Letters

Temporal Trends in the Prevalence of Nonsuicidal Self-injury Among Sexual Minority and Heterosexual Youth From 2005 Through 2017

Nonsuicidal self-injury (NSSI) has received increasing attention in recent years as a clinically important phenomenon; it has been included in the *DSM-5* as a syndrome warranting further investigation. Sexual minority youth are particularly at risk for NSSI.[1] An important step toward addressing this issue is to characterize the prevalence of NSSI among these individuals. Additionally, data on temporal trends are needed to inform progress in addressing the stated need to eliminate health disparities among sexual minorities.[2] The current study presents the first (to my knowledge) population-representative analysis of temporal trends in NSSI among sexual minority and heterosexual youth over a 13-year period.

Methods | The Youth Risk Behavior Surveillance System obtains biannual data representative of students in grades 9 through 12 (with age group ranging from 12 years and younger to 18 years and older).[3] Data were drawn from the Massachusetts Youth Risk Behavior Surveillance System for 2005 to 2017. Massachusetts was the first state to assess sexual orientation and started assessing NSSI in 2005.

This study used publicly available secondary data and was exempt from institutional review board review. The deidentified nature of the data rendered informed consent for the current study unnecessary.

Sexual orientation was assessed with an item of self-reported sexual identity and another of same-sex behavior. For sexual identity, respondents self-identifying as gay, lesbian, bisexual, and not sure were classified as sexual minorities based on identity. For same-sex behavior, respondents who had had same-sex partners in their lifetime were classified as sexual minorities based on behavior. Those who had had no sexual partners were excluded from analyses associated with sexual behavior. Respondents were asked a single item of past-12-month NSSI (ie, intentional self-harm without wanting to die).

The NSSI data were stratified by sexual orientation and weighted to obtain population-representative estimates. Joinpoint regression was conducted to quantify annual percent change with 95% CIs. Trends are presented as linear segments connected at the years (ie, joinpoints) when the slope of each trend changed significantly. If no significant change was observed, a straight line was fitted over the full period based on a simple loglinear model. These analyses were conducted separately for sexual identity and sexual behavior. Sensitivity analysis was conducted in the first case, excluding respondents unsure of their sexual identity. All tests of significance were evaluated using .05-level 2-sided tests. All analy-

Table 1. Twelve-Month Prevalence of Nonsuicidal Self-injury Among Sexual Minority and Heterosexual Youth

Year	% (SE)		
	Sexual Minority Youth	Sexual Minority Youth, Excluding Those Reporting Unsure Status[a]	Heterosexual Youth
Sexual Identity			
2005	45.74 (3.96)	47.01 (5.08)	16.90 (0.95)
2007	46.15 (2.42)	49.56 (3.66)	14.70 (0.72)
2009	51.91 (3.65)	52.82 (4.22)	14.05 (0.57)
2011	49.46 (3.64)	52.97 (4.32)	14.68 (0.69)
2013	40.82 (3.15)	46.96 (3.53)	12.10 (0.77)
2015	45.74 (2.94)	49.65 (3.89)	14.45 (0.80)
2017	38.04 (2.89)	40.16 (3.68)	10.79 (0.63)
Sexual Behavior			
2005	48.84 (5.28)	NA	20.41 (1.58)
2007	42.72 (3.55)	NA	17.84 (0.94)
2009	41.87 (3.27)	NA	18.11 (1.00)
2011	49.51 (4.39)	NA	17.87 (0.99)
2013	42.66 (4.51)	NA	15.03 (1.26)
2015	49.47 (4.19)	NA	18.48 (1.34)
2017	40.73 (3.45)	NA	15.27 (1.00)

Abbreviation: NA, not applicable.

[a] Sexual minorities included youth who self-identified as lesbian, gay, and bisexual; those unsure of their sexual identity were excluded.

ses were conducted with Joinpoint Regression 4.7.0.0 (National Cancer Institute). Data analysis was completed in January 2019.

Results | **Table 1** presents NSSI prevalence rates from 2005 to 2017, stratified by sexual identity and sexual behavior. The unweighted number of participants was 21 213. The NSSI prevalence rates ranged from 10.79% (SE, 0.63%) to 20.41% (SE, 1.58%) among heterosexual youth and from 38.04% (SE, 2.89) to 52.97% (SE, 4.32%) among sexual minority youth across the study period.

When sexual orientation was based on sexual identity, a significant decrease in NSSI was observed across this period for heterosexual youth (annual percentage change, −2.51 [95% CI, −4.75 to −0.21]; *P* = .04) but not for sexual minority youth (**Table 2**). In a sensitivity analysis excluding respondents unsure of their sexual identity, the trend for sexual minorities remained nonsignificant. When sexual orientation was based on sexual behavior, a similar pattern of results was obtained, but no significant changes over time in any group were noted.

Discussion | The NSSI prevalence rates ranged from 11% to 20% among heterosexual youth and 38% to 53% among sexual minority youth across the same period. Given that single-item measures of NSSI have been found to yield lower prevalence estimates,[4] it is possible that the actual rates may be even

Table 2. Annual Percentage Change in 12-Month Prevalence of Nonsuicidal Self-injury Among Sexual Minority and Heterosexual Youth (2005-2017)

Sexual Orientation	Parameter Estimate	Annual Percentage Change (95% CI)	P Value
Sexual identity			
Sexual minority youth	−0.01	−1.33 (−3.52 to −0.92)	.19
Sexual minority youth, excluding unsure youth[a]	−0.01	−1.11 (−3.26 to 1.10)	.25
Heterosexual youth	−0.03	−2.51 (−4.75 to −0.21)	.04
Sexual behavior			
Sexual minority youth	<−0.01	−0.20 (−2.54 to 2.19)	.84
Heterosexual youth	−0.02	−1.57 (−3.39 to 0.28)	.08

[a] Sexual minorities included youth who self-identified as lesbian, gay, and bisexual; those unsure of their sexual identity were excluded.

higher. Although the current study found a decline in NSSI among heterosexual youth since 2005, prevalence rates were nonetheless generally high across all years. Furthermore, among sexual minority peers, the rates have remained largely unchanged, suggesting that disparities in NSSI rates in sexual minority youth populations have not improved over the last 13 years. The absence of a decline in NSSI prevalence among sexual minority youth across this time period is all the more striking given that the very high rates of NSSI allow for more potential room for improvement. Collectively, these findings indicate that there remains much opportunity for progress in addressing this public health concern. The need for progress in this area is all the more pressing when the potential long-term mental health outcomes of adolescent NSSI are considered.[5]

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Defining Target Vancomycin Trough Concentrations for Treating *Staphylococcus aureus* Infection in Infants Aged 0 to 90 Days

Target trough concentrations for vancomycin hydrochloride therapy in infants younger than 90 days are poorly defined. In adults, the pharmacodynamic target for *Staphylococcus aureus* correlates with the ratio of the area under the concentration-time curve over a 24-hour period (AUC_{24}) to the minimum inhibitory concentration (MIC) of the bacteria exceeding 400 (ie, $AUC_{24}/MIC>400$).[1,2] There are no widely available AUC calculators that we know of for use in infants younger than 90 days to enable clinicians to determine the AUC_{24} at steady state (approximately 48 hours) based on a trough concentration. We developed a population-based pharmacokinetic model to determine the association between serum trough vancomycin concentrations and AUC_{24}.

Methods | Data were collected from 104 young infants enrolled in a randomized clinical trial of vancomycin between September 1, 2014, and December 31, 2017.[4] Data were analyzed using nonlinear mixed-effect modeling (NONMEM version 7; ICON plc) interfaced with PLT tools from September 1, 2018, to December 31, 2018. The first-order conditional estimation method with interaction was used. The covariates of weight, sex, serum creatinine concentration, and albumin level were added in a stepwise manner to the model. Model accuracy was assessed using goodness-of-fit plots and a visual predictive check. The study was approved by the Royal Children's Hospital Melbourne Human Research Ethics Committee (HREC 34030) and the South Eastern Sydney Local Health District Human Research Ethics Committee (SSA 16/G/335), and parents provided written informed consent to have blood samples taken.

Simulations were performed using Matlab version 9.1.0.441655 (R2016b) (MathWorks). Covariates from a separate database of 1400 infants admitted to the same hospital over an 18-month period aged 0 to 90 days with normal serum creatinine values were used to generate virtual patients. Institutional review board approval was not needed for this cohort because the data were deidentified. Simulations were stratified to generate 1000 concentration-time profiles for each dosage interval based on the British National Formulary for Children guideline.