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# Rural Primary Care Providers' Experiences and Knowledge Regarding LGBTQ Health in a Midwestern State

John Shaver, BSN;[1] Akshay Sharma, PhD;[2] & Rob Stephenson, PhD[2]

1 Vanderbilt University School of Nursing, Nashville, Tennessee
2 Center for Sexuality and Health Disparities, University of Michigan School of Nursing, Ann Arbor, Michigan

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For further information, contact Rob Stephenson, PhD, School of Nursing, University of Michigan, 400 North Ingalls, Room 2236, Ann Arbor, MI 48109; e-mail: rbsteph@med.umich.edu.

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## Abstract

**Purpose:** Health disparities among LGBTQ people have been documented across various settings and recent research has indicated that many disparities are heightened in the context of rurality. Among these disparities is the decreased rate of primary care utilization by rural LGBTQ individuals. Understanding and addressing provider knowledge and attitudes related to LGBTQ health provides a relevant avenue for addressing underutilization.

**Methods:** The study presented was a mail-out survey regarding rural primary care providers' knowledge and experiences regarding LGBTQ health. Publicly available records were compiled to recruit a total sample of 113 primary care providers, at a response rate of 19.8%.

**Findings:** A majority of respondents reported experience providing care to LGBTQ patients, while only slightly over half had received LGBTQ health education. Data analyses revealed significant associations between reported experiences and patient characteristics including religion, religiousness, age, length of time practicing in current provider role, and gender identity. Provider knowledge of LGBTQ health varied greatly across the items assessed. Provider profession (physician, nurse practitioner, physician assistant) and length of current county residence were significantly predictive of LGBTQ knowledge scores.

**Conclusion:** Results provide insight into rural health care for LGBTQ people. Preeminent findings were: (1) an existing need for LGBTQ health education, (2) variation in knowledge across content areas, and (3) association between knowledge, profession, and length of current county residence. Promotion of rural LGBTQ health may benefit by addressing identified gaps in current care.

**Key words** access to care, family medicine, health disparities, LGBTQ, medical care.

Healthy People 2020 recognized improvement of the health and well-being of lesbian, gay, bisexual, transgender, and queer (LGBTQ) Americans as a priority for both research and practice.[1] In recent years, many studies and reviews have been published detailing the broad range of health disparities experienced by LGBTQ individuals.[2,3] For example, compared to their heterosexual counterparts, lesbians and bisexual women experience elevated average weight[4] and decreased likelihood of having received a Pap smear in the past year.[5] Similarly, gay and bisexual men report higher average markers of cardiovascular stress[4] and higher rates of eating disorder symptomology.[6,7] High rates of discrimination toward LGBT individuals have been documented[8,9] and have been associated with increased risk for mental health disorders.[10] LGBTQ Americans have the nation's highest rates of tobacco,[11] alcohol,[12] and other drug use.[13] LGBTQ youth may be more than twice as likely to experience homelessness as non-LGBTQ youth.[14] Additionally, some individuals may incur health risks as a

 

result of behaviors that are associated with LGBTQ identity. These behaviors include hormone replacement therapy in transgender women, which has been shown to increase risk for organ damage and cardiovascular disease,[15] and receptive anal intercourse in gay and bisexual men, which has been associated with increased risk for some anorectal cancers,[16] HIV,[17] and other sexually transmitted infections.[18]

Although often considered as a single group, LGBTQ is a broad term for a diverse conglomerate of individuals spanning all racial, ethnic, religious, socioeconomic, and geographic subpopulations.[19] Many of these LGBTQ subpopulations face unique challenges that warrant specific investigation and mediation.[20] Rural LGBTQ individuals are one such subpopulation.[21] Emerging research findings indicate that, when compared to their urban LGBTQ counterparts, rural LGBTQ individuals experience exaggerated health risks. These include increased obesity among rural lesbians,[22] greater depression among rural transgender men,[23] and elevated smoking rates among rural LGBTQ individuals overall.[24,25] In addition to health risks, barriers to care for rural LGBTQ individuals are distinct from their urban counterparts. Difficulties related to distance from providers,[26] fewer options for health care,[22,27] cultural mores regarding sexuality and gender,[22,27-29] and inadequate legal protections for LGBTQ residents[30] have all been described as particularly salient barriers to care among this subpopulation. It is vital that relevant interventions be developed and implemented which specifically target rural LGBTQ health and well-being. Primary care medical centers might be a promising venue for efforts to address the health of rural LGBTQ individuals.

Primary care practice has long been rooted in Starfield's[31] 4 pillars: accessibility, comprehensiveness of care, coordination, and continuity of relationship. Accessibility describes the nature of primary care as the main point of entry into medical care.[31] This is a particularly important characteristic in rural regions, where medical understaffing and geographic isolation[32] can inhibit access to nonprimary medical providers. Comprehensiveness is the provision of a broad range of services to meet most client health care needs.[31,33] This tenet indicates that primary care is where most patients will be seen, increasing the likelihood that providers in this context will encounter patients who are under-represented in the general population, including racial and ethnic minorities as well as LGBTQ individuals. Coordination is the practice of connecting the patient to specialty and acute care.[31] Appropriate coordination requires that primary care providers have extensive knowledge of health concerns and treatment options beyond the scope of primary care. Continuity of relationship is the ongoing investment in individual patients and communities.[31] For rural LGBTQ patients, long-term relationships with providers can be a mechanism for mediating documented concerns related to anticipated stigma and "outing" oneself to multiple medical providers.[34] With its wide scope and focus on prevention, primary care is uniquely poised to address concerns of vulnerable and minority groups, such as rural LGBTQ individuals.[35]

Despite the advantageous position of primary care providers to address the health concerns of rural LGBTQ individuals, little is known about their actual knowledge or experiences with this subpopulation.[21] A recent review of literature concerning the health of rural LGBTQ individuals[21] found only 3 studies assessing the educational preparedness of rural health care providers.[36-38] One nationwide study and one single-state study reported relatively lower knowledge of LGBTQ health issues among rural providers,[37,38] while the third, a 2-state study, reported deficient knowledge among both rural and urban samples.[36] None of the studies focused on primary care providers, limiting extrapolations of their findings. Given that the literature from general medical provider populations suggests a continued lack of LGBTQ medical knowledge among practicing physicians[39,40] and nurses,[41] these trends are not surprising.

Our study sought to assess the current state of rural primary care in the state of Michigan, as it concerns LGBTQ health. Specifically, we evaluated primary care providers' knowledge of various LGBTQ health concerns, as well as their educational and clinical experiences related to LGBTQ health. The information gathered from this study is intended to provide a clearer understanding of the landscape of rural primary care, and to help inform the development of tailored educational interventions to advance provider preparedness in caring for LGBTQ patients.

## Methods

Between May and August 2017, 620 rural primary care providers in Michigan were sent 3 personalized invitations to complete a survey assessing their attitudes, experiences, and knowledge regarding LGBTQ health care. Potential participants were identified through a publicly available record of all certified 170 Rural Health Clinic locations across 58 Michigan counties, available through the Michigan Department of Licensing and Regulatory Affairs.[42] Rural Health Clinics are medical providers located in Census Bureau-defined nonurbanized areas and which provide a variety of certified primary medical care services.[43] Providers with any of the following licenses were targeted for recruitment: Doctor of Medicine (MD),

**Table 1** Demographic and Clinical Information of 113 Rural Primary Care Providers, Michigan, United States, May-July, 2017

| Characteristic | n (%) |
|---|---|
| **Profession** | |
| Physician[a] | 44 (38.9) |
| PA | 30 (26.5) |
| NP | 39 (34.5) |
| **Length of time in practice (years)** | |
| ≤10 | 34 (30.1) |
| 11-20 | 41 (36.3) |
| ≥21 years | 38 (33.6) |
| **Average number of patients per day** | |
| ≤20 | 82 (72.6) |
| ≥21 | 31 (27.4) |
| **Length of current county residence (years)** | |
| ≤5 | 19 (16.8) |
| 6-10 | 23 (20.4) |
| ≥11 | 71 (62.8) |
| **Lifelong residence in current county** | |
| Yes | 12 (10.6) |
| No | 101 (89.4) |
| **Age (years)**[b] | |
| ≤40 | 32 (28.3) |
| 41-55 | 36 (31.9) |
| ≥56 | 45 (39.8) |
| **Gender identity** | |
| Male | 32 (28.3) |
| Female | 81 (71.7) |
| **Sexual orientation** | |
| Straight/heterosexual | 112 (99.1) |
| Gay/homosexual | 1 (0.9) |
| **Race and ethnicity** | |
| White, non-Hispanic | 105 (92.9) |
| Other[c] | 8 (7.1) |
| **Nativity** | |
| Born in United States | 106 (93.8) |
| Born abroad | 7 (6.2) |
| **Religion** | |
| Atheist/agnostic | 12 (10.6) |
| Christian | 88 (77.9) |
| Other[d] | 13 (11.5) |
| **Religiousness** | |
| Very religious | 20 (17.7) |
| Religious | 36 (31.9) |
| Somewhat religious | 35 (31.0) |
| Not religious at all | 22 (19.5) |

[a]Physician: includes 21 MD and 23 DO.
[b]Age: mean 49 years, median 50 years, range 25-73 years.
[c]Other: includes 1 American Indian or Alaska Native, 3 Asian, 2 mixed race, 2 Hispanic/Latino.
[d]Other: includes 2 Buddhist, 1 Hindu, 1 Jewish, 1 Muslim, 6 "Other."

Doctor of Osteopathic Medicine (DO), Nurse Practitioner (NP), and Physician Assistant (PA). Eligibility criteria included current primary employment at a licensed Michigan Rural Health Clinic, current clinical practice under one of the licenses targeted, and currently offering primary medical care services at their place of employment. All survey procedures and materials were approved by the Institutional Review Board at the study organization.

## Mail-Out Methodology

Informal discussion with a small number of rural primary care practitioners led to the decision to perform a mail-out survey. Reasons discussed by these informants centered largely around the reality that many Rural Health Clinics still have only dial-up Internet connections and the use of an electronic medium may be inaccessible to a key response demographic. Therefore, recruitment occurred through postal mail and followed a modified Dillman approach.[44] Dillman's suggested methodology includes an initial mailing of a personalized cover letter requesting survey participation, as well as a copy of the survey itself and a postage-paid return envelope.[44] Following that original mailing, Dillman suggests a series of rapid succession reminders which encourage the target audience to complete the survey.[44] After the series of reminders, this method includes a final mailing that includes a second copy of the survey and another postage-paid return envelope.[44] In accordance with this approach, targeted rural providers were initially sent a personalized packet with a cover letter, an informed consent document, a paper version of the survey, and a postage-paid return envelope. One week later, a research assistant called each of the 170 clinics, requesting to speak with or leave a message for each of the targeted providers requesting their participation. Two weeks after the initial mailing, all providers who had not yet responded were sent a follow-up postcard, which reminded them of the survey and requested their response once again. Finally, 3 weeks after the original mailing, a second packet containing another copy of the cover letter, the informed consent document, the survey, and a postage-paid return envelope was sent to all providers who had not yet responded.

## Protection of Confidentiality

Before initial mailing, each provider was randomly assigned a unique 3-digit participant identification number. One password-protected Excel database was created which included the name, work address, and unique identification number of each of the target providers. A second password-protected Excel database was generated

which included received responses identified only by the participant identification number. Similarly, while mailing packets and cover letters were personalized to include the providers' names, return envelopes and survey documents included only the participant identification number. This separation ensured that there were no single records linking identifiable information to survey responses.

### Measures

Our survey was composed of 84 questions, separated into 5 distinct sections. The study team estimated that this survey would take 20 to 30 minutes to complete. Section 1 elicited demographic and general clinic information. Section 2 included a series of 7 questions about previous clinical experience with LGBTQ patients and LGBTQ health education. Section 3 was an adapted composite of 5 stigma scales measuring stigma toward gay men,[45] lesbian women,[45] bisexual men,[46] bisexual women,[46] and transgender individuals.[47] This specific combination of Likert-response stigma scales has been used previously to examine stigma toward LGBTQ individuals.[20,48] Section 4 questioned participants regarding their knowledge of LGBTQ health concerns (8 True/False and 5 multiple-choice questions). These 13 questions were developed by the study team based on the Centers for Disease Control and Prevention's LGBTQ health information[49] and the Healthy People 2020 reporting and goals for LGBTQ health.[50] Section 5 was a short closer, assessing providers' opinions of general health concerns in rural Michigan.

### Data Analysis

Data were analyzed using STATA version 14.[51] Descriptive statistics (frequencies and percentages) were used to summarize survey responses. Significant relationships between demographic or clinical responses and experience items were examined for significance using chi-square tests for homogeneity and Kruskal-Wallis testing. Kruskal-Wallis was used when responses to each experience item had a non-normal distribution. Simple regressions were performed to examine relationships between knowledge score and demographic, clinical, or experience items with binary response options. To examine relationships between knowledge score and demographic, clinical, or experience items with more than 2 categorical response options, ANOVA testing was performed. The significance level for all statistical testing performed was $\alpha \leq 0.05$.

## Results

### Study Participants

Of the 620 rural providers who were mailed copies of the survey, 123 (19.8%) responded. Responses came from 45 of the 58 Michigan counties where Rural Health Clinics operate (Figur 1). Of these, 10 were excluded from data analyses due to incomplete or missing information, resulting in a final analytic sample of 113. Table 1 summarizes reported demographic and clinical information. The sample included 44 physicians (21 MD, 23 DO), 30 PA, and 39 NP. Participants ranged in age from 25 to 73 years, with a mean age of 49 years. While multiple options for sex assigned at birth (male, female, other), gender identity (male, female, genderqueer/nonbinary, other), and sexual orientation (straight/heterosexual, gay/homosexual, bisexual, queer, other) were included in the survey response options, only a narrow set of options were reported. The majority of the sample identified as female (71.7%), 1 provider reported a sexual orientation other than heterosexual, and none reported a transgender identity. Most providers were white, non-Hispanic/Latino (92.9%), born in the United States (93.8%), and Christian (77.9%).

### Experience with LGBTQ Patients and Health

Questions assessing rural provider experiences related to LGBTQ health care provision and education are presented in Table 2. Nearly all providers reported knowledge of any current patients that identify as LGBTQ (95.6%), having had a patient reveal LGBTQ identity (96.5%), and feeling comfortable providing care to LGBTQ patients (98.2%). The majority endorsed the belief that knowledge of a patient's LGBTQ identity is important to optimal provision of care (89.4%), having personal LGBTQ contacts (86.7%), and belief that LGBTQ health education should be required for primary care providers (88.5%). Just over half (54.9%) of providers reported having received LGBTQ health education during their professional degree program.

Chi-squared tests for homogeneity and Kruskal-Wallis tests revealed significant differences in responses to 4 of the 7 experience questions across selected demographic or clinical factors, and they are presented in Table 3. The belief that knowledge of LGBTQ identity is important to optimal care provision varied across strata of religion ($P = .025$). Christian respondents were most likely to endorse this belief, followed by Atheist/Agnostic participants, and those of Other religious identities. Reporting personal LGBTQ contacts varied across strata of

**Table 2** Survey Questions Assessing Experiences with LGBTQ Patients or Health Among 113 Rural Primary Care Providers, Michigan, United States, May-July, 2017

| Question | n (%) |
|---|---|
| Item 1: To your knowledge, do any of your current patients identify as LGBTQ? | |
| Yes | 108 (95.6) |
| No | 5 (4.4) |
| Item 2: Has a patient ever revealed to you that they identify as LGBTQ? | |
| Yes | 109 (96.5) |
| No | 4 (3.5) |
| Item 3: If a patient was to reveal to you that they identify as LGBTQ, would you feel comfortable providing primary care services to that patient? | |
| Yes | 111 (98.2) |
| No | 2 (1.8) |
| Item 4: Do you believe that knowing whether a patient identifies as LGBTQ is important to providing optimal primary care services? | |
| Yes | 101 (89.4) |
| No | 12 (10.6) |
| Item 5: To your knowledge, do you have any personal contacts (friends or family) that identify as LGBTQ? | |
| Yes | 98 (86.7) |
| No | 15 (13.3) |
| Item 6: During your professional degree program, did you at any point receive education specific to LGBTQ health concerns? | |
| Yes | 62 (54.9) |
| No | 51 (45.1) |
| Item 7: Do you believe that education specific to LGBTQ health concerns should be required for all primary care providers in your field? | |
| Yes | 100 (88.5) |
| No | 13 (11.5) |

religiousness ($P = .007$) such that a lower rate of LGBTQ personal contacts were reported as reported religiousness increased. Having received LGBTQ health education during one's professional degree varied across strata of age ($P = .001$) and length of time in practice ($P = .003$), with the youngest participants and least experienced participants reporting the highest rates of LGBTQ health education. Finally, the belief that LGBTQ health education should be required was reported at significantly higher rates among female-identified than male-identified respondents ($P = .030$).

### Knowledge of LGBTQ Health Concerns

Knowledge questions, correct answers, and the percentage of correct responses for each question are presented in Table 4. The percentage of correct responses to any given question ranged from 5.3% to 98.2%. A majority of the participants correctly responded to questions regarding elevated suicide risk among LGBTQ youth (98.2%), and recommended frequency of Pap smears for transgender men (85.0%). Few participants (5.3%) correctly identified bisexual women as reporting an elevated rate of teen pregnancy.

An individual's number of correct responses was quantified and used as a cumulative knowledge score. Cumulative scores ranged from 3 to 12, with an overall mean of 7.7 and SD of 1.9. Significant factors are presented in Table 5. Profession was significantly related to this measure, with physicians reporting the highest average score and PAs reporting the lowest average. Length of current county residence was also significantly related to knowledge score, with the highest knowledge scores reported by those reporting 5 or fewer years of residence and the lowest scores reported by those reporting 6 to 10 years of residence in their current county.

## Discussion

This mailed survey of rural primary care providers in Michigan sought to assess providers' experiences and knowledge of LGBTQ health. Analyses revealed significant correlates for these measures, which may be useful in the development of LGBTQ health education interventions targeting the study population.

**Table 3** Significant Correlates of Experiences with LGBTQ Patients or Health Among 113 Rural Primary Care Providers, Michigan, United States, May-July, 2017

| Variable | % "Yes" | *P Value* |
|---|---|---|
| *Item 4: Do you believe that knowing whether a patient identifies as LGBTQ is important to providing optimal primary care services?* | | |
| **Religion** | | $P = .025$ |
| Atheist/agnostic | 83.3 | |
| Christian | 93.2 | |
| Other | 69.2 | |
| *Item 5: To your knowledge, do you have any personal contacts (friends or family) that identify as LGBTQ?* | | |
| **Religiousness** | | $P = .007$ |
| Very religious | 65.0 | |
| Religious | 86.1 | |
| Somewhat religious | 91.4 | |
| Not religious at all | 100 | |
| *Item 6: During your professional degree program, did you at any point receive education specific to LGBTQ health concerns?* | | |
| **Age** | | $P = .001$ |
| ≤40 years | 81.2 | |
| 41-55 years | 52.8 | |
| ≥56 years | 37.8 | |
| **Length of time in practice** | | $P = .003$ |
| ≤10 years | 73.5 | |
| 11-20 years | 58.5 | |
| ≥21 years | 34.2 | |
| *Item 7: Do you believe that education specific to LGBTQ health concerns should be required for all primary care providers in your field?* | | |
| **Gender identity** | | $P = .030$ |
| Male | 78.1 | |
| Female | 92.6 | |

Our preeminent findings were: (1) there is a need and desire for LGBTQ health education among rural primary care providers; (2) knowledge of LGBTQ health varies markedly by content; (3) overall knowledge of LGBTQ health concerns was significantly associated with provider profession and length of current county residence; and (4) religion and religiousness may play unique roles in the caregiving processes of rural primary care practitioners.

## Need and Desire for LGBTQ Health Education

Evidence gathered from our study underscores the necessity of LGBTQ health education for rural primary care providers. Our sample reported nearly ubiquitous levels of having ever provided care to LGBTQ patients; however, only slightly over half reported having received LGBTQ health education. Although previous reports suggest that rural LGBTQ individuals may commute to urban centers to receive health care,[22,27] it is apparent in our sample that nearly all rural primary care providers serve LGBTQ patients. Accomplishing the Healthy People 2020 goal of increasing access to care for LGBTQ patients[50] will require the involvement of rural primary care providers.

This deficiency of LGBTQ health education does not appear to be for lack of provider desire. Similar to previous investigations regarding health care providers and LGBTQ health,[52] a large majority of respondents affirmed that all providers in their field should be required to receive LGBTQ health education. Less than two-thirds of that number, however, reported receiving such education during their professional degree program. This finding complements a plethora of existing literature documenting the lack of LGBTQ education in health professional programs.[41,53-57] As attention to this needed matter has increased, there have been documented increases in the proportion of medical schools requiring LGBTQ health education.[57-59] Our findings reflect that trend, as respondents who were younger and had graduated their professional degree program more recently were significantly more likely to report having received LGBTQ health education. Nonetheless, our sample indicates that even among the youngest and most recently educated, a notable proportion has not received professional LGBTQ health education. Although advancing the curricula of medical schools has been cited as an

**Table 4** Survey Questions Assessing Knowledge of LGBTQ Health Concerns Among 113 Rural Primary Care Providers, Michigan, United States, May-July, 2017

| Question (Correct Answer) | n (%) |
|---|---|
| **LGBTQ youth are at elevated risk for attempted suicide compared to non-LGBTQ peers. (True)** | |
| Correct | 111 (98.2) |
| Incorrect | 2 (1.8) |
| **Lesbians and bisexual women are less likely than heterosexual counterparts to be up to date on Pap smears. (True)** | |
| Correct | 70 (61.9) |
| Incorrect | 43 (38.1) |
| **LGBTQ Americans report lower than average rates of tobacco use. (False)** | |
| Correct | 77 (68.1) |
| Incorrect | 36 (21.9) |
| **Individuals in same-gender (gay) relationships experience lower rates of intimate partner violence than individuals in opposite-gender (straight) relationships. (False)** | |
| Correct | 78 (69.0) |
| Incorrect | 35 (31.0) |
| **Male-to-female transgender individuals who have had genital reconstruction surgery require regular prostate exams. (True)** | |
| Correct | 81 (71.7) |
| Incorrect | 32 (28.3) |
| **Lesbians and bisexual women report lower average BMI than heterosexual women. (False)** | |
| Correct | 86 (76.1) |
| Incorrect | 27 (23.9) |
| **The majority of LGBTQ Americans report one or more clinical mental health disorders. (False)** | |
| Correct | 39 (34.5) |
| Incorrect | 74 (65.5) |
| **There are currently no FDA-approved drugs that can be taken prophylactically to reduce risk of sexual transmission of HIV-1. (False)** | |
| Correct | 55 (48.7) |
| Incorrect | 58 (51.3) |
| **Which of the following populations reports the highest rates of teen pregnancy? (Bisexual women)** | |
| Correct | 6 (5.3) |
| Incorrect | 107 (94.7) |
| **Which of the following populations reports lower than average rates of eating disorder symptomology? (Heterosexual men)** | |
| Correct | 70 (61.9) |
| Incorrect | 43 (38.1) |
| **If a female-to-male transgender patient is taking testosterone as part of hormone replacement therapy, but has not had genital reconstruction surgery, with what frequency should a Pap smear be suggested and performed? (With the same frequency as cisgender [non-transgender] women)** | |
| Correct | 96 (85.0) |
| Incorrect | 17 (15.0) |
| **According to the CDC, how frequently should gay, bisexual, and other men who have sex with men receive an HIV test? (Once every 3-6 months)** | |
| Correct | 47 (41.6) |
| Incorrect | 66 (58.4) |
| **Which of the following groups is least likely to be insured? (Transgender individuals)** | |
| Correct | 54 (47.8) |
| Incorrect | 59 (52.2) |

important landmark in advancing LGBTQ health,[60,61] findings presented here corroborate the additional need to educate providers who are already in practice.[61]

An additional issue raised by these findings concerns the quality of LGBTQ health education. It is noteworthy that there was no significant association between knowledge scores and reports of receiving LGBTQ health education. Although the inclusion of LGBTQ health information into a curriculum represents an important step toward a more inclusive academic culture,[62] the information presented must be relevant to clinical practice and prepare providers to offer competent care.[63] Utilization of curriculum models and content from organizations such as the Gay and Lesbian Medical Association[62] and the Fenway Institute[64] can ensure that information presented is comprehensive, accurate, and clinically

**Table 5** Significant Correlates of Knowledge Score Among 113 Rural Primary Care Providers, Michigan, United States, May-July, 2017

| Variable | Mean ± SD (Range 0-13) | *P Value* |
|---|---|---|
| **Profession** | | $P = .0409$ |
| Physician | 8.159 ± 1.804 | |
| PA | 7.167 ± 1.704 | |
| NP | 7.590 ± 2.087 | |
| **Length of current county residence** | | $P = .0184$ |
| ≤5 years | 8.737 ± 1.910 | |
| 6-10 years | 6.913 ± 1.832 | |
| ≥11 years | 7.676 ± 1.827 | |

relevant. Furthermore, the findings presented here may indicate that LGBTQ health education should be learned in clinical, rather than didactic, formats. Inclusion of LGBTQ health in residency or other clinical training venues may represent an avenue for more effective LGBTQ health education.

## Knowledge Variability across Content Areas

There was large variation in the percentage of correct responses to each individual knowledge item. Nearly all participants correctly identified the elevated risk for suicide among LGBTQ youth, while less than 6% correctly identified bisexual women as the demographic with the highest rates of teen pregnancy. These findings indicate that there are some aspects of LGBTQ health that are known even to those practitioners who have not had formal LGBTQ health education, while there are others which are unknown even to those who report LGBTQ-focused instruction. Previous research has found decreased provider knowledge of specific domains of LGBTQ health, including cancer risk[40] and mental health.[39] Other investigations have reported deficient knowledge pertaining to certain LGBTQ subpopulations, particularly lesbian and bisexual women[65,66] and transgender individuals.[66,67] The results of the knowledge items in this study showed no pattern of knowledge by LGBTQ subpopulation or content area. Further investigation is needed to determine why certain LGBTQ health concerns are widely known while others remain discreet.

Among widely unknown content was information regarding HIV testing and prevention. Less than half of the primary care providers in our sample accurately identified the existence of pre-exposure prophylaxis (PrEP), a once-daily medication regimen that has been shown to effectively reduce the risk of HIV transmission.[68] Other samples of primary care providers have reported similarly low rates of PrEP awareness.[69,70] Less than half of the sample correctly reported the CDC-recommended timeframe for HIV testing among men who have sex with men. Evidence has shown that the effects of HIV on the body,[71] as well as the risk of sexual transmission,[72] are nearly nonexistent for those individuals who are adherent to antiretroviral medication. To begin treatment, however, individuals must be aware of their HIV status. Specific efforts to educate rural primary care providers regarding these and other clinical methods of HIV prevention are needed.[73-75]

## Association of LGBTQ Health Knowledge with Profession and Length of Current County Residence

Cumulative LGBTQ health knowledge scores, although exhibiting significant variability, were significantly correlated with only 2 variables assessed by the study team: provider profession and length of current county residence. Provider profession was significantly correlated with knowledge score such that PAs and NPs reported lower average knowledge than physicians (MD/DO). As the proportion of both PAs and NPs in primary care continues to increase,[76,77] these findings reveal a growing need for LGBTQ health advocacy specific to NPs and PAs.

Greater LGBTQ knowledge was reported among providers who have lived in their current county of residence for less than 10 years. This relationship may represent greater knowledge among individuals who relocate more frequently or who have recently lived in an urban area. Further investigation is warranted to understand the mechanism and significance of this finding to rural LGBTQ health.

## Role of Religion and Religiousness in Rural Primary Care

Similar to other samples of medical providers,[78-80] our survey responses suggest that provider religion and religiousness have a significant relationship to their understanding of LGBTQ patients. Unlike other samples, however, there was no reported correlation among this sample between religion or religiousness and willingness to care for LGBTQ patients[78] or knowledge of LGBTQ health.[80] While it is possible that this lacking relationship is an artifact of small sample size, it may also indicate the unique operation of religion and religiousness in this population. Further study may seek to understand the role of religion and religiousness among rural primary care providers, as well as how they may be uniquely equipped to separate personal beliefs from professional practice.

### Strengths and Limitations

This study was among the first to examine LGBTQ health care from the perspectives of rural primary care providers. Additionally, the novel use of the Michigan Department of Licensing and Regulatory Affairs' list of Rural Health Clinics[42] provided access to an understudied population of providers. There are several study limitations to be noted. The use of the Michigan Department of Licensing and Regulatory Affairs' publicly available list of Rural Health Clinics[42] may have limited recruitment. There may be clinic locations that are not certified Rural Health Clinics but that serve large numbers of rural patients. The inclusion only of providers from one state limits the external validity of the study. Additionally, there was a low rate of response. Such a rate may have resulted from suboptimal recruitment methodology and survey length. Participation may also have been affected by nonresponse bias. Although the participants were assured of confidentiality, those who suspected that their opinions would be deemed undesirable may have avoided responding. Similarly, among those who did respond, response bias may have led to the selection of answers which the participant believed to be more socially desirable. Regarding data analyses, the conglomeration of distinct racial/ethnic and religious groups, although determined necessary to preserve respondent anonymity, may have restricted the nuance or detail provided by the full set of data. Finally, due to the lack of state-level data regarding LGBTQ health, LGBTQ health knowledge questions were generated from nationwide studies and publications and may not reflect specificities of LGBTQ health in Michigan.

## Conclusion

The results of this study offer much-needed insight into the care of rural LGBTQ patients. Recent attention has highlighted a vast array of health disparities experienced by this population, and understanding the perspectives of primary care providers is essential to health promotion. Although LGBTQ health topics have been more commonly taught in professional schools in recent years, rural primary care providers in Michigan continue to report significant knowledge gaps with respect to LGBTQ health risks and care guidelines. Rural primary care providers also self-identify a need for further training in LGBTQ health, and primary and continuing medical education may benefit by tailoring their efforts to the gaps identified.

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