Survey of Principal Investigators in Biobanking: Knowledge, Attitudes, and Research Behaviors About Transgender and Gender-Diverse Patients

Nat C. Jones, BS, BA^{1,2}; Monica E. Reyes, PhD²; Gwendolyn P. Quinn, PhD³; and Matthew B. Schabath, PhD^{1,2}

QUESTION ASKED: Because there are limited published data about the impact of gender-affirming interventions and how they may affect the biology of tissues in transgender and gender-diverse (TGD) populations, what are the gaps in knowledge, attitudes, and practices regarding the assessment of TGD information among researchers involved in biobanking studies?

SUMMARY ANSWER: Overall, there was limited knowledge about TGD health and cancer needs and low rates of TGD demographic data collection but a high interest in receiving education regarding this community.

WHAT WE DID: In August 2019, 172 scientists involved in biobanking studies at a single institution (H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL) were invited to complete a survey measuring knowledge, attitudes, and research practices regarding TGD health and biobanking practices. The survey data were analyzed using quantitative and qualitative approaches.

WHAT WE FOUND: The results from this study reveal a clear deficiency in annotating TGD status in cancer biospecimen collection, and this deficiency is likely widespread and not restricted to this institution. To improve the clinical care of and advance research with respect to TGD individuals, institutions and biobanks

must diversify and expand their collection of TGD demographic information to include sex assigned at birth and gender identity with TGD-inclusive options and assess whether a TGD patient has pursued any gender-affirming interventions.

BIAS, CONFOUNDING FACTORS: These results may not be generalizable to other institutions because this is a single-institution survey study of a National Cancer Institute–designated comprehensive cancer center.

REAL-LIFE IMPLICATIONS: To improve the clinical care and advance research with respect to TGD individuals, institutions and biobanks must diversify and expand their collection of both sexual orientation and gender identity and TGD demographic information. As such, clinical intake forms and demographic questionnaires must be modified to include sex assigned at birth (alternatively, organs present at birth) and gender identity with TGD-inclusive options and to assess whether a TGD patient has pursued any gender-affirming interventions. Further efforts must be pursued to recruit TGD patients for research and clinical trials. These recommendations should be incorporated in all studies that are actively collecting tissues to expand the current nonexistent pool of specimens from TGD individuals available for research.

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Survey of Principal Investigators in Biobanking: Knowledge, Attitudes, and Research Behaviors About Transgender and Gender-Diverse Patients

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abstract

PURPOSE Biobanks usually do not collect transgender and gender-diverse (TGD) demographic information, hindering research on cancer risk and biological effects related to gender-affirming interventions.

METHODS In August 2019, 172 scientists involved in biobanking research at a single institution (H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL) were invited to complete a survey measuring knowledge and attitudes about TGD health and research practices. Quantitative and qualitative analyses were performed.

RESULTS Among 47 respondents, there was high agreement (77%) regarding the importance of collecting TGD identities and histories of gender-affirming treatments with biospecimens, which was contrasted by low self-reported rates of respondents' biorepositories allowing for the entry of TGD identities (14.9%) and histories of gender-affirming interventions (8.5%). There was high interest in receiving education regarding the unique cancer health needs of TGD patients (74%), and knowledge questions yielded high percentages of "neutral" and "don't know or prefer not to answer" responses. After completing the survey, confidence in knowledge of health needs for TGD patients decreased significantly (48.9% were confident during the presurvey assessment v 36.2% in the postsurvey assessment; $P < .001$). Qualitative analysis of open-ended questions indicated overall support of TGD data inclusion in biobanks along with perceived barriers to inclusion of such data in biobanks.

CONCLUSION To our knowledge, this was the first study of researchers to assess knowledge, attitudes, and research practices regarding TGD patients. Overall, there was limited knowledge about TGD health and cancer needs and low rates of TGD demographic data collection but a high interest in receiving education regarding this community.

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INTRODUCTION

There is growing evidence that lesbian, gay, bisexual, transgender, and queer/questioning (LGBTQ+) populations are associated with increased risk and poorer outcomes for certain cancers.¹ Transgender and gender-diverse (TGD) individuals are a particularly understudied population, which is concerning because TGD individuals commonly undergo unique therapies and surgeries that modify their bodies to be more aligned with their desired presentation.² For individuals who are assigned female at birth, gender-affirming interventions include testosterone hormone replacement therapy, mastectomy, hysterectomy, oophorectomy, vaginectomy, metoidioplasty, phalloplasty, scrotoplasty, urethroplasty, and testicular or erectile prosthesis placement.³ For individuals who are assigned male at birth, these interventions include

estradiol hormone replacement therapy, mastoplasty, orchiectomy, vaginoplasty, penectomy, labiaplasty, clitoroplasty, laryngoplasty, and cricothyroid approximation.⁴ These therapies and surgeries will be collectively referred to as gender-affirming interventions.⁵

There are limited published data about the impact of gender-affirming interventions and how they may affect the biology of tissues.⁶ Although hormone replacement therapy and other exogenous hormones are well studied in cisgender populations regarding increased cancer risk and outcomes,⁷⁻⁹ research on long-term exogenous hormones in TGD populations is scant¹⁰ but likewise indicates potential carcinogenicity and has been identified as a priority area for TGD research.¹¹ Limitations of research in this domain include small sample sizes, limited long-term follow-up, and low reliability of demographic data such as sex

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assigned at birth and gender-affirming intervention history.¹² There is also some evidence that chronic inflammation as a result of surgical interventions, such as vaginoplasty, can increase risk of malignancy in TGD populations,¹³ and surgeries should also be investigated on a large scale for their oncologic implications.

An important approach to study the effects of gender-affirming interventions is to leverage existing biorepositories to conduct tissue-based studies. As delineated earlier, 2 limitations in TGD oncologic research include a lack of tissue-based studies and poor reliability of TGD demographic data and gender-affirming interventions—both of which can be addressed through high-quality biorepositories. The ability to query existing biorepositories based on accurately cataloged TGD identity or a gender-affirming intervention would allow researchers to analyze biospecimens from TGD patients with cancer and conduct comparisons to cisgender patients with cancer. Adding sexual orientation, gender identity, and TGD demographic information to biorepositories has the potential to facilitate research in significant domains such as estradiol replacement therapy and breast or prostate cancer, testosterone replacement therapy and ovarian or endometrial cancer, and many other oncologic domains. Taken together, a vast amount of data on how gender-affirming interventions may relate to cancer can become available with the addition of TGD demographics in cancer biobanks. As such, we conducted a survey at a single institution (H. Lee Moffitt Cancer Center and Research Institute [MCC], Tampa, FL) to identify potential gaps in knowledge, attitudes, and practices regarding the assessment of TGD information among researchers involved in biobanking studies.

METHODS

Study Population

In August 2019, the Tissue Core at MCC was queried to generate a list of all investigators using Tissue Core biospecimens or who had used Tissue Core services. The MCC Tissue Core is the central biorepository and is responsible for processing, storing, and releasing high-quality, well-annotated biospecimens in support of research. On the basis of this query, an e-mail was sent to 172 individuals that contained a description of the study and a link to the survey. After meeting inclusion criteria of being a principal investigator (PI), current Tissue Core user, and overseeing the banking of biospecimens, a page with instructions and relevant definitions regarding TGD populations was provided. Participants were then directed to the 35-item survey, which was hosted on Qualtrics (Provo, UT) and accessible on participants' personal devices. Upon completion, a separate Qualtrics survey was provided to collect optional contact information for a gift card raffle. Four participants were randomly selected to receive a \$20 Target gift card, which was delivered through MCC's internal mailing system. The institutional review board (Advarra,

Columbia, MD) approved this research and deemed this exempt.

Survey Measures

The survey was developed based on previously published surveys on LGBTQ+ cancer health¹⁴⁻¹⁶ and revised by the investigative team with feedback from 2 members of the TGD community. Among the 35-item survey, there were 5 knowledge items, 7 attitudes items, 6 practice items, 11 demographic questions, 1 presurvey confidence indicator, and 1 postsurvey confidence indicator. The attitudes and knowledge items measured responses on a 5-level Likert scale, as follows: strongly disagree, disagree, neutral, agree, or strongly agree. Respondents could also select "don't know" or "prefer not to answer."

Three of the practice items inquired about the following: "My biorepository allows for entry of" a TGD identity, a sex assigned at birth other than male or female, and gender-affirming interventions as data points for TGD patients. These questions were specifically inquiring about the PI's own biorepository effort and not of those of the Tissue Core because it is a sample processing and storage facility and does not directly approach or consent patients. As such, PIs who use these services are responsible for collection of patient data (eg, patient questionnaire) and acquisition of biospecimens (eg, phlebotomy, surgical specimen), of which the latter are sent to the Tissue Core for processing and storage (or samples are released to the PIs and stored in their own laboratory). There were also 3 open-ended questions eliciting personal experiences, reservations, and additional comments.

Statistical Analysis

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to quantify survey responses. Demographics were listed in tabular form, and the attitudes, knowledge, and practice results are presented graphically and in tabular form. A χ^2 test was conducted to determine whether confidence in knowledge of TGD cancer health needs changed from the start of the survey to the end of the survey.

Qualitative Data

Respondents were provided 3 open-ended comment boxes for qualitative feedback; the first asked for any experiences enrolling TGD patients in biorepositories, the second asked for any reservations with including TGD information in biorepositories, and the third asked for additional comments. These data were analyzed using thematic deductive content analysis.¹⁷ Responses to the open-ended questions were coded in relation to the question prompt and summarized by one coder and reviewed by a second coder. Discrepancies were resolved through discussion. Using this iterative process, the 2 coders achieved 0.95 interrater reliability.¹⁸ Representative quotes were selected based on relevance and illustration of the codes.

TABLE 1. Characteristics of Surveyed Primary Investigators

Characteristic	No. of Respondents (N = 47; %) ^a
Gender identity	
Female	15 (31.9)
Male	27 (57.4)
Transgender: female to male	0 (0.0)
Transgender: male to female	0 (0.0)
Genderqueer	0 (0.0)
Other ^b	1 (2.1)
Prefer not to answer	4 (8.5)
Mean age, years (SD)	49 (8.6)
Preferred not to answer	9 (19.2)
Ethnicity	
Hispanic/Latino	4 (8.5)
Not Hispanic/Latino	39 (82.9)
Prefer not to answer	4 (8.5)
Race	
White	30 (63.8)
Black	0 (0.0)
Asian	8 (17.0)
American Indian/Alaska Native	0 (0.0)
Hawaiian or Pacific Islander	0 (0.0)
Multiracial	1 (2.1)
Other/not sure	1 (2.1)
Prefer not to answer	7 (14.9)
Sexual orientation	
Heterosexual	39 (82.9)
Bisexual	0 (0.0)
Lesbian	0 (0.0)
Gay	3 (6.4)
Not sure/questioning	0 (0.0)
Other	0 (0.0)
Prefer not to answer	5 (10.6)
Religious identity	
Atheist/agnostic	8 (17.0)
Buddhist	1 (2.1)
Christian	13 (27.7)
Hindu	1 (2.1)
Jewish	6 (12.8)
Muslim	1 (2.1)
Not religious	9 (19.2)
Other	2 (4.3)
Prefer not to answer	6 (12.8)

(continued in next column)

TABLE 1. Characteristics of Surveyed Primary Investigators

(continued)

Characteristic	No. of Respondents (N = 47; %) ^a
Have transgender/gender-diverse family members	
Yes	9 (19.2)
No	33 (70.2)
Prefer not to answer	5 (10.6)
Have transgender/gender-diverse friends	
Yes	30 (63.8)
No	12 (25.5)
Prefer not to answer	5 (10.6)
Personal political leanings	
Very conservative	0 (0.0)
Conservative	3 (6.4)
Somewhat conservative	3 (6.4)
Centrist/moderate	12 (25.5)
Somewhat liberal	4 (8.5)
Liberal	15 (31.9)
Very liberal	1 (2.1)
Other	1 (2.1)
Prefer not to answer	8 (17.0)
Terminal degree program completed	
PhD	26 (55.3)
MD	27 (57.5)
MS	10 (21.3)
MPH	4 (8.5)
Other	1 (2.1)
Terminal degree completion	
Median year (SD)	2000 (9.7)

Abbreviations: MD, Doctor of Medicine; MPH, Master of Public Health; MS, Master of Science; PhD, Doctor of Philosophy; SD, standard deviation.

^aValues are numbers and percentages unless otherwise noted.

^bOne respondent checked all categories for gender identity. This seems to be user error because the respondent also checked “other gender identity” and commented, “We would record any gender history [in our biorepository].” As such, this respondent has been designated in the “other” category alone.

RESULTS

Demographics

Of the 172 investigators who were contacted by e-mail, 15 were excluded because they did not meet the inclusion criteria because they responded “no” to the screening question, “Are you a Primary Investigator with a research protocol that involves the collection of patient biospecimens

FIG 1. Participant responses to (A) attitude items and (B) knowledge items. Responses < 5% are not labeled on the figure. TGD, transgender and gender diverse.

(e.g., tumor, blood, saliva, urine, fecal, etc.)?” Forty-seven investigators responded “yes” to the screening question and completed the survey, for a 29.9% response rate (Table 1). The majority of respondents identified as cis-gender (97.9%), male (57.4%), White (63.8%), non-Hispanic (82.9%), and heterosexual (82.9%). Seventy percent of respondents reported that they did not have a TGD family member, whereas 63.8% reported having TGD friend(s). The most common religious identity was Christian (27.7%), and political identities were largely liberal (31.9%) and centrist or moderate (25.5%). Terminal degree programs were mostly MD (57.7%) and PhD (55.3%), and the median year for degree completion was 2000.

Attitudes, Knowledge, and Practices

Among self-reported responses for attitudes, 77% of respondents reported it was important (agree and strongly agree) to collect TGD identities in biorepositories, 79% thought it important to collect a history of gender-affirming interventions, and 77% thought it important to learn more about bodily tissue changes after gender-affirming interventions (Fig 1A). Regarding education, 74% were interested in learning more about TGD cancer health needs.

Knowledge was high regarding how TGD individuals often choose to undergo gender-affirming interventions, with 74% reporting agree or strongly agree (Fig 1B). Similarly, 68% agreed with the statement that TGD patients were more likely to avoid health care as a result of communication difficulties with providers. Although prior studies have demonstrated that TGD individuals are less likely to

undergo cancer screenings and have health insurance, 43% and 36% agreed or strongly agreed, respectively, with these data. Knowledge questions also yielded high percentages of “neutral” and “don’t know or prefer not to answer” responses, with the highest rate of the latter being 38% of responses to the statement of TGD individuals being less likely to undergo cancer screenings.

In terms of practice, 14.9% of respondents reported their biorepository allows for the entry of a TGD identity, 8.5% reported the ability to report gender-affirming interventions, and 17% allowed for an assigned sex at birth other than male or female (Table 2). Regarding gender-affirming interventions, 3 respondents specified the ability to record hormone replacement therapy, genital realignment surgery, gonadectomy, breast augmentation or mastectomy, and facial feminization or masculinization procedures. The 2 most common cancer foci of the biobanks were related to lung or thoracic cancer (27.7%) and breast cancer (23.4%) research. The most common biospecimens collected were blood (74.5%) and tissue (74.5%).

Postsurvey Attitudes

In the presurvey assessment, 48.9% of respondents were confident (strongly agree and agree) in their knowledge of TGD health care needs, which decreased to 36.2% in the postsurvey assessment ($P < .001$; data not shown).

Qualitative Data

The majority of respondents (80%) had no concerns about incorporating TGD data into biobank data and perceived it as positive. Approximately half of participants commented on the impact of sample size and power for the ability

TABLE 2. Participant Responses to Practice Items

Item	No. (N = 47; %)
My biorepository allows for entry of transgender or gender-diverse identity	
Yes	7 (14.9)
No	12 (25.5)
Not sure	28 (59.6)
My biorepository allows for entry of assigned sex at birth other than male or female	
Yes	8 (17.0)
No	13 (27.7)
Not sure	26 (55.3)
My biorepository allows for entry of gender-affirming interventions as data points for transgender or gender-diverse patients	
Yes	4 (8.5)
No	19 (40.4)
Not sure	24 (51.1)
My biorepository allows for entry of gender-affirming interventions as data points for transgender and gender-diverse patients	
Hormone replacement therapy	3 (6.4)
Genital realignment surgery	3 (6.4)
Gonadectomy	3 (6.4)
Breast augmentation or mastectomy	3 (6.4)
Facial feminization or masculinization procedures	3 (6.4)
Other	0 (0.0)
Cancer site(s) of main focus	
Breast	11 (23.4)
Penile	1 (2.1)
Anal	0 (0.0)
Thyroid	0 (0.0)
Sarcoma	5 (10.6)
Cervical	2 (4.3)
Prostate	6 (12.8)
Esophageal/gastric	0 (0.0)
Oral/head and neck	0 (0.0)
Malignant hematology	8 (17.0)
Ovarian	4 (8.5)
Testicular	0 (0.0)
Kidney/bladder	5 (10.6)
Neuroendocrine	1 (2.1)
BMT	2 (4.3)
Uterine	2 (4.3)
Colon/rectal	4 (8.5)
Lung/thoracic	13 (27.7)
Other	14 (29.8)

(continued in next column)

TABLE 2. Participant Responses to Practice Items (continued)

Item	No. (N = 47; %)
Biospecimens collected	
Blood	35 (74.5)
Saliva, buccal cells, etc	13 (27.7)
Urine	6 (12.8)
Tissue	35 (74.5)
Fecal	4 (8.5)
Other	5 (10.6)

Abbreviation: BMT, bone marrow transplantation.

to make comparisons (55%). Some participants (20%) expressed concern for confidentiality and patient privacy. A minority of respondents (14%) had concerns about terminology and the ability to apply this research in a meaningful way. One participant noted that current genetic testing in external laboratories is not yet prepared to address the issue of sex assigned at birth versus current gender identity. [Table 3](#) lists illustrative quotes from respondents.

DISCUSSION

In this study, we surveyed research scientists engaging in biospecimen collection at a single institution and found a high interest in learning more about TGD cancer health needs and overall limited knowledge on cancer health disparities affecting the TGD population. There was also a significant decrease from presurvey assessment to post-survey assessment regarding confidence in addressing TGD health care needs. Of note, 96% of respondents reported it was important to collect sex assigned at birth data with biospecimens, with lower importance given to collecting TGD identities (77%) and histories of gender-affirming interventions (79%). Despite these high ratings of importance, there were low rates of practice behaviors regarding the inclusion of TGD demographic options, with only 14.9% of those surveyed allowing for the entry of a TGD identity and 8.5% allowing for the entry of gender-affirming interventions.

Although the qualitative data also revealed overall support of TGD data inclusion in biobanks, some respondents identified TGD terminology, methods of statistical analysis, and capabilities of external specimen-processing facilities as barriers to TGD demographic inclusion in biobanks. In addition, the observed decrease in pre- and postsurvey confidence regarding TGD health care needs suggests an awareness of lack of knowledge, perhaps after answering “don’t know or prefer not to answer” in response to TGD knowledge items. These findings indicate that research is needed to identify appropriate TGD training and education measures that can help researchers put their inclusive beliefs into practice by diversifying their biobanks. This research gap is further confirmed by a search on PubMed,

TABLE 3. Participant Responses to 3 Open-Ended Questions
Theme

No concerns about incorporating TGD data into biobank data and perceived it as positive	"To be faithful to science and care for physical health, in both clinical and research settings, it should be routine to clearly differentiate and document the genetic gender, birth gender, and the exact status of transgender, i.e. the history of altering treatment and the sexual behavior practice."	"Our laboratory deals with a disease that has a specific gender bias and most of the studies done on it are statistical in nature. Having access to gender diversity could help answer some important and specific questions about this disease."	"No reservations. People should be given the opportunity to report diverse gender identities and associated interventions, but should be given the option to choose not to answer such questions."	"Faculty need to improve their knowledge of the specific characteristics (both biological and psychological) and thus the healthcare needs of these subgroups as it is relevant to cancer."	"I have no reservations [...] I want to know more and see how we can make future studies relevant to these subgroups."	"Transgender health disparity study is very important, and should be done with a high priority in my opinion."
The impact of sample size/power for the ability to make comparisons	"... In general, we in cancer research communities are data poor. It is difficult to conceive of a study designed for another purpose that could include sexual orientation or gender identity as a covariate and have it statistically meaningful. It is clear that sex assigned at birth sometimes has significant effects, and patients' hormonal status (either supplemented or deficient) should commonly be collected."	"The biggest concern from a biorepository point of view is that we like to group participants into big groups since that generally increases the power of any comparison that we make. This is particularly true of small bio-banks just getting going. In the future, as our bank expands, we will become more comprehensive in our thinking and collection of data[.]"	"My only reservation is that it is yet another core data element that will be difficult to parse statistically."	"... adequate sample sizes for these populations as they are subdivided could be an issue for studies."	"Information may not be available or might limit generalizability of research."	
Concern for confidentiality and patient privacy	"The health care community is wide-ranging in its outlook and opinions. While we believe we have no bias I wonder how collecting this data may affect treatment at the point of care. One thing is to understand the molecular basis of disease changes due to for instance specific hormone treatments which would be good for the LGBTQ community but at the patient level, I worry it may have unintended consequences to provide that information unless a better system is in place."	"Patient privacy and disclosure of data should be clear to both consenting subjects as well as investigators to whom specimens are being released. Specimens from subjects receiving exogenous hormones for gender affirmation should be sequestered and analyzed separately from cis-gender subjects due to potential alterations in results due to alterations in the hormonal milieu."	"Privacy for the individual needs to be protected."			
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TABLE 3. Participant Responses to 3 Open-Ended Questions (continued)

Theme	Participant Responses		
Concerns about terminology and the ability to apply this research in a meaningful way	<p>"I am concerned that the plethora of terms to describe the spectrum of sexual/romantic orientation and identity are not sufficiently defined from a data registry standpoint to be fully accurate or informative at the time the samples are collected. Particularly if the patients are not open or are in different phases of transitioning at time the sample was provided. This could cause confounding effects if you are trying to look for biologic differences in cancer samples from declared LGBTQ patients vs. heterosexual cisgendered [sic] declared patients. Also how would you know the tissue effects observed are solely due to affirming treatments if we don't have matching tissues prior to initiation of those treatments."</p>	<p>"Education is needed on the way in which to ask these questions appropriately from both a PI and research coordinator standpoint to ensure a comfortable discussion and to elicit the most complete and accurate information as possible from the participant."</p>	<p>"For biospecimens collected for the sole purpose of germline DNA, some aspects of information conveying gender identity and/or interventions may not be directly relevant, although this is not necessarily an argument for noncollection of this information."</p> <p>"Perceived imprecision of terminology and relevance"</p>
Current genetic testing in external laboratories is not yet prepared to address the issue of sex assigned at birth versus current gender identity	<p>"We record all pertinent medical history, including anything related to gender. ... [In] clinical NGS genetic testing, gender is evaluated by FoundationOne and if it does not match the gender on the order form, they will hold the result thinking there may be risk for a specimen switch. In patients with gender change history, it would be important to know this because you would not want these clinical important results delayed due to the gender based on the DNA testing being different from the gender on the order form which I think is based on gender in the electronic medical record."</p>		

NOTE: The 3 open-ended questions were as follows: 1. Please describe any experiences you might have with enrolling transgender or gender-diverse patients in your biorepository. 2. Please describe any reservations you might have with including information on diverse gender identities and/or interventions with your biospecimens. 3. Please provide any additional comments.

Abbreviations: NGS, next-generation sequencing; TGD, transgender and gender diverse.

when, as of February 2020, if “biobank AND transgender” is queried only a single case study is identified. In this case study, breast tissue from a transgender man was added to the Breast Cancer Campaign Tissue Bank, and tissue analysis revealed that breast tissue is significantly modified by testosterone therapy.¹⁹

We do acknowledge some limitations of this study. First, this is a single-institution study of a National Cancer Institute–designated comprehensive cancer center, and these results may not be generalizable to other institutions. It is worth noting that MCC is considered a leader in LGBTQ+ health care by the Human Rights Campaign and regularly engages in programs to support their LGBTQ+ staff and patients. This suggests that other cancer centers and institutions with biorepositories and less engagement with the LGBTQ+ community may have even lower numbers regarding the entry of TGD demographics, and a wider-scale study that samples a larger population of biorepository researchers may reveal more accurate trends for the overall field of biobanking. Next, we cannot assess differences in characteristics between responders and nonresponders because we do not have metadata on the nonresponders. Finally, the response rate was somewhat low at 29.9%.

The results from this study reveal a deficiency in annotating TGD status in biospecimen collection, and this deficiency is likely widespread and not restricted to this institution.

Although the MCC has been collecting and including sexual orientation and gender identity information in patient medical records since 2017, there have been limited efforts to ensure sexual orientation and gender identity, including TGD status, are linked to biobanking efforts. However, on the basis of the efforts from this survey, the Florida Pancreas Collaborative²⁰ has started annotating sexual orientation and gender identity in their biobanking efforts. Nonetheless, development of cultural sensitivity and humility training may be warranted to ensure successful implementation by other PIs at this and other institutions. To improve the clinical care and advance research with respect to TGD individuals, institutions and biobanks must diversify and expand their collection of sexual orientation and gender identity (including TGD) demographic information. As such, clinical intake forms and demographic questionnaires must be modified to include sex assigned at birth (alternatively, organs present at birth) and gender identity with TGD-inclusive options and to assess whether a TGD patient has pursued any gender-affirming interventions. Further efforts must be pursued to recruit TGD patients for research and clinical trials. These recommendations should be incorporated in all studies that are actively collecting tissues to expand the current nonexistent pool of specimens from TGD individuals available for research.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Survey of Principal Investigators in Biobanking: Knowledge, Attitudes, and Research Behaviors About Transgender and Gender-Diverse Patients

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