original report

# National Survey of Oncologists at National Cancer Institute–Designated Comprehensive Cancer Centers: Attitudes, Knowledge, and Practice Behaviors About LGBTQ Patients With Cancer

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abstract

**PURPOSE** To identify potential gaps in attitudes, knowledge, and institutional practices toward lesbian, gay, bisexual, transgender, and queer/questioning (LGBTQ) patients, a national survey of oncologists at National Cancer Institute–Designated Comprehensive Cancer Centers was conducted to measure these attributes related to LGBTQ patients and desire for future training and education.

**METHODS** A random sample of 450 oncologists from 45 cancer centers was selected from the American Medical Association's Physician Masterfile to complete a survey measuring attitudes and knowledge about LGBTQ health and institutional practices. Results were quantified using descriptive and stratified analyses and by a novel attitude summary measure.

**RESULTS** Of the 149 respondents, there was high agreement (65.8%) regarding the importance of knowing the gender identity of patients, which was contrasted by low agreement (39.6%) regarding the importance of knowing sexual orientation. There was high interest in receiving education regarding the unique health needs of LGBTQ patients (70.4%), and knowledge questions yielded high percentages of "neutral" and "do not know or prefer not to answer" responses. After completing the survey, there was a significant decrease ($P < .001$) in confidence in knowledge of health needs for LGB (53.1% agreed they were confident during survey assessment *v* 38.9% postsurvey) and transgender patients (36.9% *v* 19.5% postsurvey). Stratified analyses revealed some but limited influence on attitudes and knowledge by having LGBTQ friends and/or family members, political affiliation, oncology specialty, years since graduation, and respondents' region of the country.

**CONCLUSION** This was the first nationwide study, to our knowledge, of oncologists assessing attitudes, knowledge, and institutional practices of LGBTQ patients with cancer. Overall, there was limited knowledge about LGBTQ health and cancer needs but a high interest in receiving education regarding this community.

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## INTRODUCTION

The lesbian, gay, bisexual, transgender, and queer/questioning (LGBTQ) community, also referred to as sexual and gender minorities (SGMs),[1] is a diverse and medically underserved population[2-5] that is often marginalized in a predominantly hetero- and cisgender-normative society. Despite the overwhelming evidence of cancer disparities related to age, sex, race/ethnicity, income, social class, disability, and geographic location,[6,7] there have been limited efforts to address cancer disparities by sexual orientation and gender identity (SOGI). Although estimates for the size of LGBTQ communities vary, studies have reported that 3.4% to 12% of the adult population in the United States identifies as LGBTQ.[8-10]

The sparse but growing body of evidence demonstrates the LGBTQ population is associated with increased risk and poorer outcomes for certain cancers.[1,10-12] Despite the increased risk, the LGBTQ population is less likely to engage in early detection and cancer screening[10,13-15] and often engages in behaviors associated with increased cancer risk, including elevated rates of smoking, alcohol use, obesity, and nulliparity (among SGM assigned female at birth); anal receptive sex (among SGM assigned male at birth); and lower rates of exercise.[1,16-20] With respect

ASSOCIATED CONTENT

Appendix

Author affiliations and support information (if applicable) appear at the end of this article.

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to health care experiences, LGBTQ populations have reported lower satisfaction with cancer care treatment[21,22] and higher rates of psychological distress in survivorship,[22] are less likely to have insurance coverage,[23,24] and report higher rates of perceived discrimination in the health care setting.[25-27] The cumulative evidence suggesting increased cancer risk and poorer outcomes among the LGBTQ community has direct translation implications. Specifically, providers with increased knowledge and understanding of the LGBTQ community will enable delivery of precision health care for primary, secondary, and tertiary preventions.

Because cancer disparity in the LGBTQ community is a largely ignored public health issue,[12] there is a gap in LGBTQ-specific evidence-based clinical practice guidelines and best practice behaviors across the cancer care continuum from prevention to survivorship. In addition to having a welcoming and inclusive environment, providers should provide culturally sensitive and clinically knowledgeable care to LGBTQ patients. To generate relevant curriculum and guidelines addressing cancer disparities in LGBTQ patients, an assessment must be conducted to identify needs and gaps among providers. As such, we conducted a national survey of oncologists at National Cancer Institute (NCI)–Designated Comprehensive Cancer Centers to measure attitudes, knowledge, institutional practice behaviors, and interest in education on the care of LGBTQ patients with cancer.

## METHODS

### Study Population

Using random sampling from a third-party provider (Redi-Data, Fairfield, NJ), 450 oncologists from 45 NCI-Designated Comprehensive Cancer Centers (as of January 2016) were selected from the American Medical Association (AMA) Physician Masterfile. No stratification was conducted for the random sampling, but equal numbers of oncologists across the 45 cancer centers was requested. The AMA Physician Masterfile is the only national database of licensed practicing physicians in the United States. At the time of the random sampling, the AMA Physician Masterfile listed 15,443 health care providers, excluding residents, fellows, and oncologists whose primary position was listed as teaching, administrative, and locum tenens or unclassified, because these individuals are less likely to provide clinical care to patients on a regular basis or at all. We excluded the Moffitt Cancer Center (Tampa, FL), because we previously conducted a pilot study among these oncologists.[28]

The 450 oncologists were mailed a paper survey in January 2016 with a prepaid self-addressed return envelope. An optional link for a Web-based version of the survey was also provided. To encourage survey completion, a $20 bill was included in the envelope. The survey was anonymous, and no identifiers were collected. We used a three-wave mailing (ie, the Dillman method[29]), which included the initial mailing and two reminder postcards to complete the survey sent at 2 and 4 weeks after the initial mailing. The study was deemed exempt (category 2) by the institutional review board (Advarra, Columbia, MD).

### Survey Measures

The details of the survey have been published elsewhere[28,30] and are provided in the Appendix (online only). Briefly, the survey was developed based on previously published surveys on SGM health[31-37] and was further vetted and revised by our group through a cognitive debriefing process with three oncologists and our team of researchers. The survey included 12 attitude items, six knowledge items, three items about institutional practices, 18 demographic items, and two postsurvey confidence items about providers' knowledge regarding LGB health and transgender health. Some questions inquired separately about LGB patients versus transgender patients. The attitudes and knowledge measured responses on a five-level Likert scale: strongly disagree, disagree, neutral, agree, or strongly agree. Respondents could also select don't know or prefer not to answer. In addition, there were three open-ended questions eliciting additional comments to describe personal experiences treating LGBTQ patients, reservations about treating LGBTQ patients, and suggestions for improving cancer care for LGBTQ patients. Respondents were also provided with space for additional comments. Responses from the open-ended question are not included in the current analysis.

### Statistical Analysis

Descriptive statistics, including frequencies, percentages, means, and SDs, were used to quantify survey responses. Demographics were listed in tabular form (Table 1), and the attitudes, knowledge, and practice results are presented graphically (Figs 1-3) and in tabular form (Appendix Tables A1-A4, online only). A paired samples *t* test was conducted to determine whether confidence in knowledge of LGB and transgender health issues changed from the start to the end of the survey.

An exploratory factor analysis was conducted to determine the validity and factor structure of the attitude items using principal axis factoring and varimax rotation. Two items that did not meet factor loading criteria of 0.40 or greater were removed (assume patient is heterosexual and LGBTQ patients are more difficult to treat). The final exploratory factor analysis indicated three factors (Eigenvalues $> 1.62$) representing comfort-confidence (items 1 to 4 in Table 2; factor loadings, 0.56 to 0.83; $\alpha = 0.76$), practice beliefs (items 8 to 10 in Table 2; factor loadings, 0.61 to 0.94; $\alpha = 0.76$), and education-involvement (items 5, 6, and 12 in Table 2; factor loadings, 0.51 to 0.78; $\alpha = 0.62$). Within the identified factors we calculated an attitude summary measure (ASM) score, which is the average of the items within each factor.

**TABLE 1.** Characteristics of Surveyed Oncologists (N = 149)

| Characteristic | No. (%) |
|---|---|
| Age, mean (SD)* | 47.2 (9.3) |
| Years since MD degree, mean (SD)† | 20.4 (9.8) |
| Survey completion method | |
| Paper survey | 132 (88.6) |
| Online survey | 17 (11.4) |
| Gender identity | |
| Female | 46 (30.9) |
| Male | 102 (68.5) |
| Transgender: female to male | 0 (0) |
| Transgender: male to female | 0 (0) |
| Other | 0 (0) |
| Missing | 1 (0.7) |
| Sexual orientation | |
| Heterosexual | 135 (90.6) |
| Lesbian | 0 (0) |
| Gay | 5 (3.4) |
| Bisexual | 0 (0) |
| Not sure/questioning | 0 (0) |
| Other | 0 (0) |
| Prefer not to answer | 8 (5.4) |
| Missing | 1 (0.7) |
| Race | |
| White or Caucasian | 95 (63.8) |
| Asian | 35 (23.5) |
| American Indian, Alaska Native | 1 (0.7) |
| Black or African American | 2 (1.3) |
| Other | 2 (1.3) |
| Prefer not to answer | 13 (8.7) |
| Missing | 1 (0.7) |
| Ethnicity | |
| Hispanic | 4 (2.7) |
| Non-Hispanic | 130 (87.3) |
| Prefer not to answer | 10 (6.7) |
| Missing | 5 (3.4) |
| Medical specialty | |
| Medical oncology | 68 (45.6) |
| Surgical oncology | 26 (17.5) |
| Radiation oncology | 22 (14.8) |
| Gynecologic oncology | 3 (2.0) |
| Pediatric hematology-oncology | 20 (13.4) |
| Other | 9 (6.0) |
| Missing | 1 (0.7) |

(continued in next column)

**TABLE 1.** Characteristics of Surveyed Oncologists (N = 149) (continued)

| Characteristic | No. (%) |
|---|---|
| Cancer sites treated‡ | |
| Breast | 42 (28.2) |
| Penile | 10 (6.7) |
| Anal | 24 (16.1) |
| Thyroid | 15 (10.1) |
| Sarcoma | 36 (24.2) |
| Cervical | 15 (10.1) |
| Prostate | 21 (14.1) |
| Esophageal/gastric | 34 (22.8) |
| Oral/head and neck | 20 (13.4) |
| Malignant hematology | 44 (29.5) |
| Ovarian | 13 (8.7) |
| Testicular | 17 (11.4) |
| Kidney/bladder | 18 (12.1) |
| Neuroendocrine | 26 (17.4) |
| BMT | 16 (10.7) |
| Uterine | 16 (10.7) |
| Colon/rectal | 39 (26.2) |
| Lung/thoracic | 23 (15.4) |
| Neuro-oncology | 23 (15.4) |
| Other | 27 (18.1) |
| Age groups treated‡ | |
| Adult | 125 (83.9) |
| Older adult, elderly | 81 (54.4) |
| Adolescent and young adult | 54 (36.2) |
| Pediatrics | 25 (16.8) |
| Prefer not to answer | 1 (0.7) |
| No. of patients seen each week | |
| 0-25 | 45 (30.2) |
| 26-50 | 75 (50.3) |
| 51-75 | 20 (13.4) |
| 76-100 | 5 (3.4) |
| > 100 | 4 (2.7) |
| NCI-Designated Cancer Center Region§ | |
| East North Central | 20 (13.4) |
| East South Central | 5 (3.4) |
| Mid Atlantic | 12 (8.1) |
| Mountain | 15 (10.1) |
| New England | 13 (8.7) |
| Pacific | 31 (20.8) |
| South Atlantic | 2 (1.3) |

(continued on following page)

**TABLE 1.** Characteristics of Surveyed Oncologists (N = 149) (continued)

| Characteristic | No. (%) |
|---|---|
| West North Central | 13 (8.7) |
| West South Central | 10 (6.7) |
| Missing | 28 (18.8) |
| Percent of patients who identify as LGBTQ | |
| None | 8 (5.4) |
| 1–5 | 70 (47.0) |
| 6–10 | 38 (25.5) |
| 11–15 | 7 (4.7) |
| 16–20 | 3 (2.0) |
| > 20 | 1 (0.7) |
| Do not know | 20 (13.4) |
| Missing | 2 (1.3) |
| Family member identifies as LGBTQ | |
| Yes | 45 (30.2) |
| No | 97 (65.1) |
| Prefer not to answer | 6 (4.0) |
| Missing | 1 (0.7) |
| Friend identifies as LGBTQ | |
| Yes | 120 (80.5) |
| No | 24 (16.1) |
| Prefer not to answer | 5 (3.4) |

NOTE. Data presented as No. (%) unless otherwise noted.

Abbreviations: BMT, bone marrow transplant; LGBTQ, lesbian, gay, bisexual, transgender, and queer/questioning; NCI, National Cancer Institute.

*Missing responses (n = 121).

†Missing responses (n = 125).

‡Percentages exceed 100% because of multiple responses for each question.

§Regions are defined by National Cancer Institute at: http://www.cancer.gov/research/nci-role/cancer-centers/find.

Stratified analyses were performed to assess a priori differences in survey responses by demographic subgroups, including friends and/or family members identifying as LGBTQ, political affiliation, oncology specialty, number of years since graduation, and region of the country. For region of the country, we collapsed the surveyed nine regions defined by the NCI[38] into Northwest, Midwest, South, and West, as defined by the US Census Bureau.[39] For the stratified analyses, Pearson's $\chi^2$ was used to determine differences in individual attitudes and knowledge across the demographic subgroups. Pairwise analyses were conducted when significant differences were found among three or more subgroups. Two factorial analyses of variances were conducted to assess main effects and interaction effects for education-involvement and practice beliefs by comfort-confidence and total knowledge.

## RESULTS

### Demographics

Of the 450 oncologists contacted, 149 participated, for a 33.1% response rate (Table 1). The majority of respondents identified as male (68.5%), white (63.8%), non-Hispanic (87.3%), and heterosexual (90.6%). Males and females were considered cisgender because they did not self-report as a transgender individual in the gender category. Medical oncologists represented 45.6% of the respondents, and 83.9% of respondents primarily treated adult patients (age 40 to 64 years). Using the regions defined by the NCI, the regions with the lowest percentage of respondents were South Atlantic (1.3%), East South Central (3.4%), and West South Central (6.7%). Forty-seven percent of respondents reported that 1% to 5% of their patients identified as LGBTQ, and 65.1% reported that they did not have a family member who identified as LGBTQ. The cancer center affiliations of the respondents are presented in Appendix Table A5.

### Attitudes, Knowledge, and Institutional Practices

Among self-reported responses for attitudes, 95.3% reported they were comfortable (agree and strongly agree) treating LGB patients, yet only 53.1% reported they were confident in their knowledge of the health needs of LGB patients (Fig 1A). By comparison, the percentage of oncologists comfortable treating transgender patients dropped to 82.5%, and only 36.9% reported they were confident in their knowledge of the health needs of transgender patients. Among the attitudes related to disclosure, 34.3% reported it was not important (strongly disagree and disagree) to know the sexual orientation of their patients to provide the best care, and 15.5% reported it was not important to know the gender identity of patients. With respect to education, 70.4% were interested (agree and strongly agree) in education regarding the unique health needs of LGBTQ patients (Fig 1A), and 43.7% believed there should be mandatory education about LGBTQ health needs in their workplaces (Fig 1B).

A subset of knowledge (Fig 1C) questions yielded high percentages of "neutral" and "do not know or prefer not to answer" responses. For example, the question asking whether regularly screening gay and bisexual men for anal cancer through anal Pap testing can increase life expectancy yielded a "neutral" and "do not know or prefer not to answer" response among 17.5% and 30.2% of respondents, respectively. Although studies have reported a higher prevalence of smoking among LGBTQ individuals[17,18] compared with non-LGBTQ individuals, 26.2% and 40.9% of responses were "neutral" and "do not know or prefer not to answer," respectively. Despite evidence that LGBTQ individuals tend to engage in more sun-seeking behaviors[40] than heterosexual and cisgender individuals, 29.5% and 49.0% of responses were "neutral" and "do

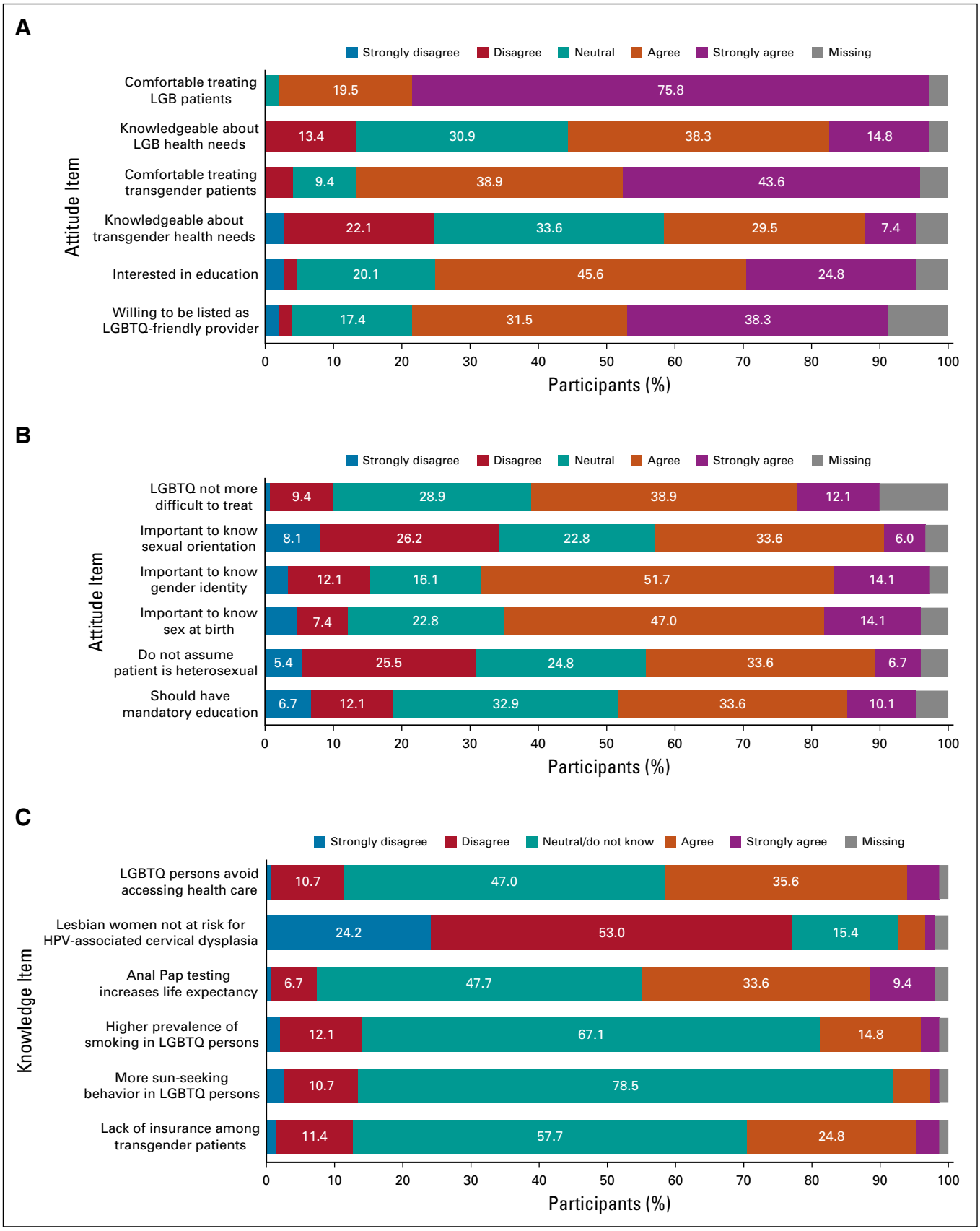


**FIG 1.** Participant responses to (A, B) attitude items, and (C) knowledge items. Responses less than 5% are not labeled on the figure. All numbers and percentages are presented in Tables A1 and A2. HPV, human papillomavirus; LGBTQ, lesbian, gay, bisexual, transgender, queer/questioning.

not know or prefer not to answer," respectively. Among the practice items (Fig 2), 63.1% responded that institutional intake forms did not inquire about a patient's sexual orientation, 54.4% did not inquire about a patient's sex at birth, and 55% did not inquire about current gender identity.

### Postsurvey Attitudes

In the survey assessment, 53.1% (mean, 3.12; SD, 0.87) were confident (strongly agree and agree) in their knowledge of health care needs among LGB patients (Fig 3), which decreased to 38.9% (mean, 3.56; SD, 0.91; $P <$ .001 for paired differences). Similarly, 36.9% (mean, 3.18; SD, 0.97) were confident in their knowledge of health care needs among transgender patients in the survey assessment, which decreased to 19.5% (mean, 2.71; SD, 0.88; $P <$ .001).

### Subgroup Analyses

For the stratified analyses (Tables 2 and 3), having LGBTQ friends or family was associated with greater comfort with LGB individuals and interest in education on LGBTQ health needs (Table 2; $P$ = .008 and $P$ = .045, respectively). Political affiliation was associated with agreement that LGBTQ individuals have a higher prevalence of smoking (Table 3; $P$ = .029). Political moderates were significantly more likely to agree LGBTQ individuals have a higher prevalence of smoking (28.0%) compared with liberals (17.7%; $P$ = .007), but only marginally higher than conservatives (12.0%; $P$ = .074). Political affiliation was also associated with agreement in mandatory education (Table 2; $P$ = .047), with liberals reporting significantly higher agreement (53.8%) versus conservatives (36.9%; $P$ = .019) but not significantly higher than moderates (33.3%). There were significant mean differences between provider political affiliation for the education-involvement subscale ($P$ = .010), such that liberals had a higher average score (mean, 3.96; SD, 0.68) versus conservatives (mean, 3.51; SD, 0.73) and moderates (mean, 3.66; SD, 0.69). Additional subgroup analyses were performed by years since medical school graduation on the basis of the median value split (17.5 years) and NCI region (Tables A6 and A7).

### Factorial Analyses of Variance

Greater knowledge was associated with higher practice belief scores ($P$ = .004), but comfort-confidence was not ($P$ = .803). The interaction between higher comfort-confidence and knowledge was marginally associated with greater practice belief scores ($P$ = .099; Fig A1). The model for education-involvement was not significant ($P$ = .279).

## DISCUSSION

In this study, we used random sampling to identify oncologists from 45 NCI-Designated Comprehensive Cancer Centers to assess attitude, knowledge, institutional practices, and desire for education/training regarding the care of LGBTQ patients with cancer. We found a high interest in receiving education regarding the unique health needs of LGBTQ patients and an overall limited knowledge about LGBTQ health and cancer needs. Our analyses also revealed a significant decrease from survey assessment to postsurvey assessment for confidence in knowledge for both LGB health needs and transgender health needs. We also noted a high agreement (65.8%) regarding the importance of knowing gender identity, which was contrasted with a low agreement (39.6%) regarding the importance of knowing sexual orientation. Stratified analyses by having LGBTQ friends and/or family members, political affiliation, oncology specialty, years since graduation, and region of the country of the respondents revealed some but limited influence for attitudes and knowledge regarding LGBTQ patients with cancer.

This study is an expansion of a prior published analysis conducted at a single NCI-Designated Comprehensive Cancer Center that also noted gaps in knowledge regarding the care of LGBTQ patients with cancer and found the majority of respondents were comfortable treating this population, were willing to be listed as an LGBTQ-friendly provider, were interested in receiving education about the LGBTQ care, and understood this group had unique health needs.[28] Taken together, the cumulative evidence of 257 oncologists from 46 cancer centers provides the first nationwide assessment, to our knowledge, of physicians

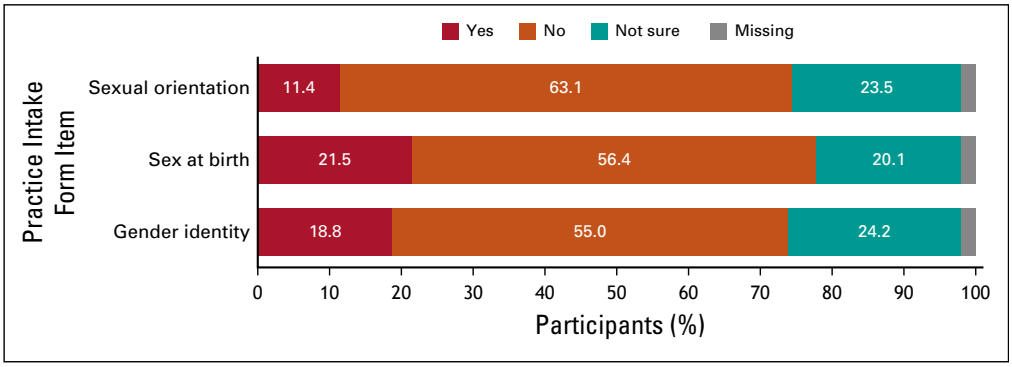


**FIG 2.** Institutional inquiry regarding sexual orientation and gender identity. Responses less than 5% are not labeled on the figure. All numbers and percentages are presented in Table A3.

  

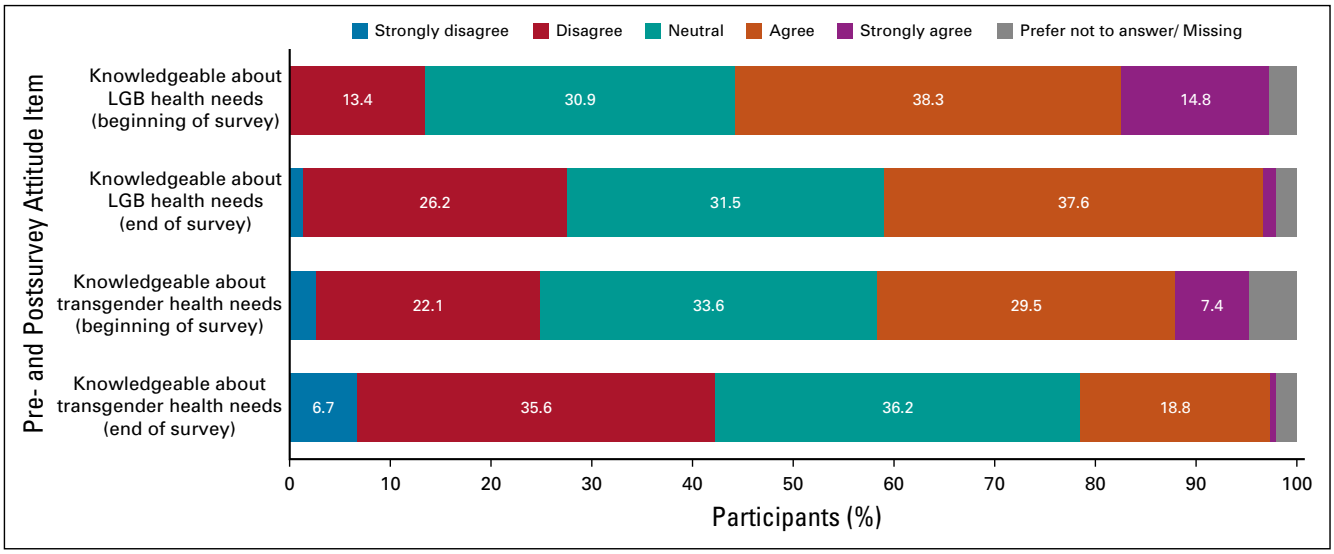


**FIG 3.** Attitude items beginning and end of survey. Responses less than 5% are not labeled on the figure. All numbers and percentages are presented in Table A4. LGB, lesbian, gay, bisexual.

about their knowledge, attitudes, and institutional practice behaviors of LGBTQ patients with cancer. Such data provide crucial evidence to develop both culturally sensitive and clinically knowledgeable curriculum and guidelines addressing cancer disparities in LGBTQ patients across the cancer care continuum. Professional membership societies have published policy statements calling for provider education and training to address cancer disparities in the LGBTQ community.[10,41] Providers with a general awareness and understanding of LGBTQ issues will provide improved quality of care for LGBTQ patients.[42] As noted in this study, there was high interest in receiving education about LGBTQ health needs and a significant postsurvey decrease in confidence regarding providers' ability to treat LGBTQ patients. This observed decrease suggests a developed awareness of lack of knowledge, and subsequent decreased confidence, perhaps attributed to exposure to survey items related to practice intake forms inquiring about SOGI information or the high number of "do not know or prefer not to answer" responses to knowledge items. As such, the results from this study can be leveraged toward future research to develop LGBTQ-centric training and resources for the development of evidence-based competency curriculum to prepare and train the oncology workforce for cancer disparities in the LGBTQ community.

Lack of accurate statistics for cancer in the LGBTQ community is directly attributed to the deficiency of collection of SOGI information at the national, state, and institutional levels. The inclusion of SOGI questions in national surveys, registries, and patient medical records is crucial to precisely identify the demography and track the disparities of this population. More than half of the respondents in this study indicated their practice intake forms did not inquire about a patient's sexual orientation, sex at birth, or gender identity. Moreover, only a minority (39.6%) of respondents indicated it was important to know sexual orientation, despite the majority (65.8%) agreeing the importance of knowing gender identity. These findings parallel the American Association of Medical Colleges report that the majority of providers and medical students do not believe they need to know sexual orientation.[43-45] Although only a minority agreed that LGBTQ patients were more difficult to treat (10.1%), more than one third were neutral or responded "do not know or prefer not to answer" to this statement (37.6%), which may point to implicit biases that may result in lower likelihood of collecting SOGI information and a lack of inclusion of LGBTQ patients more broadly for this subset of oncologists. An inclusive and inviting clinical environment that enables providers to capture SOGI information is vital to providing patient-centered care. Moreover, the National Institutes of Health and the Institute of Medicine recognize SOGI information as a vital aspect of medical care and health research and recommend collection of this information.[46,47] Because knowledge among clinicians about the specific cancer health needs of LGBTQ is low, collecting SOGI data in a standardized fashion[48,49] is imperative to competently and sensitively treat this population.

This study presents a novel scale—the ASM—that was used to assess three dimensions of LGBTQ-related attitudes, including feeling comfortable and confident with LGBTQ patients' health, interest in education and being involved with LGBTQ patients, and recognizing the importance of SOGI information on quality of care. In the current study, ASM scores revealed differences for some of the factors by political ideology and region of the country but not for having LGBTQ friends/family, oncology specialty, and years since graduation. The ASM is a brief tool that can

**TABLE 2.** Stratified Analyses for Attitude Items and ASM Score

| | LGBTQ Friends/Family | | Political Affiliation | | | Oncology Specialty | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Item** | **No** | **Yes and/or Yes** | **Conservative** | **Moderate** | **Liberal** | **Medical** | **Surgical** | **Radiation** | **Pediatric** | **Other** |
| 1. I am comfortable treating LGB patients | | | | | | | | | | |
| Strongly disagree | **0 (0.0)** | **0 (0.0)** | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Neutral | **2 (10.0)** | **1 (0.8)** | 0 (0.0) | 1 (4.0) | 1 (1.3) | 2 (3.0) | 1 (4.2) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Strongly agree | **18 (90.0)** | **121 (99.2)** | 25 (100.0) | 24 (96.0) | 78 (98.7) | 65 (97.0) | 23 (95.8) | 21 (100.0) | 20 (100.0) | 12 (100.0) |
| 2. I am confident in my knowledge of health needs of LGB patients | | | | | | | | | | |
| Strongly disagree | 3 (15.0) | 17 (13.9) | 3 (12.0) | 5 (20.0) | 8 (10.1) | 11 (16.4) | 3 (12.5) | 1 (4.8) | 3 (15.0) | 2 (16.7) |
| Neutral | 8 (40.0) | 38 (31.1) | 9 (36.0) | 4 (16.0) | 29 (36.7) | 18 (26.9) | 7 (29.2) | 10 (47.6) | 6 (30.0) | 4 (33.3) |
| Strongly agree | 9 (45.0) | 67 (54.9) | 13 (52.0) | 16 (64.0) | 42 (53.2) | 38 (56.7) | 14 (58.3) | 10 (47.6) | 11 (55.0) | 6 (50.0) |
| 3. I am comfortable treating transgender patients | | | | | | | | | | |
| Strongly disagree | 0 (0.0) | 6 (5.0) | 2 (8.0) | 0 (0.0) | 3 (3.9) | 3 (4.6) | 1 (4.2) | 1 (4.8) | 1 (5.0) | 0 (0.0) |
| Neutral | 4 (20.0) | 10 (8.3) | 2 (8.0) | 3 (12.0) | 7 (9.1) | 9 (13.8) | 3 (12.5) | 1 (4.8) | 0 (0.0) | 1 (8.3) |
| Strongly agree | 16 (80.0) | 104 (86.7) | 21 (84.0) | 22 (88.0) | 67 (87.0) | 53 (81.5) | 20 (83.3) | 19 (90.5) | 19 (95.0) | 11 (91.7) |
| 4. I am confident in my knowledge of health needs of transgender patients | | | | | | | | | | |
| Strongly disagree | 4 (22.2) | 33 (27.3) | 6 (25.0) | 7 (29.2) | 19 (24.4) | 21 (31.8) | 3 (13.0) | 5 (23.8) | 7 (35.0) | 1 (9.1) |
| Neutral | 8 (44.4) | 41 (33.9) | 8 (33.3) | 4 (16.7) | 33 (42.3) | 20 (30.3) | 6 (26.1) | 10 (47.6) | 6 (30.0) | 7 (63.6) |
| Strongly agree | 6 (33.3) | 47 (38.8) | 10 (41.7) | 13 (54.2) | 26 (33.3) | 25 (37.9) | 14 (60.9) | 6 (28.6) | 7 (35.0) | 3 (27.3) |
| 5. I would be interested in education regarding the unique health needs of LGBTQ patients | | | | | | | | | | |
| Strongly disagree | **0 (0.0)** | **7 (5.8)** | 2 (8.0) | 1 (4.0) | 1 (1.3) | 3 (4.6) | 3 (12.5) | 0 (0.0) | 1 (5.3) | 0 (0.0) |
| Neutral | **8 (42.1)** | **22 (18.2)** | 6 (24.0) | 5 (20.0) | 16 (20.8) | 17 (26.2) | 2 (8.3) | 7 (33.3) | 2 (10.5) | 2 (16.7) |
| Strongly agree | **11 (57.9)** | **92 (76.0)** | 17 (68.0) | 19 (76.0) | 60 (77.9) | 45 (69.2) | 19 (79.2) | 14 (66.7) | 16 (84.2) | 10 (83.3) |
| 6. I would be willing to be listed as an LGBTQ-friendly provider | | | | | | | | | | |
| Strongly disagree | 2 (11.8) | 4 (3.4) | 2 (8.0) | 1 (4.3) | 2 (2.6) | 3 (4.8) | 0 (0.0) | 2 (10.5) | 1 (5.3) | 0 (0.0) |
| Neutral | 5 (29.4) | 21 (17.6) | 5 (20.0) | 5 (21.7) | 12 (15.8) | 15 (23.8) | 4 (17.4) | 2 (10.5) | 2 (10.5) | 3 (27.3) |
| Strongly agree | 10 (58.8) | 94 (79.0) | 18 (72.0) | 17 (73.9) | 62 (81.6) | 45 (71.4) | 19 (82.6) | 15 (78.9) | 16 (84.2) | 8 (72.7) |
| 7. The LGBTQ population is often more difficult to treat | | | | | | | | | | |
| Strongly disagree | 10 (50.0) | 65 (58.0) | 12 (48.0) | 9 (39.1) | 48 (66.7) | 36 (58.1) | 13 (59.1) | 14 (66.7) | 9 (50.0) | 4 (36.4) |
| Neutral | 5 (25.0) | 37 (33.0) | 10 (40.0) | 11 (47.8) | 17 (23.6) | 20 (32.3) | 6 (27.3) | 3 (14.3) | 8 (44.4) | 6 (54.5) |
| Strongly agree | 5 (25.0) | 10 (8.9) | 3 (12.0) | 3 (13.0) | 7 (9.7) | 6 (9.7) | 3 (13.6) | 4 (19.0) | 1 (5.6) | 1 (9.1) |
| 8. It is important to know the sexual orientation of my patients to provide the best care | | | | | | | | | | |
| Strongly disagree | 6 (30.0) | 44 (36.7) | 11 (44.0) | 7 (28.0) | 29 (37.2) | 23 (33.8) | 11 (47.8) | 8 (38.1) | 6 (31.6) | 3 (25.0) |
| Neutral | 7 (35.0) | 25 (20.8) | 7 (28.0) | 6 (24.0) | 15 (19.2) | 16 (23.5) | 5 (21.7) | 6 (28.6) | 3 (15.8) | 4 (33.3) |
| Strongly agree | 7 (35.0) | 51 (42.5) | 7 (28.0) | 12 (48.0) | 34 (43.6) | 29 (42.6) | 7 (30.4) | 7 (33.3) | 10 (52.6) | 5 (41.7) |

(continued on following page)

**TABLE 2.** Stratified Analyses for Attitude Items and ASM Score (continued)

| | LGBTQ Friends/Family | | Political Affiliation | | | Oncology Specialty | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Item** | **No** | **Yes and/or Yes** | **Conservative** | **Moderate** | **Liberal** | **Medical** | **Surgical** | **Radiation** | **Pediatric** | **Other** |
| 9. It is important to know the gender identity of my patients to provide the best care | | | | | | | | | | |
| Strongly disagree | 4 (20.0) | 17 (14.0) | 5 (20.0) | 3 (12.0) | 10 (12.8) | 11 (16.2) | 4 (16.7) | 5 (23.8) | 2 (10.5) | 1 (8.3) |
| Neutral | 3 (15.0) | 20 (16.5) | 3 (12.0) | 5 (20.0) | 11 (14.1) | 12 (17.6) | 5 (20.8) | 4 (19.0) | 1 (5.3) | 2 (16.7) |
| Strongly agree | 13 (65.0) | 84 (69.4) | 17 (68.0) | 17 (68.0) | 57 (73.1) | 45 (66.2) | 15 (62.5) | 12 (57.1) | 16 (84.2) | 9 (75.0) |
| 10. It is important to know the patient's assigned sex at birth to provide the best care | | | | | | | | | | |
| Strongly disagree | 3 (15.0) | 15 (12.4) | 5 (20.0) | 2 (8.0) | 8 (10.1) | 8 (11.9) | 4 (18.2) | 2 (9.5) | 2 (10.0) | 2 (16.7) |
| Neutral | 4 (20.0) | 28 (23.1) | 5 (20.0) | 6 (24.0) | 17 (21.5) | 22 (32.8) | 5 (22.7) | 1 (4.8) | 4 (20.0) | 2 (16.7) |
| Strongly agree | 13 (65.0) | 78 (64.5) | 15 (60.0) | 17 (68.0) | 54 (68.4) | 37 (55.2) | 13 (59.1) | 18 (85.7) | 14 (70.0) | 8 (66.7) |
| 11. Upon first encounter I assume a patient is heterosexual | | | | | | | | | | |
| Strongly disagree | 6 (31.6) | 51 (42.1) | 7 (28.0) | 11 (44.0) | 36 (45.6) | 27 (40.9) | 11 (47.8) | 8 (38.1) | 8 (40.0) | 5 (41.7) |
| Neutral | 5 (26.3) | 32 (26.4) | 8 (32.0) | 6 (24.0) | 19 (24.1) | 17 (25.8) | 7 (30.4) | 4 (19.0) | 3 (15.0) | 6 (50.0) |
| Strongly agree | 8 (42.1) | 38 (31.4) | 10 (40.0) | 8 (32.0) | 24 (30.4) | 22 (33.3) | 5 (21.7) | 9 (42.9) | 9 (45.0) | 1 (8.3) |
| 12. There should be mandatory education on LGBTQ health needs at my workplace | | | | | | | | | | |
| Strongly disagree | 4 (21.1) | 23 (19.2) | **9 (36.0)** | **6 (25.0)** | **9 (11.5)** | 14 (21.2) | 4 (17.4) | 6 (30.0) | 2 (10.0) | 2 (16.7) |
| Neutral | 8 (42.1) | 40 (33.3) | **7 (28.0)** | **10 (41.7)** | **27 (34.6)** | 26 (39.4) | 7 (30.4) | 4 (20.0) | 6 (30.0) | 5 (41.7) |
| Strongly agree | 7 (36.8) | 57 (47.5) | **9 (36.0)** | **8 (33.3)** | **42 (53.8)** | 26 (39.4) | 12 (52.2) | 10 (50.0) | 12 (60.0) | 5 (41.7) |
| Subscales of ASM score, mean (SD) | | | | | | | | | | |
| Comfort-confidence overall = 3.94 (0.62) | 3.84 (0.67) | 3.95 (0.61) | 3.92 (0.62) | 3.99 (0.69) | 3.94 (0.58) | 3.91 (0.65) | 4.04 (0.73) | 4.02 (0.56) | 3.88 (0.56) | 3.94 (0.43) |
| Practice beliefs overall = 3.42 (0.86) | 3.42 (0.83) | 3.45 (0.84) | 3.27 (0.88) | 3.49 (0.70) | 3.50 (0.85) | 3.42 (0.85) | 3.20 (0.76) | 3.38 (0.80) | 3.72 (1.06) | 3.44 (0.83) |
| Education-involvement overall = 3.77 (0.73) | 3.52 (0.79) | 3.81 (0.72) | **3.51 (0.73)** | **3.66 (0.69)** | **3.96 (0.68)** | 3.67 (0.78) | 3.80 (0.60) | 3.71 (0.65) | 4.04 (0.77) | 3.88 (0.79) |

NOTE. Data presented as No. (%) unless otherwise noted. Bold indicates significant difference with an $\alpha$ level of less than .05, two-tailed. Some percentages do not sum to 100% because of missing data. Strongly disagree and disagree were combined into the strongly disagree category. Strongly agree and agree were combined into the strongly agree category.

Abbreviations: ASM, attitude summary measure; LGBTQ, lesbian, gay, bisexual, transgender, and queer/questioning.

**TABLE 3.** Stratified Analyses for Knowledge Items

| | LGBTQ Friends/Family | | Political Affiliation | | | Oncology Specialty | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Item** | **No** | **Yes and/or Yes** | **Conservative** | **Moderate** | **Liberal** | **Medical** | **Surgical** | **Radiation** | **Pediatric** | **Other** |
| 1. LGBTQ patients avoid accessing health care due to difficulty communicating with providers | | | | | | | | | | |
| Strong disagree | 2 (10.0) | 14 (11.5) | 3 (12.0) | 4 (16.0) | 5 (6.3) | 12 (17.6) | 2 (8.3) | 2 (9.1) | 0 (0.0) | 1 (8.3) |
| Neutral | 8 (40.0) | 59 (48.4) | 12 (48.0) | 12 (48.0) | 36 (45.6) | 30 (44.1) | 11 (45.8) | 13 (59.1) | 9 (45.0) | 6 (50.0) |
| Strong agree* | 10 (50.0) | 49 (40.2) | 10 (40.0) | 9 (36.0) | 38 (48.1) | 26 (38.2) | 11 (45.8) | 7 (31.8) | 11 (55.0) | 5 (41.7) |
| 2. HPV-associated cervical dysplasia is only found in women with a history of heterosexual intercourse | | | | | | | | | | |
| Strong disagree* | 16 (80.0) | 96 (79.3) | 21 (84.0) | 22 (88.0) | 60 (76.9) | 48 (71.6) | 19 (79.2) | 19 (86.4) | 17 (85.0) | 11 (91.7) |
| Neutral | 4 (20.0) | 17 (14.0) | 3 (12.0) | 2 (8.0) | 12 (15.4) | 14 (20.9) | 4 (16.7) | 2 (9.1) | 2 (10.0) | 1 (8.3) |
| Strong agree | 0 (0.0) | 8 (6.6) | 1 (4.0) | 1 (4.0) | 6 (7.7) | 5 (7.5) | 1 (4.2) | 1 (4.5) | 1 (5.0) | 0 (0.0) |
| 3. Regularly screening gay and bisexual men for anal cancer through anal Pap testing can increase life expectancy | | | | | | | | | | |
| Strong disagree | 3 (15.8) | 8 (6.6) | 2 (8.0) | 1 (4.2) | 7 (8.9) | 4 (5.9) | 1 (4.2) | 3 (13.6) | 0 (0.0) | 3 (27.3) |
| Neutral | 6 (31.6) | 62 (50.8) | 10 (40.0) | 9 (37.5) | 45 (57.0) | 33 (48.5) | 9 (37.5) | 13 (59.1) | 11 (55.0) | 4 (36.4) |
| Strong agree* | 10 (52.6) | 52 (42.6) | 13 (52.0) | 14 (58.3) | 27 (34.2) | 31 (45.6) | 14 (58.3) | 6 (27.3) | 9 (45.0) | 4 (36.4) |
| 4. LGBTQ individuals tend to have a higher prevalence of smoking compared with non-LGBTQ individuals | | | | | | | | | | |
| Strong disagree | 3 (15.0) | 18 (14.8) | **4 (16.0)** | **8 (32.0)** | **8 (10.1)** | 5 (7.4) | 6 (25.0) | 5 (22.7) | 2 (10.0) | 3 (25.0) |
| Neutral | 14 (70.0) | 82 (67.2) | **18 (72.0)** | **10 (40.0)** | **57 (72.2)** | 52 (76.5) | 13 (54.2) | 15 (68.2) | 11 (55.0) | 8 (66.7) |
| Strong agree*[2] | 3 (15.0) | 22 (18.0) | **3 (12.0)** | **7 (28.0)** | **14 (17.7)** | 11 (16.2) | 5 (20.8) | 2 (9.1) | 7 (35.0) | 1 (8.3) |
| 5. LGBTQ individuals tend to engage in more sun-seeking behaviors compared with non-LGBTQ individuals | | | | | | | | | | |
| Strong disagree | 2 (10.0) | 18 (14.8) | 4 (16.0) | 7 (28.0) | 8 (10.1) | 6 (8.8) | 6 (25.0) | 5 (22.7) | 1 (5.0) | 2 (16.7) |
| Neutral | 18 (90.0) | 94 (77.0) | 20 (80.0) | 15 (60.0) | 66 (83.5) | 58 (85.3) | 17 (70.8) | 16 (72.7) | 16 (80.0) | 9 (75.0) |
| Strong agree* | 0 (0.0) | 10 (8.2) | 1 (4.0) | 3 (12.0) | 5 (6.3) | 4 (5.9) | 1 (4.2) | 1 (4.5) | 3 (15.0) | 1 (8.3) |
| 6. Transgender individuals are less likely to have health insurance than other individuals | | | | | | | | | | |
| Strong disagree | 2 (10.0) | 17 (13.9) | 1 (4.0) | 5 (20.0) | 9 (11.4) | 7 (10.3) | 4 (16.7) | 3 (13.6) | 1 (5.0) | 4 (33.3) |
| Neutral | 14 (70.0) | 67 (54.9) | 12 (48.0) | 12 (48.0) | 48 (60.8) | 42 (61.8) | 13 (54.2) | 13 (59.1) | 12 (60.0) | 5 (41.7) |
| Strong agree* | 4 (20.0) | 38 (31.1) | 12 (48.0) | 8 (32.0) | 22 (27.8) | 19 (27.9) | 7 (29.2) | 6 (27.3) | 7 (35.0) | 3 (25.0) |

NOTE. Data presented as No. (%). Bold indicates significant difference with an $\alpha$ level of less than .05, two-tailed. Some percentages do not sum to 100% because of missing data. Strongly disagree and disagree were combined into the strongly disagree category. Strongly agree and agree were combined into the strongly agree category.

Abbreviations: HPV, human papillomavirus; LGBTQ, lesbian, gay, bisexual, transgender, and queer/questioning.

*Correct response on the basis of current published data.

be used by researchers, within practice settings, or in the context of education intervention evaluation as a metric to assess providers' LGBTQ-related attitudes.

We acknowledge some modest limitations of this study. We only surveyed oncologists at NCI-Designated Comprehensive Cancer Centers, and, as such, these results may not be generalizable. Future studies are needed to assess these metrics in community settings and academic centers not affiliated with NCI-Designated Comprehensive Cancer Centers. With a response rate of 33.1%, this study may not be representative of all oncologists at the cancer centers surveyed. However, assuming these respondents were highly motivated, we still identified substantial knowledge gaps among this subset of oncologists. We are unable to conduct subgroup analyses by SOGI status of the oncologists because there were too few LGBTQ respondents. Last, we are unable to compare demographic characteristics between responders and nonresponders because the survey was anonymous and metadata are not available from the AMA database.

This study is the first nationwide assessment, to our knowledge, of oncologists regarding attitudes, knowledge, and practice behaviors about LGBTQ patients with cancer. Although we noted overall limited knowledge about LGBTQ health and cancer needs and lack of institutional collection of SOGI information, oncologists who responded revealed a high interest in receiving education regarding the unique health needs of LGBTQ patients. Future research will be needed to assess these metrics among other health care providers, such as allied health professionals, nurses, and advanced practice providers.

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M.B.S. and C.A.B. contributed equally to this work.



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AUTHOR'S DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST AND DATA AVAILABILITY STATEMENT

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**Manuscript writing:** All authors

**Final approval of manuscript:** All authors

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## AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

**National Survey of Oncologists at National Cancer Institute–Designated Comprehensive Cancer Centers: Attitudes, Knowledge, and Practice Behaviors About LGBTQ Patients With Cancer**

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## APPENDIX

## SUPPLEMENTARY METHODS FOR CONTENT OF SURVEY MEASURES

The attitude questions inquired about comfort treating lesbian, gay, bisexual, transgender, and queer/questioning (LGBTQ) patients, confidence in knowledge of LGBTQ health needs, interest in education about LGBTQ health needs, willingness to be listed as LGBTQ-friendly provider, level of difficulty treating LGBTQ population, importance of knowing a patient's sexual orientation and gender identity, importance of knowing a patient's sex at birth for care, assumption a patient is heterosexual, and necessity of mandatory education on LGBTQ health needs. The knowledge questions inquired about LGBTQ patients' avoidance of health care because of communication challenges, relationship between human papillomavirus–associated cervical dysplasia and heterosexual intercourse, life expectancy, and anal Pap screening for gay and bisexual men, prevalence of smoking in LGBTQ individuals, sun-seeking behaviors in LGBTQ individuals, and health insurance coverage among transgender individuals. The practice behaviors questions inquired whether their institution collected patient intake data regarding sexual orientation, sex at birth, and gender identity. The demographics section collected cancer center affiliation, age, race, ethnicity, gender identity, sexual orientation, religious identity, role of religion in practice and treatment of patients, presence of LGBTQ family members, presence of LGBTQ friends, political identification, licensure, years since graduation, number of patients seen weekly, percent of LGBTQ patients, specialty/subspecialty, cancer sites treated, and age population treated. To gauge whether potential changes in attitudes occurred by the completion of the survey, two postsurvey attitude questions were reassessed at the end of the survey regarding confidence in knowledge of the health needs of LGB patients and confidence in knowledge of the health needs of transgender patients.

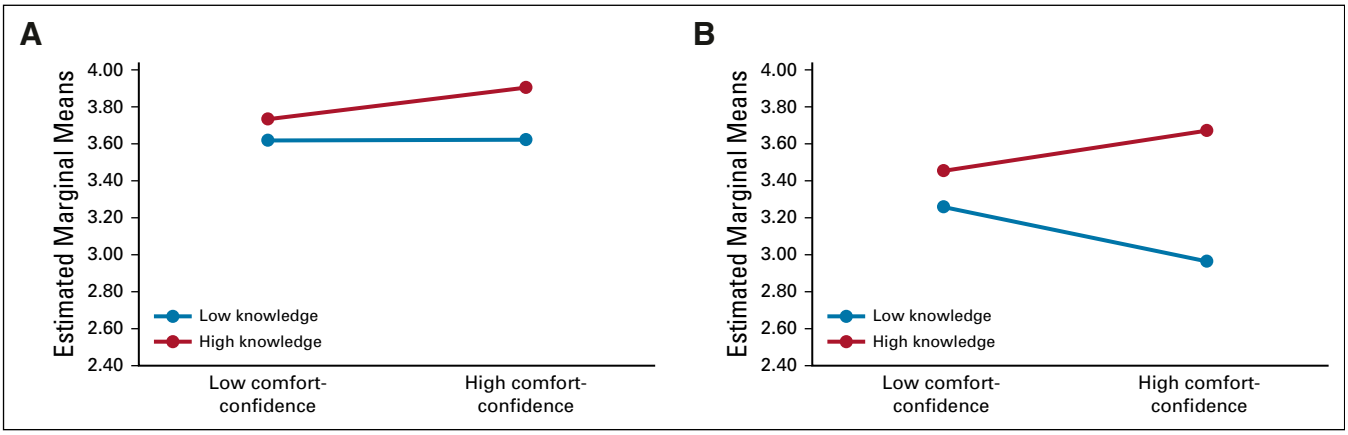


**FIG A1.** Factorial analyses of variance for (A) education-involvement and (B) practice beliefs by comfort-confidence and total knowledge composite score. The total knowledge composite score was calculated by the summing the correct knowledge items.

**TABLE A1.** Participant Responses to Attitude Items (N = 149)

| Item | No. (%) |
|---|---|
| I am comfortable treating LGB patients | |
| Strongly disagree | 0 (0.0) |
| Disagree | 0 (0.0) |
| Neutral | 3 (2.0) |
| Agree | 29 (19.5) |
| Strongly agree | 113 (75.8) |
| Do not know or prefer not to answer | 2 (1.3) |
| Missing | 2 (1.3) |
| I am confident in my knowledge of health needs of LGB patients | |
| Strongly disagree | 0 (0.0) |
| Disagree | 20 (13.4) |
| Neutral | 46 (30.9) |
| Agree | 57 (38.3) |
| Strongly agree | 22 (14.8) |
| Do not know or prefer not to answer | 2 (1.3) |
| Missing | 2 (1.3) |
| I am comfortable treating transgender patients | |
| Strongly disagree | 0 (0.0) |
| Disagree | 6 (4.0) |
| Neutral | 14 (9.4) |
| Agree | 58 (38.9) |
| Strongly agree | 65 (43.6) |
| Do not know or prefer not to answer | 4 (2.7) |
| Missing | 2 (1.3) |
| I am confident in my knowledge of health needs of transgender patients | |
| Strongly disagree | 4 (2.7) |
| Disagree | 33 (22.2) |
| Neutral | 50 (33.6) |
| Agree | 44 (29.5) |
| Strongly agree | 11 (7.4) |
| Do not know or prefer not to answer | 5 (3.4) |
| Missing | 2 (1.3) |
| I would be interested in education regarding the unique health needs of LGBTQ patients | |
| Strongly disagree | 4 (2.7) |
| Disagree | 3 (2.0) |
| Neutral | 30 (20.1) |
| Agree | 68 (45.6) |
| Strongly agree | 37 (24.8) |
| Do not know or prefer not to answer | 5 (3.4) |
| Missing | 2 (1.3) |

(continued in next column)

**TABLE A1.** Participant Responses to Attitude Items (N = 149) (continued)

| Item | No. (%) |
|---|---|
| I would be willing to be listed as an LGBTQ-friendly provider | |
| Strongly disagree | 3 (2.0) |
| Disagree | 3 (2.0) |
| Neutral | 26 (17.4) |
| Agree | 47 (31.5) |
| Strongly agree | 57 (38.3) |
| Do not know or prefer not to answer | 11 (7.4) |
| Missing | 2 (1.3) |
| The LGBTQ population is often more difficult to treat | |
| Strongly disagree | 18 (12.1) |
| Disagree | 58 (38.9) |
| Neutral | 43 (28.9) |
| Agree | 14 (9.4) |
| Strongly agree | 1 (0.7) |
| Do not know or prefer not to answer | 13 (8.7) |
| Missing | 2 (1.3) |
| It is important to know the sexual orientation of my patients to provide the best care | |
| Strongly disagree | 12 (8.1) |
| Disagree | 39 (26.2) |
| Neutral | 34 (22.8) |
| Agree | 50 (33.6) |
| Strongly agree | 9 (6.0) |
| Do not know or prefer not to answer | 3 (2.0) |
| Missing | 2 (1.3) |
| It is important to know the gender identity of my patients to provide the best care | |
| Strongly disagree | 5 (3.4) |
| Disagree | 18 (12.1) |
| Neutral | 24 (16.1) |
| Agree | 77 (51.7) |
| Strongly agree | 21 (14.1) |
| Do not know or prefer not to answer | 2 (1.3) |
| Missing | 2 (1.3) |
| It is important to know the patient's assigned sex at birth to provide the best care | |
| Strongly disagree | 7 (4.7) |
| Disagree | 11 (7.4) |
| Neutral | 34 (22.1) |
| Agree | 70 (47.7) |
| Strongly agree | 21 (14.1) |
| Do not know or prefer not to answer | 3 (2.0) |
| Missing | 3 (2.0) |

(continued on following page)

**TABLE A1.** Participant Responses to Attitude Items (N = 149) (continued)

| Item | No. (%) |
|---|---|
| Upon first encounter, I assume a patient is heterosexual | |
| Strongly disagree | 10 (6.7) |
| Disagree | 50 (33.6) |
| Neutral | 37 (24.8) |
| Agree | 38 (25.5) |
| Strongly agree | 8 (5.4) |
| Do not know or prefer not to answer | 4 (2.7) |
| Missing | 2 (1.3) |
| There should be mandatory education on LGBTQ health needs at my workplace | |
| Strongly disagree | 10 (6.7) |
| Disagree | 18 (12.1) |
| Neutral | 49 (32.9) |
| Agree | 50 (33.6) |
| Strongly agree | 15 (10.1) |
| Do not know or prefer not to answer | 5 (3.4) |
| Missing | 2 (1.3) |

Abbreviations: LGB, lesbian, gay, and bisexual; LGBTQ, lesbian, gay, bisexual, transgender, and queer/questioning.

**TABLE A2.** Participant Responses to Knowledge Items (N = 149)

| Item | No. (%) |
|---|---|
| LGBTQ patients avoid accessing health care due to difficulty communicating with providers | |
| Strongly disagree | 1 (0.7) |
| Disagree | 16 (10.7) |
| Neutral | 34 (22.8) |
| Agree | 53 (35.6) |
| Strongly agree | 7 (4.7) |
| Do not know or prefer not to answer | 36 (24.2) |
| Missing | 2 (1.3) |
| HPV-associated cervical dysplasia is only found in women with a history of heterosexual intercourse | |
| Strongly disagree | 36 (24.2) |
| Disagree | 79 (53.0) |
| Neutral | 7 (4.7) |
| Agree | 6 (4.0) |
| Strongly agree | 2 (1.3) |
| Do not know or prefer not to answer | 16 (10.7) |
| Missing | 3 (2.0) |
| Regularly screening gay and bisexual men for anal cancer through the anal Pap testing can increase life expectancy | |
| Strongly disagree | 1 (0.7) |
| Disagree | 10 (6.7) |
| Neutral | 26 (17.5) |
| Agree | 50 (33.6) |
| Strongly agree | 14 (9.4) |
| Do not know or prefer not to answer | 45 (30.2) |
| Missing | 3 (2.0) |
| LGBTQ individuals tend to have a higher prevalence of smoking compared with non-LGBTQ individuals | |
| Strongly disagree | 3 (2.0) |
| Disagree | 18 (12.1) |
| Neutral | 39 (26.2) |
| Agree | 22 (14.8) |
| Strongly agree | 4 (2.7) |
| Do not know or prefer not to answer | 61 (40.9) |
| Missing | 2 (1.3) |
| LGBTQ individuals tend to engage in more sun-seeking behaviors compared with non-LGBTQ individuals | |
| Strongly disagree | 4 (2.7) |
| Disagree | 16 (10.7) |
| Neutral | 44 (29.5) |
| Agree | 8 (5.4) |
| Strongly agree | 2 (1.3) |
| Do not know or prefer not to answer | 73 (49.0) |
| Missing | 2 (1.3) |
| Transgender individuals are less likely to have health insurance than other individuals | |
| Strongly disagree | 2 (1.3) |
| Disagree | 17 (11.4) |
| Neutral | 25 (16.8) |
| Agree | 37 (24.8) |
| Strongly agree | 5 (3.4) |
| Do not know or prefer not to answer | 61 (40.9) |
| Missing | 2 (1.3) |

Abbreviations: HPV, human papillomavirus; LGBTQ, lesbian, gay, bisexual, transgender, and queer/questioning.

**TABLE A3.** Institutional Inquiry Regarding Sexual Orientation and Gender Identity (N = 149)

| Item | No. (%) |
|---|---|
| Inquires about sexual orientation | |
| Yes | 17 (11.4) |
| No | 94 (63.1) |
| Not sure | 35 (23.5) |
| Missing | 3 (2.0) |
| Inquires about sex assigned at birth | |
| Yes | 32 (21.5) |
| No | 84 (56.4) |
| Not sure | 30 (20.1) |
| Missing | 3 (2.0) |
| Inquires about current gender identity | |
| Yes | 28 (18.8) |
| No | 82 (55.0) |
| Not sure | 36 (24.2) |
| Missing | 3 (2.0) |

**TABLE A4.** Comparison of Survey to Postsurvey Assessment of Two Attitude Items

| Item | Beginning of Survey | After Survey |
|---|---|---|
| I am confident in my knowledge of health needs of LGB patients* | | |
| Strongly disagree | 0 (0.0) | 2 (1.3) |
| Disagree | 20 (13.4) | 39 (26.2) |
| Neutral | 46 (30.9) | 47 (31.5) |
| Agree | 57 (38.3) | 56 (37.6) |
| Strongly agree | 22 (14.8) | 2 (1.3) |
| Do not know or prefer not to answer | 2 (1.3) | 1 (0.7) |
| Missing | 2 (1.3) | 2 (1.3) |
| I am confident in my knowledge of health needs of transgender patients† | | |
| Strongly disagree | 4 (2.7) | 10 (6.7) |
| Disagree | 33 (22.1) | 53 (35.6) |
| Neutral | 50 (33.6) | 54 (36.2) |
| Agree | 44 (29.5) | 28 (18.8) |
| Strongly agree | 11 (7.4) | 1 (0.7) |
| Do not know or prefer not to answer | 5 (3.4) | 1 (0.7) |
| Missing | 2 (1.3) | 2 (1.3) |

NOTE. Data presented as No. (%).

Abbreviation: LGB, lesbian, gay, and bisexual.

*n = 144. Five respondents did not complete both the pre- and postsurvey assessments for this item.

†n = 141. Eight respondents did not complete both the pre- and postsurvey assessments for this item.

**TABLE A5.** Affiliations of the Survey Participants

| Institution | No. (%) |
|---|---|
| Abramson Cancer Center | 2 (1.3) |
| Alvin J. Siteman Cancer Center | 5 (3.4) |
| Arizona Cancer Center | 7 (4.7) |
| City of Hope Comprehensive Cancer Center | 3 (2.0) |
| Comprehensive Cancer Center at Wake Forest University | 1 (0.7) |
| Dan L. Duncan Comprehensive Cancer Center | 5 (3.4) |
| Dana-Farber/Harvard Cancer Center | 2 (1.3) |
| Fox Chase Cancer Center | 4 (2.7) |
| Fred Hutchinson/University of Washington Cancer Consortium | 2 (1.3) |
| Georgetown Lombardi Comprehensive Cancer Center | 1 (0.7) |
| Harold C. Simmons Cancer Center | 1 (0.7) |
| Holden Comprehensive Cancer Center | 4 (2.7) |
| Huntsman Cancer Institute | 5 (3.4) |
| Masonic Cancer Center | 4 (2.7) |
| Norris Cotton Cancer Center at Dartmouth | 5 (3.4) |
| Ohio State University Comprehensive Cancer Center | 2 (1.3) |
| Robert H. Lurie Comprehensive Cancer Center | 3 (2.0) |
| Roswell Park Cancer Institute | 2 (1.3) |
| Rutgers Cancer Institute of New Jersey | 1 (0.7) |
| St. Jude's Children's Research Hospital | 5 (3.4) |
| UC Davis Comprehensive Cancer Center | 5 (3.4) |
| UC San Diego Moores Cancer Center | 7 (4.7) |
| UCLA Jonsson Comprehensive Cancer Center | 4 (2.7) |
| UCSF Helen Diller Family Comprehensive Cancer Center | 1 (0.7) |
| University of Chicago Comprehensive Cancer Center | 6 (4.0) |
| University of Michigan Comprehensive Cancer Center | 4 (2.7) |
| University of New Mexico Cancer Center | 3 (2.0) |
| University of Texas MD Anderson Cancer Center | 4 (2.7) |
| University of Wisconsin Carbone Cancer Center | 5 (3.4) |
| USC Norris Comprehensive Cancer Center | 3 (2.0) |
| Yale Cancer Center | 6 (4.0) |
| Missing/Not Reported | 28 (18.8) |

**TABLE A6.** Attitudes Toward LGBTQ Health by Years Since Graduation and Region of the Country

| | Years Since Graduation | | Region | | | |
|---|---|---|---|---|---|---|
| **Item** | **≤ 17.5** | **> 17.5** | **Northeast** | **Midwest** | **South** | **West** |
| I am comfortable treating LGB patients | | | | | | |
| Strongly disagree | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Neutral | 0 (0.0) | 2 (3.3) | 1 (4.0) | 0 (0.0) | 0 (0.0) | 2 (4.6) |
| Strongly agree | 62 (100.0) | 58 (96.7) | 24 (96.0) | 33 (100.0) | 17 (100.0) | 42 (95.5) |
| I am confident in my knowledge of health needs of LGB patients | | | | | | |
| Strongly disagree | 12 (19.4) | 6 (10.0) | 2 (8.0) | 7 (21.2) | 3 (17.7) | 4 (9.1) |
| Neutral | 17 (27.4) | 19 (31.7) | 6 (24.0) | 13 (39.4) | 6 (35.3) | 13 (29.6) |
| Strongly agree | 33 (53.2) | 35 (58.3) | 17 (68.0) | 13 (39.4) | 8 (47.1) | 27 (61.4) |
| I am comfortable treating transgender patients | | | | | | |
| Strongly disagree | 2 (3.3) | 2 (3.4) | 0 (0.0) | 3 (9.1) | 0 (0.0) | 1 (2.3) |
| Neutral | 7 (11.5) | 5 (8.5) | 3 (12.0) | 1 (3.0) | 1 (6.7) | 6 (13.6) |
| Strongly agree | 52 (85.2) | 52 (88.1) | 22 (84.6) | 29 (90.6) | 14 (93.3) | 37 (84.1) |
| I am confident in my knowledge of health needs of transgender patients | | | | | | |
| Strongly disagree | 18 (29.5) | 13 (22.0) | **6 (25.0)** | **11 (33.3)** | **6 (37.5)** | **7 (16.3)** |
| Neutral | 25 (41.0) | 18 (30.5) | **7 (29.2)** | **14 (42.4)** | **7 (43.8)** | **11 (25.6)** |
| Strongly agree | 18 (29.5) | 28 (47.5) | **11 (45.8)** | **8 (24.2)** | **3 (18.8)** | **25 (58.1)** |
| I would be interested in education regarding the unique health needs of LGBTQ patients | | | | | | |
| Strongly disagree | 4 (6.5) | 2 (3.4) | 1 (4.0) | 1 (3.0) | 0 (0.0) | 1 (2.3) |
| Neutral | 13 (21.0) | 14 (24.1) | 5 (20.0) | 4 (12.1) | 3 (17.7) | 12 (27.9) |
| Strongly agree | 45 (72.6) | 42 (72.4) | 19 (76.0) | 28 (84.9) | 14 (82.4) | 30 (69.8) |
| I would be willing to be listed as an LGBTQ-friendly provider | | | | | | |
| Strongly disagree | 2 (3.3) | 4 (7.0) | 0 (0.0) | 1 (3.0) | 1 (6.3) | 1 (2.4) |
| Neutral | 10 (16.4) | 7 (12.3) | 3 (12.5) | 9 (27.3) | 3 (18.8) | 7 (17.1) |
| Strongly agree | 49 (80.3) | 46 (80.7) | 21 (87.5) | 23 (69.7) | 12 (75.0) | 33 (80.5) |
| The LGBTQ population is often more difficult to treat | | | | | | |
| Strongly disagree | 6 (10.5) | 6 (10.5) | 3 (12.5) | 4 (14.3) | 3 (20.0) | 4 (9.3) |
| Neutral | 15 (26.3) | 19 (33.3) | 6 (25.0) | 11 (39.3) | 5 (33.3) | 13 (30.2) |
| Strongly agree | 36 (63.2) | 32 (56.1) | 15 (62.5) | 13 (46.4) | 7 (46.7) | 26 (60.5) |
| It is important to know the sexual orientation of my patients to provide the best care | | | | | | |
| Strongly disagree | 23 (37.1) | 24 (40.7) | 10 (40.0) | 14 (42.4) | 7 (41.2) | 11 (25.0) |
| Neutral | 15 (24.2) | 10 (16.9) | 6 (24.0) | 8 (24.2) | 1 (5.9) | 13 (29.6) |
| Strongly agree | 24 (38.7) | 25 (42.4) | 9 (36.0) | 11 (33.3) | 9 (52.9) | 20 (45.5) |
| It is important to know the gender identity of my patients to provide the best care | | | | | | |
| Strongly disagree | 8 (12.9) | 11 (18.6) | 4 (16.0) | 2 (6.1) | 4 (23.5) | 6 (13.6) |
| Neutral | 13 (21.0) | 7 (11.9) | 4 (16.0) | 4 (12.1) | 3 (17.6) | 9 (20.5) |
| Strongly agree | 41 (66.1) | 41 (69.5) | 17 (68.0) | 27 (81.8) | 10 (58.8) | 29 (65.9) |
| It is important to know the patient's assigned sex at birth to provide the best care | | | | | | |
| Strongly disagree | 7 (11.3) | 11 (18.3) | 3 (12.0) | 1 (3.0) | 1 (6.3) | 8 (18.2) |
| Neutral | 10 (16.1) | 16 (26.7) | 3 (12.0) | 7 (21.2) | 4 (25.0) | 11 (25.0) |
| Strongly agree | 45 (72.6) | 33 (55.0) | 19 (76.0) | 25 (75.8) | 11 (68.8) | 25 (56.8) |
| Upon first encounter I assume a patient is heterosexual | | | | | | |
| Strongly disagree | 21 (33.9) | 19 (31.7) | 12 (48.0) | 15 (45.5) | 7 (41.2) | 8 (18.6) |

(continued on following page)

**TABLE A6.** Attitudes Toward LGBTQ Health by Years Since Graduation and Region of the Country (continued)

| | Years Since Graduation | | Region | | | |
|---|---|---|---|---|---|---|
| **Item** | **≤ 17.5** | **> 17.5** | **Northeast** | **Midwest** | **South** | **West** |
| Neutral | 19 (30.6) | 13 (21.7) | 5 (20.0) | 7 (21.2) | 3 (17.6) | 15 (34.9) |
| Strongly agree | 22 (35.5) | 28 (46.7) | 8 (32.0) | 11 (33.3) | 7 (41.2) | 20 (46.5) |
| There should be mandatory education on LGBTQ health needs at my workplace | | | | | | |
| Strongly disagree | 12 (19.7) | 15 (25.4) | 3 (12.0) | 4 (12.1) | 5 (29.4) | 10 (23.3) |
| Neutral | 34 (39.3) | 18 (30.5) | 8 (32.0) | 12 (36.4) | 4 (23.5) | 16 (37.2) |
| Strongly agree | 25 (41.0) | 26 (44.1) | 14 (56.0) | 17 (51.5) | 8 (47.1) | 17 (39.5) |
| Subscales of attitude summary measure, mean (SD) | | | | | | |
| Comfort-confidence | 3.88 (.57) | 4.04 (.63) | **4.10 (.61)** | **3.72 (.55)** | **3.86 (.51)** | **4.11 (.68)** |
| Practice beliefs | 3.49 (.86) | 3.33 (.90) | 3.47 (.76) | 3.63 (.73) | 3.27 (1.17) | 3.42 (.85) |
| Education-involvement | 3.76 (.79) | 3.74 (.70) | 3.88 (.60) | 3.89 (.70) | 3.89 (.78) | 3.74 (.59) |

NOTE. Data presented as No. (%) unless otherwise noted. Bold indicates significant difference with an $\alpha$ level of less than .05, two-tailed. Strongly disagree and disagree were combined into the strongly disagree category. Strongly agree and agree were combined into the strongly agree category.

Abbreviations: LGB, lesbian, gay, and bisexual; LGBTQ, lesbian, gay, bisexual, transgender, and queer/questioning; SD, standard deviation.

**TABLE A7.** Knowledge of LGBTQ Health by Years Since Graduation and Region of the Country

| | Years Since Graduation | | Region | | | |
|---|---|---|---|---|---|---|
| **Item** | **≤ 17.5** | **> 17.5** | **Northeast** | **Midwest** | **South** | **West** |
| LGBTQ patients avoid accessing health care due to difficulty communicating with providers | | | | | | |
| Strongly disagree | 7 (11.3) | 7 (11.7) | 0 (0.0) | 2 (6.1) | 2 (11.8) | 8 (18.2) |
| Neutral | 31 (50.0) | 27 (45.0) | 13 (52.0) | 14 (42.4) | 8 (47.1) | 22 (50.0) |
| Strongly agree* | 24 (38.7) | 26 (43.3) | 12 (48.0) | 17 (51.5) | 7 (41.2) | 14 (31.8) |
| HPV-associated cervical dysplasia is only found in women with a history of heterosexual intercourse | | | | | | |
| Strongly disagree* | 54 (87.1) | 44 (74.6) | 21 (87.5) | 27 (81.8) | 11 (64.7) | 34 (77.3) |
| Neutral | 6 (9.7) | 9 (15.3) | 2 (8.3) | 5 (15.2) | 5 (29.4) | 5 (11.4) |
| Strongly agree | 2 (3.2) | 6 (10.2) | 1 (4.2) | 1 (3.0) | 1 (5.9) | 5 (11.4) |
| Regularly screening gay and bisexual men for anal cancer through anal Pap testing can increase life expectancy | | | | | | |
| Strongly disagree | 4 (6.5) | 7 (11.7) | 2 (8.0) | 1 (3.0) | 0 (0.0) | 4 (9.1) |
| Neutral | 34 (54.8) | 27 (45.0) | 14 (56.0) | 21 (63.6) | 7 (41.2) | 17 (38.6) |
| Strongly agree* | 24 (38.7) | 26 (43.3) | 9 (36.0) | 11 (33.3) | 10 (58.8) | 23 (52.3) |
| LGBTQ individuals tend to have a higher prevalence of smoking compared with non-LGBTQ individuals | | | | | | |
| Strongly disagree | 9 (14.5) | 11 (18.3) | 1 (4.0) | 5 (15.2) | 3 (17.6) | 9 (20.5) |
| Neutral | 43 (69.4) | 40 (66.7) | 16 (64.0) | 23 (69.7) | 11 (64.7) | 30 (68.2) |
| Strongly agree* | 10 (16.1) | 9 (15.0) | 8 (32.0) | 5 (15.2) | 3 (17.6) | 5 (11.4) |
| LGBTQ individuals tend to engage in more sun-seeking behaviors compared with non-LGBTQ individuals | | | | | | |
| Strongly disagree | 10 (16.1) | 9 (15.0) | 0 (0.0) | 4 (12.1) | 3 (17.6) | 9 (20.5) |
| Neutral | 48 (77.4) | 48 (80.0) | 22 (88.0) | 26 (78.8) | 13 (76.5) | 33 (75.0) |
| Strongly agree* | 4 (6.5) | 3 (5.0) | 3 (12.0) | 3 (9.1) | 1 (5.9) | 2 (4.5) |
| Transgender individuals are less likely to have health insurance than other individuals | | | | | | |
| Strongly disagree | 6 (9.7) | 9 (15.0) | 2 (8.0) | 3 (9.1) | 0 (0.0) | 10 (22.7) |
| Neutral | 39 (62.9) | 31 (51.7) | 14 (56.0) | 19 (57.6) | 8 (47.1) | 24 (54.5) |
| Strongly agree* | 17 (27.4) | 20 (33.3) | 9 (36.0) | 11 (33.3) | 9 (52.9) | 10 (22.7) |

NOTE. Data presented as No. (%). $\chi^2$ tests indicated no significant differences. Strongly disagree and disagree were combined into the strongly disagree category. Strongly agree and agree were combined into the strongly agree category.

Abbreviations: HPV, human papillomavirus; LGBTQ, lesbian, gay, bisexual, transgender, and queer/questioning.

*Correct response on the basis of current published data.