	18	11
African American	5	3
Native American	3	2
Multirace	3	2
No response	1	1
Ethnicity		
Non-Hispanic	130	82
Hispanic	10	6

Continued in the next column

TABLE 1. *(CONTINUED)*
SAMPLE CHARACTERISTICS (N = 158)

CHARACTERISTIC	n	%
Ethnicity *(continued)*		
No response	18	11
Marital status		
Single	79	50
Married	71	45
Divorced	7	4
No response	1	1
Dentist		
Yes	127	80
No	31	20
Head and neck examination		
Yes	96	61
No	62	39
Received vaccination		
No	81	51
Yes	77	49

Note. Because of rounding, percentages may not total 100.

educated patients concerning HPV vaccination as a mode of primary prevention for genital warts, anogenital cancer, and cervical cancer; however, there is currently no indication to link oropharyngeal cancer and HPV (U.S. Preventive Services Task Force, 2013a). Dentists and dental hygienists traditionally have had the primary responsibility of assessing the oral cavity for evidence of cancer, but some studies report that they may be inattentive, be inconsistent, or lack confidence in their oral cancer assessments (Cotter, McCann, Schneiderman, De Wald, & Campbell, 2011; Horowitz, Siriphant, Sheikh, & Child, 2001). In addition, dentists and hygienists may not discuss HPV prevention methods with their patients for a variety of reasons, including a lack of knowledge of the association of HPV-associated oropharyngeal cancer and discomfort with discussing oral–genital sexual contact as a means of contracting the HPV virus (Thompson et al., 2017; Vázquez-Otero et al., 2018).

Nurses and nurse practitioners can provide oral cancer prevention and early detection as part of health promotion and disease prevention (Meng et al., 2007). Studies show that people at higher risk for oral cancer do not visit dentists on a regular

basis (Wee et al., 2016), and nurses and nurse practitioners are more likely than dentists to serve high-risk populations (Meng et al., 2007). The inclusion of nurses and nurse practitioners in the detection and prevention of oral cancers can augment opportunities that are missed for a significant proportion of the population who are not accessible for oral cancer screening by dentists (Meng et al., 2007).

Although nurses and nurse practitioners are likely to serve high-risk patients and can positively influence a patient's desire to receive the HPV vaccination, particularly among adolescent men and women, their knowledge of oral and oropharyngeal cancers and perceived scope of practice and confidence in their training to perform examinations and counsel patients about HPV-associated oropharyngeal cancer are not well studied. Assessment of these variables can help inform curricula aimed at reducing and preventing oral cancers.

"Cross-training students can encourage them to perform screening assessments and HPV counseling during routine appointments."

Methods

This cross-sectional study surveyed a convenience sample of 158 nursing, nurse practitioner, dental hygiene, and dental students from Indiana University in May 2017. The investigation was conducted through the Department of Cariology, Operative Dentistry, and Dental Public Health and the dental hygiene program in the Department of Periodontics at the Indiana University School of Dentistry and the Indiana University School of Nursing. The study sample included second-year predoctoral dental students, second-year dental hygiene students, fourth-year baccalaureate nursing students, and second- and third-year pediatric and family nurse practitioner students.

The survey was comprised of 33 questions, which measured demographics, oral and oropharyngeal cancer knowledge, perceived scope of practice related to performing an oral examination to detect oral and oropharyngeal cancer and lifestyle counseling, and perceived confidence in and importance of oral and oropharyngeal cancer education and oral examinations. Knowledge was measured with 14 true-or-false questions that were adapted from the American Cancer Society website and

TABLE 2.
SIGNIFICANT POST-HOC DIFFERENCES IN OVERALL AND INDIVIDUAL CONFIDENCE IN TRAINING AND PERCEIVED SCOPE OF PRACTICE SCORES BY PROGRAM

	DENTAL		DENTAL HYGIENE		NURSING		NURSE PRACTITIONER		
VARIABLE	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	p
Confidence									
Overall	18.29	2.17	17.2	1.82	13.79	2.32	16.68	3.13	< 0.001
Training prepared me with knowledge of oral and oropharyngeal cancer.	4.93	0.26	4.58	0.52	3.83	0.89	4.46	0.84	< 0.001
Confidence in training of oral examination	4.48	0.96	4.42	0.52	3.83	0.89	4.46	0.99	0.001
Importance of oral and oropharyngeal cancer training	4.72	0.74	4.42	0.52	3.93	0.84	4.31	0.99	–
Perceived scope									
Overall	22.03	2.83	20.92	2.61	18.02	3.55	22.54	3.57	0.024
Performing examination	4.71	0.68	4.77	0.49	3.41	1.15	4.2	0.91	< 0.001

Note. The total possible confidence score is 20 (range = 4–20). Higher scores indicate more confidence in training and education received about oral and oropharyngeal cancer examination practices. The total possible perceived scope score is 25 (range = 5–25). Higher scores indicate higher perception that it is their role to counsel about oropharyngeal cancer risk factors, including human papillomavirus, and perform oropharyngeal cancer examinations.

reviewed for accuracy by an oral pathologist. Responses received one point for each correctly answered question. Scores were summed to produce a composite knowledge score (Cronbach alpha = 0.7). Perceived scope of practice was measured with five questions about students' perceived scope of practice for performing an oral examination and perceived scope of practice for counseling patients concerning HPV-associated cancers, history of HPV vaccination, and health habits (use of alcohol and tobacco). Perception of confidence in education and training of oral and oropharyngeal cancer and examinations was measured with four questions. Perceived scope of practice and confidence questions were adapted from questionnaires that included previously validated terms and items specifically designed for this study (Haresaku, Makino, Sugiyama, Naito, & Marino, 2016; Rutkoski et al., 2018). Responses were assessed on a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Responses were summed to produce composite perceived scope of practice and confidence scores (Cronbach alpha = 0.82 and 0.78, respectively). All questions were piloted with a sample of students (N = 15) not included in the study.

Approval for the study was obtained from the Indiana University Institutional Review Board. After obtaining permission from classroom instructors, the study goals were presented to all students in participating classes. Students were informed that participation was voluntary and that the data would be used for research purposes only. Hard copies of the questionnaires were distributed to all students during class time by one of the investigators on the same day. Because the study was exempt, consent was indicated by completion of the questionnaire.

Data Analysis

Statistical analysis was performed using IBM SPSS Statistics, version 23.0. Descriptive statistics were calculated for all variables. Knowledge, perceived scope of practice, and confidence mean composite scores were compared by program with one-way analysis of variance (ANOVA). In addition, the authors explored for significant differences among programs by individual questions. Chi-squared analysis and ANOVA with post-hoc testing using Dunnett's test, with dental students as the control group, was conducted on categorical and interval data, respectively (Shingala & Rajyaguru, 2015). The threshold for statistical significance was set at $p < 0.05$.

Results

Sample Characteristics

Of the 176 students offered the survey, 158 participated for an overall response rate of 90%. Of the students sampled, 37% (n = 58) were dental, 37% (n = 59) nurse practitioner, 18% (n = 29) nursing, and 8% (n = 12) dental hygiene. Respondents were primarily Caucasian (81%, n = 128) women (78%, n = 123) in the second year of their program (47%, n = 74) and aged 20–39 years (89%, n = 140); participants were evenly divided between being single or married. Most had a regular dentist they see annually (80%, n = 127) and self-reported having a head and neck examination as part of their regular dental examination (61%, n = 96). About half (49%, n = 77) self-reported receiving the HPV vaccination. Table 1 lists the sample demographics.

Data Analyses

Data analysis included total question scores and differences among programs followed by individual question scores and differences. Significant ANOVA post-hoc tests are reported in Table 2.

KNOWLEDGE: From a score of 14, the overall mean knowledge score for all programs was 9.69 (SD = 1.45, range = 5–13). No significant differences were found in mean scores among programs (p =

TABLE 3.
CORRECT RESPONSES TO KNOWLEDGE QUESTIONNAIRE FOR ALL PROGRAMS (N = 158)

AREA	n	%
Knew alcohol and tobacco are risk factors for oral and oropharyngeal cancer	153	97
Identified which oral structures are affected by oral and oropharyngeal cancer	149	94
Knew HPV-related oropharyngeal cancer is often associated with types of sexual contact	149	94
Knew oral and oropharyngeal cancer in Caucasian people is related to HPV infection	137	87
Knew increase in HPV-associated oropharyngeal cancer incidence not related to tobacco or alcohol use	134	85
Identified men as more likely to develop oral and oropharyngeal cancer	133	84
Knew the number of cases of oral and oropharyngeal cancer was increasing	128	81
Estimated the number of deaths related to oral and oropharyngeal cancer	125	79
Knew most oral and oropharyngeal cases are not diagnosed in early stages	103	65
Oral and oropharyngeal cancer are easily discernible.	103	65
Knew the long-term survival of oral and oropharyngeal cancer had not changed since 2005	88	56
Estimated the number of new cases of oral and oropharyngeal cancer in 2017	32	20
Thought Caucasian and African American people were equally likely to develop oral and oropharyngeal cancer	19	12
HPV vaccines may be effective in protecting against HPV and related oropharyngeal cancer.	8	5

HPV—human papillomavirus

0.113) (dental: $\bar{X}$ = 9.42, SD = 1.63; dental hygiene: $\bar{X}$ = 9.18, SD = 1.25; nurse practitioner: $\bar{X}$ = 10.08, SD = 1.36; nursing: $\bar{X}$ = 9.81, SD = 1.27).

The number of correct responses for each individual knowledge question is reported in Table 3. Results showed that most respondents answered 11 of 14 questions correctly. Students across all programs (95%, n = 150) most frequently missed the question about the HPV vaccination being effective in preventing all HPV-related cancers, including oropharyngeal cancer. Other questions missed were recognition of new cases of oral and oropharyngeal cancers (80%, n = 126) and inaccurate belief that oral and oropharyngeal cancers occur equally in African Americans and Caucasians (88%, n = 139). Chi-squared analysis revealed that programs differed significantly in their response to one knowledge question regarding the increase of HPV-associated oropharyngeal cancer cases in Caucasians (χ^2 = 9.892, p = 0.02). The variance in the question occurred between dental and dental hygiene students' responses, with 78% and 83% representing the highest percentage of correct response, respectively, in comparison to 90% and 97% for nursing and nurse practitioner students.

CONFIDENCE AND IMPORTANCE IN EDUCATION: From a possible score of 20, the overall mean confidence and importance in education and training about oral and oropharyngeal cancer and examination was 16.78 (SD = 3.01; range = 3–20). ANOVA results showed that the effect of the program on overall mean confidence scores was significant (F[3, 154] = 19.79, p < 0.001). Post-hoc tests using Dunnett's test, with dental students as the control, indicated that nursing ($\bar{X}$ = 13.79, SD = 2.32) and nurse practitioner ($\bar{X}$ = 16.68, SD = 3.13) students' confidence scores were significantly lower than dental students' scores ($\bar{X}$ = 18.29, SD = 2.17). Dental hygiene students' scores did not differ significantly from dental students' (p > 0.05).

The highest-rated responses for individual confidence questions are shown in Table 4. ANOVA results for the effect of the program were significant for three individual items: training will prepare me with knowledge about oral and oropharyngeal cancer (F[3, 154] = 17.73, p < 0.001), confidence in training for oral and oropharyngeal cancer examination (F[3, 154] = 15.62, p < 0.001), and importance of oral and oropharyngeal cancer training (F[3, 154] = 6.022, p = 0.001). Post-hoc tests using Dunnett's test, with dental students as the control, showed confidence scores were lower for nursing ($\bar{X}$ = 3.83, SD = 0.89; $\bar{X}$ = 3.83, SD = 0.89; $\bar{X}$ = 3.93, SD = 0.84) and nurse practitioner ($\bar{X}$ = 4.46, SD = 0.84; $\bar{X}$ = 4.46, SD = 0.99; $\bar{X}$ = 4.31, SD = 0.99) students on all three items in comparison to dental students ($\bar{X}$ = 4.93, SD = 0.26; $\bar{X}$ = 4.48, SD = 0.96; $\bar{X}$ = 4.72, SD = 0.74). Dental hygiene students' scores did not differ significantly from dental students' (p > 0.05).

PERCEIVED SCOPE OF PRACTICE: From a possible score of 25, the overall mean perceived scope of practice score was 18.02 (SD = 3.32; range = 7–25). ANOVA results showed that the effect of the program on overall mean perceived scope of practice scores was significant (F[3,154] = 3.29, p = 0.024). Post-hoc tests using Dunnett's test, with dental students as the control, indicated nursing students' perceived scope of practice score ($\bar{X}$ = 18.02; SD = 3.55) was significantly lower in comparison to dental students' perceived scope of practice score ($\bar{X}$ = 22.03; SD = 2.83). Dental hygiene students' and nurse practitioner students' scores did not differ significantly from dental students' scores (p > 0.05).

ANOVA results showed that the effect of the program was significant for one item: belief that performing an examination is within the perceived scope of practice (F[3, 154] = 15.62, p < 0.001). Post-hoc tests using Dunnett's test, with dental students as the control, showed that nursing ($\bar{X}$ = 3.41, SD = 1.15) and nurse practitioner students ($\bar{X}$ = 4.2, SD = 0.91) were less likely to consider performing an oral examination within their perceived scope of practice in comparison to dental students ($\bar{X}$ = 4.71, SD = 0.68). Dental hygiene students' mean scores did not significantly differ from dental students' (p > 0.05).

TABLE 4.
HIGHEST-RATED RESPONSE FOR PERCEIVED SCOPE OF PRACTICE AND TRAINING AND EDUCATION RESULTS FOR ALL PROGRAMS (N = 158)

ITEM	n	%
Confidence and importance of training		
Training prepared me with knowledge of oral and oropharyngeal cancer.	144	91
Oral cancer training is important.	142	90
Desired more oral cancer education	105	66
Felt prepared to give examination	104	66
Perceived scope of practice		
Counsel about alcohol.	151	96
Counsel about the link between human papillomavirus and oral cancer.	142	90
Advise vaccine for oral cancer.	133	84
Perform oral cancer examination.	133	84
Advise vaccine for all human papillomavirus cancers.	125	79

Discussion

Oral cancers have one of the lowest five-year survival rates of all cancers (Razzaghi et al., 2018). As a result, several Healthy People 2020 objectives are aimed at increasing the number of oral and oropharyngeal cancers classified as stage I lesions at the time of diagnosis (Office of Disease Prevention and Health

Promotion, 2018). This study approach was that training as part of a professional school curriculum provides valuable time to encourage students to think beyond their traditional roles as healthcare providers. Because oral and systematic disease manifestations are intertwined, cross-training students to perform screening assessments and HPV counseling can encourage them to later perform these behaviors during routine appointments in practice.

The study results indicate that oral and oropharyngeal cancer educational needs are specific to nursing and nurse practitioner programs, and some needs were common to nursing and dental education. The study's findings positively indicate that overall knowledge of oral and oropharyngeal cancer was high for students, regardless of their educational program. However, students in all programs were frequently unaware of the racial disparities in the development of oral and oropharyngeal cancer, with dental and dental hygiene students scoring the lowest.

This study's findings show that students across programs lacked knowledge of the relationship between HPV vaccination and its potential effectiveness in reducing cancer, including HPV-associated oropharyngeal cancer. Findings are comparable to previous studies with medical, dental hygiene, and dental students that demonstrated a lack of awareness of the changing profile of HPV-associated oropharyngeal cancer (Cotter et al., 2011; Lazalde, Gilkey, Kornides, & McRee, 2018). As the prevalence of HPV-associated oropharyngeal cancer increases, the results indicate the need for education about the role of HPV vaccination in potentially reducing oropharyngeal cancer and for encouraging counseling of patients about HPV prevention and vaccination against the virus.

HPV vaccination rates in the United States are low, in part because of missed opportunity for provider recommendation during existing clinical encounters (Ylitalo, Lee, & Mehta, 2013). Data indicate that healthcare providers' recommendations can positively influence children's HPV vaccination rates (Dodd, Marlow, & Waller, 2016; Kramer & Dunlop, 2012; Ylitalo et al., 2013). The use of basic knowledge-based syllabi regarding HPV vaccination and cancer prevention are recommended.

Although overall knowledge of oral and oropharyngeal cancer was high for nursing and nurse practitioner students, both student groups were less confident in their training to detect oral and oropharyngeal cancers and believed their training to be less important in comparison to dental students. Nursing and nurse practitioner students also responded that they believed they were less prepared than dental students to perform an oral examination, and many viewed the performance of an oral examination as outside their perceived scope of practice. This study's findings showing lower scores on these items is not surprising, because oral health has not traditionally been a high priority in nursing education or practice (Dolce, Haber, & Shelley, 2012). However, given that five-year survival rates of oral and oropharyngeal cancer drop from 83% for localized cases to 27% when distant metastasis has occurred (U.S. Preventive Services Task Force, 2013b), widespread training to perform oral examinations with nursing and nurse practitioner students can increase the number of oral and oropharyngeal cancers that are detected at the earliest stage (Dolce, 2014). Although the U.S. Preventive Services Task Force (2013a) has found insufficient evidence for assessing the balance of the benefits and harms of screening for oral cancer in asymptomatic adults, other organizations, such as the American Cancer Society, recommend conducting an oral cancer examination during regular periodic health examinations for individuals aged 20 years or older (Smith, Cokkinides, & Eyre, 2004).

IMPLICATIONS FOR PRACTICE

- Expand the perceived scope of practice for nursing education to include oral cancer education, oral cancer screening examinations, and human papillomavirus (HPV) counseling.
- Become knowledgeable about oral cancer, particularly linking it to HPV and developing clinical skills that will provide confidence to perform oral cancer assessments.
- Increase HPV counseling and screening self-efficacy through observation and modeling of behaviors that include clinical rotations, interprofessional education, and use of curriculum and university experiences posted on websites and professional organizations.

Limitations

The use of a convenience sample limits the study's generalizability. Also, the unequal sample sizes, with dental hygiene students less represented than other groups, could have had an impact on results. However, statistical procedures were used to control for the variance in sample size. Finally, practicing dentists and nurses, particularly those who specialize in treating patients with cancer, were not included in the sample to determine their knowledge of oral and oropharyngeal cancers and oral assessments.

Implications for Practice

The nursing profession plays a valuable role in the prevention and detection of oral and oropharyngeal cancers, and training is an opportune time for learning necessary skills that can help reduce these cancers. Nursing education should allow more opportunities to become knowledgeable about oral cancer, particularly linking it to HPV and developing clinical skills that will provide them the confidence to perform routine oral cancer assessments. The perceived scope of practice for nursing education can be expanded to include oral cancer education, oral cancer screening examinations, and HPV counseling.

Previous studies have indicated that provider self-efficacy is associated with self-reported preventive care delivery and counseling and screening practices (Ozer et al., 2004). One way to increase self-efficacy is through mastery of skills. Self-efficacy also may be improved through observation and modeling of behaviors (Ozer et al., 2004). Clinical rotations that include practicing and observing oral cancer examinations and counseling about the risks of HPV infection and need to be vaccinated

could be used to improve student self-efficacy for doing so. Interprofessional education clinical simulation experiences documented at a university with cohorts of nurse practitioner, dental, and medical students have been shown to positively influence interprofessional communication, collaboration, patient communication, and student understanding of patient care roles. These documented experiences can be used as models of success (Haber et al., 2017). In addition, other universities' experiences exposing nursing, dental, and medical faculty and students to the expanded HEENOT (head, ears, eyes, nose, and throat) examination (adding the teeth, gums, mucosa, tongue, and palate to the traditional head, ears, eyes, nose, and throat examination) for the assessment, diagnosis, and treatment of oral–systemic health have been associated with increased dental–primary care referral (Haber et al., 2015). Their experiences with the examination could be modeled to increase self-efficacy. National curricula and resources also are available online that encourage and promote an interprofessional approach to oral health, such as Smiles for Life (http://smilesforlifeoralhealth.org) and the many resources provided by Oral Health Nursing Education and Practice (http://ohnep.org/interprofessional-resources) that can serve as sources of inspiration for encouraging confidence and self-efficacy for oral health skills.

Conclusion

Dentists and dental hygienists are the primary oral healthcare providers and, as such, will continue to have primary responsibility for assessment of patients' risk for the development of oral cancer and for performing oral examinations. However, only 65% of Americans visit the dentist annually (Bushak, 2014). In addition, attendance by young adults aged 18–29 years, who are experiencing an increasing prevalence of oropharyngeal cancer, is particularly low. As such, it is unlikely that the Healthy People 2020 goal of a 10% increase in these types of cancers detected as stage I lesions will be attained (Office of Disease Prevention and Health Promotion, 2014). Nursing education about HPV-associated oropharyngeal cancers, along with training to perform oral cancer assessments, may help to increase early referrals needed to diagnose more oral and oropharyngeal cancers in early stage I lesions during practice. By increasing the number of opportunities to educate, the hope is that future practicing nurses, who assess a wider variety of patient interactions than dentists do, will be even better positioned to help collaboratively reduce the incidence of oral and oropharyngeal cancers.

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