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Rates and Determinants of Suicide Attempts in Transgender People: Data from Integrated Health Systems

By

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Masters of Public Health

Epidemiology

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B.A., Emory University, 2016

Thesis Committee Chair: Michael Goodman, MD MPH

An abstract of
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Abstract

Rates and Determinants of Suicide Attempts in Transgender People: Data from Integrated Health Systems

By Josephine Mak

Background: Transgender people, face greater discrimination and stigma and thus may have experience a variety of mental health problems. As suicide attempt is an important and severe manifestation of poor mental health, it is essential to estimate the frequency and determinants of these events among transgender individuals.

Methods: Longitudinal data on 6,327 transgender individuals from 2006 – 2016 STRONG cohort were analyzed to calculate rates of suicide attempts among study participants and to compare these rates across demographic and gender identity-specific groups and by mental health status at baseline. Episode of possible and confirmed self-inflicted injuries and poisoning, transgender status, gender identity and other variables were ascertained based on electronic medical records from three integrated health systems.

Results: Using Poisson regression, we found that the rates of suicide attempt vary across subgroups. Participants of younger age, transmasculine individuals, and those with previous history of suicide attempt and poor mental health at baseline had higher rates of suicide attempt. Additionally, among transmasculine individuals, those who resided in an area that had less than 30% of residents with high school education and those who were racial/ethnic minorities had higher rates of suicide attempt. By contrast, among transfeminine study participants, racial/ethnic minorities had lower rates of suicide attempt relative to non-Hispanic whites and no association was observed with area-based level of education.

Conclusions: These results suggest that previous history of suicide attempt and multiple mental health diagnoses are powerful predictors of future suicide attempts among the transgender population. Transmasculine study participants and younger individuals experience higher rates of suicide attempt compared to their respective reference groups. Future research should examine the impact of gender affirmation therapy on risk suicide attempts and help identify targets for suicide prevention interventions in this population.

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INTRODUCTION

The term ‘transgender’ describes individuals who have “gender identities, expressions, or behaviors not traditionally associated with their birth sex” (1). While some transgender individuals self-identify as men or women, a substantial proportion of them may reject binary gender categories (2). For this reason, current terminology aims to reflect the complex spectrum of gender identities and, the term ‘transfeminine’ (TF) refers to an individual whose gender identity differs in any way from their male sex designation at birth. Similarly, ‘transmasculine’ (TM) refers to someone whose gender identity differs from their female assignment at birth.

It is estimated that 0.5% - 0.6% of US adults may identify as transgender or, more broadly, gender non-confirming (3, 4). However, it is possible that these estimates are subject to error due to sampling of mainly urban areas, where the transgender population may be overrepresented (3, 5). In a recent population-based probability sampling study, the meta-regression model suggested that the proportion of transgender individuals in the US has been increasing. Based on the model, it is estimated that approximately 390 adults per 100,000 person or 1 in every 250 adults are transgender in 2016, which translates to around 1 million US transgender adults (5). Regardless of the existing uncertainty the available data indicate that transgender individuals represent a sizable subpopulation whose health needs deserve to be examined and addressed.

Transgender individuals have been found to have greater prevalence of mental health problems compared to the general population. This may be explained by the minority stress theory where stress due to prejudice, discrimination, or stigma results in worse psychological functioning (6-8). The prejudice, discrimination, and stigma can

occur in a variety of settings and though different mechanisms (6, 9). Moreover, fear of stigmatization can force transgender individuals to conceal their identities, and thereby increase the level of stress (1, 6, 10).

In an online sampling of US transgender population, 44.1% of respondents were found to be clinically depressed (6). Similarly, in a cohort study of over 500 transgender individuals, nearly two thirds of TM and 55% of TF individuals were depressed (11).

Suicide ideation and suicide/self-harm are particularly important manifestations of poor mental health status because they have dire consequences. Prevalence of suicide attempt is estimated to be between 32% - 41% for both TM and TF populations, which is much higher than the average prevalence of 9% reported across 17 countries (10-14). Another recent study found that the transgender people are more likely to attempt suicide or have suicide ideation compared cisgender individuals (15). It is important to point out however, that much of the previous literature on suicide attempt among transgender individuals is limited due to a predominance includes of qualitative studies, or studies that are based on samples of convenience with inadequate statistical power (10, 12, 16).

The present study is designed to address this knowledge gap and examine incidence of suicide attempts in a cohort of approximately 6,300 transgender people enrolled in three large integrated health systems in the United States.

METHODS

Study Design & Cohort Ascertainment

The data for the current analyses originated from the Study of Transition Outcomes and Gender (STRONG). The STRONG cohort was assembled from electronic medical records (EMR) of individuals enrolled in three Kaiser Permanente (KP) sites located in Northern California (KPNC), Southern California (KPSC), and Georgia (KPGA). The details of cohort ascertainment methodology are provided elsewhere (17). Briefly, transgender and gender non-conforming individuals were identified from the three participating sites based on the relevant International Classification of Diseases, Ninth Edition (ICD-9) codes or the presence of specific keywords within the free-text section of medical records. Each cohort member was assigned an "index date", which was defined as the first instance the EMR contained evidence of transgender status. Another search of free text was conducted to ascertain each participant's TF or TM status. Individuals who diagnosed with disorders of sex development disorders (also known as intersex conditions) were excluded.

Once the cohort was ascertained and validated patient identification numbers were linked to multiple data sources including ICD-9 and ICD-10 diagnostic codes and health care utilization records. To date, cohort follow up extends through the end of 2016.

Variables of Interest

The main outcome variable in the present analysis was EMR-based evidence of suicide attempt. Suicide attempt was defined by ICD-9 and ICD-10 codes, which included self-inflicted injury, possible self-inflicted injury and self-inflicted injury/poisoning (Table 1). Date of each suicide attempt was also recorded.

The demographic variables of interest included age at index date, TM/TF status and race/ethnicity. With respect to age the participants were included in one of the three categories: 0-20, 21-40 and greater than 40 years. Each study subject's race and ethnicity was categorized as Hispanic, non-Hispanic Black, non-Hispanic White, and other. Census-level education status was divided into three groups based on the percentage of residents with at least high school education, <30%, 30% - 50%, and > 50%. A count of previously diagnosed categories of mental health conditions at baseline (i.e. on or before the index date) was calculated for each study subject. The categories of mental health diagnoses included: anxiety disorders, attention deficit disorders, autism spectrum disorders, bipolar disorders, depressive disorder, schizophrenia spectrum disorder, substance use disorders, and other disorders which includes conduct/disruptive disorder, eating disorder, other psychoses, and personality disorder. The total number of mental health conditions was then divided into three ordinal categories, 0, 1-2, and 3+. Additionally, baseline suicide attempts (ever-never) were ascertained using the same approach and expressed as a binary variable

Analysis

The main parameter of interest was rate of suicide attempts calculated as the number of events per 100,000 person-days of observation. Time under observation was based on enrollment records; it started at the index date and ended at the time of permanent disenrollment, death, or end of the study (December 2017). Temporary disenrollment for less than 90 days is likely due to delay in insurance renewal and does not result in interruption of health care services. For this reason, only disenrollment intervals of over 90 days were excluded from the person-time calculations as was done in

previous studies(18). Only those participants who had at least one or more days of enrollment were included in the study.

All comparison of rates were carried out using Poisson regression models. The results of these models were expressed as adjusted rate ratios (RR) and the corresponding 95% confidence intervals (CI). The analyses were performed for all covariates taken together and separately stratified on TM/TF status. All analyses were conducted using SAS ® Software Version 9.4 (SAS Institute Inc., Cary, NC).

RESULTS

Selected characteristics of the transgender cohort are shown in Table 2. A total of 6327 transgender individuals were included in the analysis, of those 2875 (45%) were TM and 3452 (55%) were TF. In both TM and TF sub-cohorts, participants with a documented suicide attempt during follow up were younger than those who had no evidence of the suicide attempt. Other notable differences between persons with and without suicide attempt included much greater number of mental health diagnoses and greater proportion of participants with a previous history of the event in the former group (Table 2).

The crude rate of suicide attempts in the TF study population was 26 (95 % CI 25-27) per 100,000 person-days of follow up. The corresponding rate among TM study participants was 27 (95% CI: 26- 28) per 100,000 person-days of follow up

In the overall multivariable model (Table 3) the rate of suicide attempt for TM was 43% higher (95% CI: 1.25, 1.64) among TM compared to TF. Relative to participants who were 41 years of age or older at baseline, the RR estimates for those between ages 21 and 40 years and those under the age of 21 years were 2.44 (95% CI: 1.95-3.06) and 2.12 (95% CI: 1.70-2.65), respectively. Other factors associated with higher rates was greater number of mental health diagnoses at baseline, and in particular, history of previous suicide attempts (RR: 13.68, 95% CI: 11.72-15.97)

When stratifying on gender identity, among both TF and TM individuals, factors associated with higher rates of suicide attempt also included number of mental health diagnoses history of previous suicide attempts. The associations with race/ethnicity and education differed across strata. Among TM, non-Hispanic Blacks and Hispanics as well

as persons of Other/Unknown race/ethnicity experienced significantly higher rates of suicide attempts relative to non-Hispanic Whites with RR (95 % CI) estimates of 1.43 (1.08-1.90), 2.05 (1.16-3.61) and 2.93 (1.26-3.61), respectively. By contrast among TF the association was in the opposite direction, although not statistically significant: using non-Hispanic-Whites as reference, the estimated RRs were 0.74 (95% 0.49-1.12) for non-Hispanic Blacks, 0.54 (95% 0.24-1.26) for Hispanics and 0.40 (95% CI: 0.11-1.41) for individuals whose race/ethnicity was recorded as other/unknown. The associations with area-based education also differed in the two groups. Among TM, living in a neighborhood with greater proportions of residents who completed at least high school was inversely associated with rates of suicide attempts, whereas among TF the same RR estimates were not significantly different from the null value (Table 4).

DISCUSSION

In this longitudinal study we examined factors associated with suicide attempts in a cohort of transgender individuals who were enrolled in 3 integrated health systems. We found that the rates were especially high among persons with greater number of mental health diagnoses and those who had evidence of previous suicide attempts. The rates were also higher in younger compared to older study participants and in TM compared to TF individuals. When stratifying on gender identity, several notable differences were observed. TM persons who lived in census tracts with higher proportion of at least high school-educated residents experienced lower rates of suicide attempts; however, no association with area-based measured of education was observed among TF study participants. Perhaps the most intriguing gender identity-specific associations were observed with respect to race/ethnicity. While among TM, racial/ethnic minorities had much higher rates of suicide attempts relative to their non-Hispanic White counterparts, the opposite was true when the data were limited to the TF sub-cohort.

The findings of this study are supported by previous research (10, 12, 19, 20). Three earlier studies also found that younger transgender people may be at higher risk of suicide attempt (12, 20, 21). One previous study conducted in San Francisco, California in 1997 interviewed 515 self-identified transgender subjects (392 TF and 123 TM) to assess predictors of suicide attempts and found that those who were 24 years old and younger were more than twice as likely to report at least one event. The subjects in the San Francisco study were self-recruited; this was accomplished over a 6-month period by advertising a 1-800 number that allowed contacting the investigators (12).

As part of the Virginia Department of Health's HIV Community Planning Group and the statewide transgender task force, the Community Health Research Initiative of the Virginia Commonwealth University conducted a series of in-person interviews with self-identified transgender participants 18 years or older. The purpose of the interviews which took place from September 2005 through June 2006 was to assess gender-based victimization and frequency suicide attempts during high school. Suicide attempt was assessed by asking "Have you ever tried to kill yourself or commit suicide". Only 290 transgender individuals out of the 350 (147 TF & 81 TM) surveyed experienced gender-based victimization and of the 290 participants, those aged 45 or younger were reported to have much higher rates of suicide compared to those aged 45 and older (20).

Additional data are available from the 2008 cross-sectional National Transgender Discrimination Survey that was conducted over a period of 6 months across all 50 states (21). This survey utilized a convenience sample of self-identified transgender individuals who completed a 20-minute online questionnaire. The researchers found that those who were 45 years or younger had higher odds of ever attempting a suicide compared to those who were older (21).

Our results with respect observed TM/TF differences are more consistent with the previous literature. A secondary analysis of a 2003 cross-sectional Internet-based health assessment of transgender adults living in the United States examined data on 1229 survey respondents. The participants were recruited through advertisements that were posted in the transgender communities' websites and listservs. Suicide attempt was assessed by asking "Have you ever attempted suicide (tried to kill yourself)?" and "How long ago was the last time you attempted suicide (tried to kill yourself)?" The study

found that 53.2 % of TM adults accounted for lifetime attempted suicide compared to 46.8% TF adults (10).

Another study analyzing the data gathered by the National Center for Transgender Equality and the National Gay and Lesbian Task Force in 2008 also aimed to identify factors associated with suicide among transgender and non-conforming adults. There were over 7,000 responses to the 70-question survey, which included a question "have you ever attempted suicide?". The researchers found that frequency of suicide attempts among TM respondents was slightly higher than that reported among TF participants, 46% compared to 42%, respectively (14).

In an earlier study conducted in 2004, transgender persons (125 TF and 28 TM) were recruited at a regional transgender support conference to determine prevalence of suicide (22). The participants responded to a 20-minute paper survey and were asked if they have ever attempted suicide to assess suicide attempts. TM subjects were found to have higher rates compared to TF with 41% of TM compared to 20% of TF reporting suicide attempt (22).

The racial/ethnic disparities in suicide attempts were reported in a previously discussed 2003 online survey of transgender adults (10). Similar results , were observed in another previously referenced study, a secondary analysis based on the national survey of transgender adults (14). A more recent, study also found a higher rate of suicide attempt among racial minorities compared to non-Hispanic Whites (20).

It is important to point out that direct comparisons of our findings to those reported elsewhere are difficult due to several notable methodological differences. First, the majority of available studies depended on self-referral, respondent-driven

recruitment, or used samples of convenience with variable response rates. By contrast our study was entirely EMR-based and relied on de-identified data that did not require participant opt-in. Second, while we used diagnostic codes for outcome ascertainment the preponderance of the available studies relied on self-report. Finally, and perhaps most importantly, unlike previous studies, which employed cross-sectional surveys, our study was based on longitudinal data and examined incidence rather than history of suicide attempts. For example, in the analysis of the association between age and suicide attempts, asking people of younger and older age groups about their lifetime experiences is very different from comparing these same age groups with respect to their risks for future events.

Perhaps the most important limitation of our study is the use of self-inflicted injuries as surrogate for suicide attempts. Previous EMR-based studies addressing this issue in predominantly cis-gender populations used more sophisticated algorithms that not only included self-inflicted injuries but also combined data on suicidal ideation with information on any type of injury to more fully ascertain events consistent with suicide attempts. Unfortunately, the data collected for the purposes of this present analyses did not include information on injuries that were not specified as self-inflicted.

It is expected that transgender people who receive appropriate gender affirmation treatment may experience improvement in their mental health status and the overall quality of life (23-27). It follows that persons who achieve greater congruence between their gender identity and appearance may also experience a reduction in suicide ideation and suicide attempts. Our study could not address this issue directly because the available data do not capture hormone therapy or surgical procedures received outside of the

participating health care systems. This restricts our ability to identify a subcategory of transgender cohort members with no history of transgender treatment of any kind. The broadening of coverage for gender affirmation services at KP occurred relatively recently. As the proportion of transgender people among KP enrollees has been increasing and many patients now initiate and receive gender affirmation therapy exclusively within the system, a number of additional analyses may be possible in the future.

We recognize that transgender people enrolled through integrated health care systems represent a cohort of persons with health insurance that may not be representative of the transgender population in the US. Moreover, the vast majority of the cohort members resided in California. It is expected that some of the results may differ among transgender people in different socioeconomic strata and geographic locations. Weighing against this concern is the demonstrated ability to cost-effectively identify and follow a large cohort of transgender subjects with a high degree of internal validity.

We conclude that rates of self-inflicted injuries consistent with suicide attempts differ in across subgroups of transgender people. The most powerful predictors of new events are poor mental health status at baseline and past history of suicide attempts. We also found that younger transgender people and TM individuals may be at higher risk for suicide attempts compared to their respective counterparts independently of other demographic characteristics or mental health status. The finding that racial/ethnic and education-related disparities in suicide attempts are more evident among TF than among TM individuals requires confirmation, and if confirmed, further exploration to understand the underlying mechanisms. Future studies should investigate the impact of gender

affirming therapy and the influence of specific mental health diagnoses on the risk for suicide attempts. These data will be important for risk stratification and for the development and implementation of interventions aimed at preventing suicide among transgender people.

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TABLES

Table 1: ICD – 9 and ICD – 10 Codes for Suicide Attempt

Diagnosis Category	ICD-9 Code	ICD-10 code
Self-inflicted injury[a]	E95.x, E98.x	T14.92, T36.xX2 - T63.xX2, T37.92X, T38.8x2, T38.9x2, T39.0x2, T39.3x2, T39.92X, T40.6x2, T40.9x2, T41.2x2, T42.72X, T43.0x2, T43.2x2, T43.5x2, T42.6x2, T43.92X, T44.9x2, T45.5x2, T45.6x2, T45.92X, T46.9x2, T47.92X, T48.2x2, T48.9x2, T49.92X, T50.9x2, T50, Ax2, T50.Bx2, T50.Zx2, T51.92X-T54.92X, T56.8x2, T56.92X-T58.92X, T60.x2X, T59.8x2, T61.x2X, T61.7x2, T61.92X, T62.92X, T63.0x2, T63.1x2, T63.3x2-T63.8x2, T63.92X, T64.x2X, T65.xX2, T65.2x2, T65.2x2, T65.92X, T71.1x2, T71.2x2, X71.x-X83.x

[a] Includes possible self-inflicted injury and self-inflicted poisoning

Table 2: Selected Characteristics of TM and TF study participants from 2006 – 2016

Participant characteristics	TM (N=2875)				TF (N=3452)			
	Suicide Attempt[a]		No Attempt		Suicide Attempt[a]		No Attempt	
	n	%	n	%	n	%	n	%
Age								
0 - 20	146	64.6	864	32.6	67	41.4	764	23.2
21 - 40	64	28.3	1310	49.5	57	35.2	1230	37.4
41 +	16	7.1	475	17.9	38	23.5	1296	39.4
Race/Ethnicity								
Hispanic	52	23.0	445	16.8	32	19.8	672	20.4
Non-Hispanic Black	27	12.0	227	8.6	17	10.5	224	6.8
Non-Hispanic White	124	54.9	1539	58.1	97	59.9	1725	52.4
Other/Unknown	23	10.2	438	16.5	16	9.9	669	20.3
Area-based education level								
Less than 30%	91	40.3	1099	41.5	55	34.0	1344	40.9
30-50%	75	33.2	899	33.9	62	38.3	1149	34.9
Greater than 50%	56	24.8	593	22.4	42	25.9	745	22.6
Count of Mental Health Diagnoses at baseline [c]								
0	16	7.1	1199	45.3	32	19.8	1700	51.7
1-2	107	47.4	1128	42.6	66	40.7	1253	38.1
2-7	103	45.6	322	12.2	64	39.5	337	10.2
History of suicide attempt at baseline[d]								
Yes	136	60.2	72	2.7	67	41.4	64	2.0
No	90	39.8	2577	97.3	95	58.6	3226	98.1
Total	226		2649		162		3290	

[a] Suicide attempt includes: "self-inflicted injury" "possibly self-inflicted injury" "self inflicted injury/poisoning

[b] Proportion of neighborhood residents with less than high school education; missing n=117

[c] Baseline refers to mental health diagnoses that occurred on or before index date

[d] Baseline refers to suicide attempt diagnosis that occurred on or before index date

Table 3. Multivariable analyses of suicide attempt rates: No interaction model

Participant characteristics	RR	95% CI
Gender Identity		
TF	1.0 (reference)	
TM	1.43	1.25, 1.64
Age (years)		
41 +	1.0 (reference)	
21 - 40	2.44	1.95, 3.06
0 - 20	2.12	1.70, 2.65
Race/ethnicity		
Non-Hispanic Whites	1.0 (reference)	
Non-Hispanic Blacks	1.05	0.84, 1.33
Hispanics	1.18	1.00, 1.39
Other/Unknown	0.82	0.65, 1.02
Area-based Education level		
Less than 30%	1.0 (reference)	
30-50%	0.80	0.67, 0.93
Greater than 50%	0.80	0.76, 1.07
Count of Mental Health Diagnoses		
0	1.0 (reference)	
1-2	2.12	1.66, 2.71
3-7	3.25	2.50, 4.21
History of Suicide attempt		
No	1.0 (reference)	
Yes	13.68	11.73, 15.97

Table 4. Multivariable analyses of suicide attempt rates: Stratified on gender identity

Participant characteristics	TM subjects		TF subjects	
	RR	95% CI	RR	95% CI
Age (years)				
41 +	1.0 (reference)		1.0 (reference)	
21 - 40	2.93	1.99, 4.31	2.36	1.75, 3.17
0 - 20	2.60	1.77, 3.80	2.01	1.49, 2.70
Race/ethnicity				
Non-Hispanic Whites	1.0 (reference)		1.0 (reference)	
Non-Hispanic Blacks	1.43	1.08, 1.90	0.74	0.49, 1.12
Hispanics	2.05	1.16, 3.61	0.54	0.24, 1.26
Other/Unknown	2.93	1.26, 3.61	0.40	0.11, 1.41
Education level				
Less than 30%	1.0 (reference)		1.0 (reference	
30-50%	0.68	0.56, 0.83	1.14	0.88, 1.48
Greater than 50%	0.47	0.32, 0.69	1.31	0.78, 2.20
Count of Mental Health Diagnoses				
0	1.0 (reference)		1.0 (reference)	
1-2	3.79	2.46, 5.83	1.46	1.06, 2.00
3-7	14.36	6.06, 34.03	2.13	1.13, 4.03
History of Suicide attempt				
No	1.0 (reference)		1.0 (reference)	
Yes	14.50	11.96, 17.59	11.89	9.20, 15.36