A Contemporary Examination of First and Second Permanent Molar Emergence

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Abstract

The emergence of first permanent molars (FPMs) and second permanent molars (SPMs) is an important developmental milestone influencing caries risk and the timing of sealant placement. Emergence times have been shown to vary by sex and race/ethnicity, while recent reports suggest a positive association with adiposity. Amid the changing demographics of the US population and the rising rates of pediatric overweight/obesity, we sought to examine the association of body mass index (BMI) with FPM/SPM emergence in a representative sample of US children and adolescents. We used cross-sectional data from 3 consecutive cycles of the National Health and Nutrition Examination Survey (2009 to 2014). The FPM analysis included ages 4 to 8 y ($n = 3,102$ representing ~20 million children), and the SPM analysis included ages 9 to 13 y ($n = 2,774$ representing ~19 million children/adolescents). The Centers for Disease Control and Prevention's growth chart data were used to calculate age- and sex-specific BMI percentiles, as measures of adiposity. Initial data analyses relied on descriptive statistics and stratified analyses. We used multivariate methods, including survey linear and ordinal logistic regression and marginal effects estimation to quantify the association between pediatric overweight/obesity and FPM/SPM emergence, adjusting for age, sex, and race/ethnicity. Forty-eight percent of 6-y-olds and 98% of 8-y-olds had all FPMs emerged, whereas SPM emergence varied more. Blacks (vs. whites) and females (vs. males) experienced earlier emergence of FPMs and SPMs. Overweight/obesity was associated with earlier FPM emergence, particularly among black females. Obesity but not overweight was associated with earlier SPM emergence. Overall, overweight/obesity accounted for 6 to 12 mo of dental acceleration. This study's results emanate from the most recent US-representative data and affirm that FPM/SPM emergence varies by race/ethnicity and sex and is positively influenced by BMI. Future research should further elucidate these associations with detailed eruption data and examine the implications of this variation for clinical care.

Keywords: dental public health, obesity, pediatric dentistry, sealants, tooth development, caries risk

Introduction

The emergence of first permanent molars (FPMs) and second permanent molars (SPMs) is an important developmental milestone with important implications for the development of functional occlusion, dental caries risk, and the timing of sealant placement. Understandably, many population-based studies on the timing of permanent molar emergence in the United States have been connected to the evaluation of school-based and school-linked dental sealant programs. In such programs, there is well-documented variation in the timing of FPM/SPM emergence by race/ethnicity and sex. For example, Kuthy and Ashton (1989) examined the timing of eruption of FPMs and SPMs to better time sealant placement for 4,879 Ohio schoolchildren in grades 1 to 3, 6 to 8, and 11 from 1987 to 1988, finding that FPMs and SPMs both erupted earlier among females. Furthermore, black children had FPMs erupted at the same time as whites, but SPMs erupted earlier among blacks.

More recently, Phipps et al. (2013) examined the timing of emergence and the presence of caries lesions on FPMs among American Indian and Alaska Native schoolchildren, using Indian Health Service oral health surveillance data for 2011 to 2012. They found that 27% of kindergarten children already had all FPMs erupted. The greatest increase in erupted FPMs and dental caries experience occurred for children in the first grade, leading to the conclusion that a school-based sealant

program for American Indian and Alaska Native children should begin in kindergarten and continue into first grade. Both studies examined and reported emergence according to school grade rather than age, limiting the potential for inference regarding the latter.

Beyond racial and ethnic variation in tooth emergence, recent evidence suggests that increased adiposity, as measured by body mass index (BMI), is associated with dental acceleration and earlier tooth emergence (Hilgers et al. 2006; Weddell and Hartsfield 2011; Must et al. 2012). Dental acceleration is of special relevance because of the rising prevalence of overweight and obesity among children and adolescents in the

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A supplemental appendix to this article is available online.

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United States. For example, the most recent national data from the National Health and Nutrition Examination Survey (NHANES) for 2011 to 2012 indicate that 32% of those aged 2 to 19 were overweight or obese (Ogden et al. 2014). However, only a few studies have examined the relationship between high BMI and accelerated tooth emergence for US children and adolescents. One study (Hilgers et al. 2006) examined 105 children and adolescents (ages 8 to 15), finding that those overweight or obese experienced a mean dental acceleration of 1 y 5 mo $\pm$ 1 y 2 mo (henceforth, 1:5 $\pm$ 1:2). Similarly, a study of 257 Caucasians (ages 5 to 17.5) found emergence accelerated by 6 mo among overweight/obese versus healthy-weight participants (Weddell and Hartsfield 2011). More recently, Must et al. (2012) examined the association between obesity and total number of erupted teeth among those aged 5 to 14, using 2001 to 2006 NHANES data. Controlling for age, sex, and race/ethnicity, the authors found that obese children had 1.44 more teeth present than their healthy-weight peers; however, this study did not report sex or racial/ethnic variation nor differentiate primary versus permanent teeth.

In summary, there is evidence for age-, racial/ethnic- and sex-related variation in the timing of permanent molar emergence. There also is evidence for dental acceleration with increasing BMI; however, there are limited recent national-level data on the variability in FPM/SPM emergence and no report on the association of BMI with molar emergence. Considering the potential effects on permanent molar emergence from the changing racial and ethnic landscape and rising prevalence of pediatric overweight and obesity in the United States, we sought to examine the current variation in FPM/SPM emergence by age, sex, race/ethnicity, and BMI.

Methods and Materials

Data Source

This study was reviewed and exempted from a full committee review by the Institutional Review Board at the University of North Carolina at Chapel Hill. We used data from the 3 most recent cycles of the NHANES (2009 to 2010, 2011 to 2012, and 2013 to 2014). NHANES data, recommended survey methods, and analytic guidelines are freely accessible via the National Center for Health Statistics (<https://www.cdc.gov/nchs/nhanes/>). NHANES is based on a stratified multistage complex probability sample of the community-dwelling US population. Survey weights allow for generation of nationally representative estimates of the entire noninstitutionalized US population. The data are unique because of the availability of demographic, anthropometric, and dental clinical examination information. The use of ≥ 2 consecutive cycles of NHANES data is recommended to obtain statistically reliable estimates, especially when investigating outcomes within demographic subdomains.

Outcome Variables

The outcome variables were the counts of erupted maxillary and mandibular FPMs and SPMs. In the NHANES dental

examination, a tooth is identified as erupted when any part of the tooth has broken through the gingiva into the oral cavity. We present detailed findings for FPMs in the Results section. For parsimony, we present a summary of the results for SPMs, with detailed tables and figures provided in the online Appendix.

Independent Variables

Our explanatory variables included age, sex, race/ethnicity, and BMI. In the NHANES, age was measured in months, which we converted to a categorical age variable as follows. For the FPM sample, the age categories were 4 y (48 to 59 mo), 5 y (60 to 71 mo), 6 y (72 to 83 mo), 7 y (84 to 95 mo), and 8 y (96 to 107 mo). Similarly, in the SPM sample, age categories were as follows: 9 y (108 to 119 mo), 10 y (120 to 131 mo), 11 y (132 to 143 mo), 12 y (144 to 155 mo), and 13 y (156 to 167 mo).

The NHANES race and ethnicity variables included: 1) Mexican American, 2) other Hispanic, 3) non-Hispanic white, 4) non-Hispanic black, and 5) other (including Asian and multiracial individuals). Because of small numbers and the similar distribution of BMI and permanent molar counts, we combined Mexican American and other Hispanic into a single Hispanic category, resulting in a 4-category race/ethnicity variable.

BMI values were converted to standardized Z scores with reference to the Centers for Disease Control and Prevention's age- and sex-standardized growth charts for year 2000 with the "zanthro" program in Stata (Stata Corp; Vidmar 2004). The generation of a Z score was essential because the BMI for children and adolescents of different sexes and at different ages cannot be compared directly. These age- and sex-standardized Z scores were used to categorize subjects into the following 4 categories based on the Centers for Disease Control and Prevention's BMI percentiles: underweight (<5th percentile), normal weight (5th to <85th percentile), overweight (85th to <95th percentile), and obese (≥ 95 th percentile; Ogden et al. 2014).

Sample and Analytic Approach

Analyses were restricted to individuals with information on tooth presence and BMI. The youngest children with an erupted FPM and SPM were 4:8 and 8:3, respectively. Eighty-five percent of children had all 4 FPMs erupted by age 8:9. In contrast, only 75% of children had SPMs erupted by age 13:9. We used this information to define the upper and lower age limits for inclusion in the analytic sample and thus included children aged 4 to 8 y (48 to 107 mo) for the FPM analysis and aged 9 to 13 y (108 to 167 mo) for the SPM analysis.

Descriptive tabular and graphic methods were used to summarize and present the count of FPMs and SPMs, overall and stratified by type (mandibular vs. maxillary molars), age, sex, race/ethnicity, and BMI category. We used multivariate methods, including linear and ordinal logistic regression to determine the joint contribution of these factors to molar emergence. Initial analyses suggested similar results for the linear and ordinal regression models. Thus, we present the results from the linear regression models because those allowed for straightforward graphic representation of predictive marginal effects.

The number of FPMs and SPMs present (0 to 4) were modeled separately, adjusting for age, race/ethnicity, sex, and BMI.

Additional exploratory models were constructed for maxillary and mandibular FPMs and SPMs and to explore possible interactions between race/ethnicity and BMI categories. Inferences regarding the influence of BMI and race/ethnicity on eruption were based on predictive marginal effects (Graubard and Korn 1999) and 95% confidence interval (CI) estimation with Stata 14.2 (StataCorp LP). All analyses included appropriate survey weights to account for the complex survey design of the NHANES. This study conforms to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies. STROBE refers to an international collaborative initiative for “Strengthening the Reporting of Observational Studies in Epidemiology” (von Elm et al. 2007). STROBE guidelines are fast becoming recognized by biomedical journals as a way to better standardize the reporting of scientific research.

Results

Descriptive information of the analytical sample for FPMs and SPMs is presented in Table 1. Mean ages for the analytical sample for FPMs and SPMs were 6:5 and 11:5, respectively.

First Permanent Molars

About 48% of those at age 6 and 98% of those at age 8 had all FPMs present (Appendix Table 1). Females showed earlier emergence of ≥ 1 FPMs versus males by a month (6:8 vs. 6:9, respectively). Similarly, females experienced earlier emergence of all 4 FPMs versus males by a month (7:0 vs. 7:1). There was distinct racial and ethnic variation in FPM emergence (Fig. 1), with blacks followed by Asian/multiracial children experiencing earlier emergence than whites. Overweight and obese black and Hispanic females experienced earlier emergence of FPMs when compared with their peers, by approximately 6 mo (Fig. 2).

The multivariable models (Table 2) revealed trends similar to those observed in unadjusted analyses: blacks had significantly more FPMs present than whites; females had more FPMs erupted than males; and when compared with healthy and underweight children, those overweight (beta, 0.15; 95% CI, 0.02 to 0.28) and obese (beta, 0.26; 95% CI, 0.14 to 0.38) had more FPMs present. Fitted values from this multivariable model that controlled for age, sex, and race/ethnicity were used to generate Figure 3A, which shows that overweight and obese individuals had more erupted FPMs when compared with their healthy and underweight counterparts at any given age. Of note, we found no significant interaction between race/ethnicity and BMI categories in this multivariable model.

Sex-stratified analyses (Table 2) revealed that black race/ethnicity and obesity were positively associated with emergence among both sexes, but overweight was significantly associated with emergence only among females. When taken together, overweight and obese females showed accelerated FPM eruption versus males, wherein they had 3 FPMs present by age 6, as compared with 2 FPMs among males of the same age (Fig. 3B).

Table 1. Descriptive Statistics for the Analytic Samples Examining First and Second Permanent Molar Eruption: National Health and Nutrition Examination Survey (2009 to 2014).

	First Permanent Molar Sample		Second Permanent Molar Sample	
	n	% (Weighted)	n	% (Weighted)
Age, y (mo)				
4 (48 to 59)	651	21.6		
5 (60 to 71)	561	18.2		
6 (72 to 83)	647	19.5		
7 (84 to 95)	639	20.5		
8 (96 to 107)	604	20.2		
9 (108 to 119)			609	20.0
10 (120 to 131)			575	18.8
11 (132 to 143)			620	20.7
12 (144 to 155)			499	21.5
13 (156 to 167)			471	19.0
Sex				
Male	1,628	52.9	1,386	49.3
Female	1,474	47.1	1,388	50.7
Race/ethnicity				
NH Asian/multiracial	428	9.6	354	8.7
NH black	770	14.0	692	13.9
Hispanic	1,087	24.7	965	22.7
NH white	817	51.7	763	54.7
Body mass index				
Underweight	112	3.5	96	4.0
Healthy weight	2,021	67.5	1,599	60.0
Overweight	439	14.3	476	16.0
Obese	530	14.7	603	20.0
Analytic sample	3,102		2,774	
Represented US population	20,095,047		19,906,358	

NH, non-Hispanic.

Second Permanent Molars

We found similarities and differences between FPM and SPM emergence. The most notable difference was the larger variation in the eruption of SPMs versus FPMs (Appendix Fig. 1), wherein about 54% of 12-y-olds and 79% of 13-y-olds had all SPMs present (Appendix Table 1). In unadjusted analyses, SPMs erupted earlier on average by about 6 to 12 mo among those overweight/obese when compared with healthy/underweight individuals, particularly black females and Asian males (Appendix Fig. 2). Females exhibited earlier emergence of ≥ 1 SPMs versus males (12:3 vs. 12:5, respectively). Additionally, females experienced earlier emergence of all 4 SPMs versus males (12:8 vs. 12:6, respectively).

These associations persisted in multivariable analyses (Appendix Table 2), wherein 1) non-Hispanic blacks and Hispanics versus non-Hispanic whites, 2) females versus males, and 3) obese (beta, 0.44; 95% CI, 0.30 to 0.58) versus healthy/underweight experienced earlier SPM eruption. Similar to the FPM analysis, fitted values from the SPM multivariable model that controlled for age, sex, and race/ethnicity were used to generate Appendix Figure 3A, which shows that overweight and obese females generally experienced accelerated

Figure 1. Percentage of first permanent molars present by race/ethnicity and age among 4- to 8-y-olds in the United States: National Health and Nutrition Examination Survey (2009 to 2014).

Figure 2. Number (mean and 95% confidence intervals) of erupted first permanent molars among overweight/obese versus healthy/underweight children (4 to 8 y) by race/ethnicity and sex: National Health and Nutrition Examination Survey (2009 to 2014). NH, non-Hispanic.

eruption when compared with their healthy and underweight counterparts, with all 4 (vs. 3) FPMs present by age 13.

In the sex-stratified analysis, non-Hispanic black females and Hispanic males had more SPMs emerged at any given age. Obese males (beta, 0.31; 95% CI, 0.12 to 0.51) and obese females (beta, 0.59; 95% CI, 0.35 to 0.82) but not overweight individuals had more SPMs present, controlling for age and race/ethnicity. Furthermore, Appendix Figure 3B shows that overweight and obese females showed accelerated eruption,

wherein they had 3 SPMs present by age 12, as opposed to about 2 SPMs among males.

Discussion

To our knowledge, this is the only nationally representative study to report on the emergence times for FPMs and SPMs in the context of the current racial/ethnic, BMI, and sex makeup of the US pediatric population. In general, emergence of FPMs occurs over a more tightly defined time frame than SPMs, wherein emergence appears to be more widely distributed across the 5-y time frame examined in this study. Analogous to previous studies that have suggested race- and sex-related variation in tooth emergence (Demirjian and Levesque 1980; Kuthy and Ashton 1989), we found that non-Hispanic blacks experienced the earliest emergence and, in general, females exhibited earlier eruption of FPMs and SPMs when compared with males. In addition, Hispanic males (vs. non-Hispanic white males) experienced earlier emergence of SPMs.

Although confined by small sample sizes, previous studies have provided evidence linking obesity with dental acceleration (Kuthy and Ashton 1989; Hilgers et al. 2006; Must et al. 2012). Our study corroborates these observations with national-level evidence for overweight- and obesity-associated acceleration of FPM emergence and obesity-related acceleration of SPM emergence by 6 to 12 mo, as compared with those healthy and underweight in the pediatric population. The reasons for dental acceleration with increasing BMI are presently unknown. One theory is that tooth emergence has a documented association with physical growth and development (Hilgers et al. 2006). Therefore, high BMI-related dental acceleration may be attributable to the somatic growth-promoting effect of excess

adipose tissue, as ascertained by overweight and obesity. From a growth and development standpoint, accelerated permanent molar emergence may prompt clinicians to consider earlier evaluation for orthodontic treatment needs and may require altering of the time frame for growth modification (Ohm et al. 2002) and space maintenance (Hilgers et al. 2006).

Beyond its effects on growth and development, pediatric overweight- and obesity-related acceleration of FPM/SPM emergence may have important implications for dental caries

Table 2. Estimates of Association for Age, Race/Ethnicity, Sex, and BMI with the Number of First Permanent Molars (0 to 4) among Children Aged 4 to 8 y: National Health and Nutrition Examination Survey (2009 to 2014).

	Overall Model				Sex-Stratified Model: Males				Sex-Stratified Model: Females			
	Beta ^a	SE	95% CI	P Value	Beta ^b	SE	95% CI	P Value	Beta ^b	SE	95% CI	P Value
Child's age, y (mo), vs. 6 (72 to 83)												
4 (48 to 59)	-2.38	0.09	-2.57,-2.19	<0.0005	-2.13	0.14	-2.42,-1.84	<0.0005	-2.67	0.13	-2.93,-2.42	<0.0005
5 (60 to 71)	-1.79	0.13	-2.04,-1.54	<0.0005	-1.60	0.19	-2.0,-1.23	<0.0005	-2.01	0.16	-2.33,-1.69	<0.0005
7 (84 to 95)	1.32	0.12	1.08,1.56	<0.0005	1.54	0.17	1.20,1.87	<0.0005	1.07	0.14	0.79,1.35	<0.0005
8 (96 to 107)	1.57	0.10	1.38,1.76	<0.0005	1.84	0.14	1.56,2.13	<0.0005	1.23	0.13	0.97,1.49	<0.0005
Race/ethnicity vs. NH white												
Hispanic	0.05	0.05	-0.05,0.15	0.319	0.06	0.07	-0.07,0.20	0.362	0.03	0.07	-0.11,0.16	0.668
NH black	0.18	0.06	0.07,0.30	0.003	0.18	0.08	0.01,0.34	0.040	0.18	0.08	0.03,0.33	0.019
NH Asian/multiracial	0.08	0.08	-0.09,0.24	0.337	0.09	0.12	-0.15,0.34	0.444	0.08	0.08	-0.09,0.25	0.331
Female vs. male	0.16	0.05	0.06,0.26	0.003								
BMI vs. healthy/underweight												
Overweight	0.15	0.07	0.02,0.28	0.025	0.04	0.10	-0.16,0.23	0.711	0.28	0.07	0.15,0.42	<0.0005
Obese	0.26	0.06	0.14,0.38	<0.0005	0.20	0.08	0.04,0.35	0.015	0.32	0.07	0.18,0.46	<0.0005
Model R ²		0.73				0.72				0.74		
Analytic sample size, <i>n</i>		3,102				1,628				1,474		
Represented U.S. population size, <i>n</i>		20,095,047				10,620,404				9,474,643		

BMI, body mass index; CI, confidence interval; NH, non-Hispanic.

^aDerived from a multivariable linear regression model including terms for age, race/ethnicity, sex, and BMI.

^bDerived from multivariable linear regression models including terms for age, race/ethnicity, and BMI, stratified by sex.

risk. Previous research supports that teeth are at highest risk for dental caries in the first 2 to 3 y following their emergence (Ferreira Zandona et al. 2012; Carvalho et al. 2014). Because teeth are emerging earlier among the overweight and obese segment of the pediatric population, these children may be at risk for permanent molar caries lesion development earlier than their healthy and underweight peers. However, the relationship of pediatric overweight and obesity with dental caries is not straightforward. A systematic review found that obese children from industrialized (but not from newly industrialized) countries are at increased risk for caries (Hayden et al. 2013), whereas another systematic review suggested that both high and low BMI may be associated with caries in children and adolescents (Hooley et al. 2012). Furthermore, at least 1 study proposed that overweight and obesity may have a protective effect on an individual's risk for developing caries (Sánchez-Pérez et al. 2010).

Notwithstanding the equivocal evidence related to caries risk among those overweight and obese, this growing segment of the pediatric population may necessitate clinicians and public health practitioners to reexamine their assumptions regarding the eruption timing of "6-y molars" and "12-y molars."

Figure 3. Model-predicted number of erupted first permanent molars for healthy/underweight and overweight/obese children aged 4 to 8 y: National Health and Nutrition Examination Survey (2009 to 2014). The multivariable linear regression models included terms for age, sex, race/ethnicity, and body mass index category.

From an individual clinician's perspective, this may entail an expectation to seal FPMs and SPMs at an earlier age for those overweight and obese, particularly if the patient is female and non-Hispanic black (for FPMs) or female and non-Hispanic black/Hispanic (for SPMs).

From a public health perspective, overweight- and obesity-related dental acceleration can have important implications for school-based sealant programs. School sealant programs (using resin-based dental sealants) can achieve caries reductions of 87% at 12 mo and 60% at 48 to 54 mo after sealant placement (Gooch et al. 2009). Furthermore, such programs are a cost-effective vehicle for providing sealants for children attending “high risk” schools—defined as schools with half or more students eligible for the US Department of Agriculture’s free- and reduced-price lunch program (Griffin et al. 2016). The key issue in these programs is to identify the grades when most children have newly erupted FPMs and SPMs to benefit from sealant placement. To maximize the number of children who can benefit from school-based sealant programs, public health personnel and school administrators are pressed to adopt the conventional or “average” approach of identifying the grades when the maximum number of children have FPMs and SPMs available to benefit from sealants. For this reason, historically, sealant programs target the second grade (ages 7 to 8) for sealing FPMs and sixth grade (ages 11 to 12) for sealing SPMs (Association of State and Territorial Directors Best Practices Committee 2014). However, age at entry into the school system is uneven, and our results suggest that children with accelerated dental development may have newly erupted and thus vulnerable teeth present for up to 12 mo before sealant placement is conventionally planned.

Siegal and Detty (2010) examined whether school programs provide sealants to those most in need of them, and they found that targeting sealant programs to “high risk” schools was successful in reaching children at high caries risk. Our analyses suggest that for schools with high prevalence of overweight and obesity and/or majority non-Hispanic black students, targeting first grade or even kindergarten for FPMs may be prudent. For SPMs, our analyses indicate wider variability in emergence of SPMs versus FPMs, in addition to accelerated emergence among non-Hispanic blacks and Hispanics and those overweight and obese. Given these findings, administrators of school-based sealant programs may wish to consider different strategies than targeting only 2 grades (i.e., second and sixth) for initial placement of sealants on FPMs and SPMs.

Public health programs, such as school sealant programs, aim to maximize the use of available resources by optimizing the ratio of population benefit over operational costs. As opposed to adopting a one-size-fits-all strategy, our proposed, more nuanced approach of tailoring public health strategies (i.e., a school sealant program) is aligned with the marriage of personalized or precision dentistry (Divaris 2017) and precision public health (Khouri et al. 2016). Currently, there is an imperative for paralleling the progress in the burgeoning field of personalized or precision medicine to move public health toward precision public health. We argue that this approach is needed because the conventional public health approach does not capture the increasing variability in populations being identified in this era of precision medicine.

Tooth emergence is a complex process influenced by various factors, including genetics, nutrition, preterm birth,

craniofacial morphology, and hormones (Almonaitiene et al. 2010). We were unable to account for these factors in this analysis. Moreover, BMI is not a direct measure of adiposity, but there is consensus that it is a “reasonable” measure of adiposity in the pediatric population (Dietz and Bellizzi 1999). Finally, we acknowledge that the definition of tooth eruption used in NHANES does not coincide with the optimal timing of sealants placement, with the latter being typically closer to the stage of complete molar eruption versus initial, even partial, emergence. In spite of these limitations, our findings have merit because they rely on the most recent, nationally representative data and illustrate meaningful differences in chronologic age for FPM and SPM emergence. Clearly, more research is needed to disentangle the issues of emergence, full eruption, and the caries risk of these cornerstone teeth. While serving as a point of departure for future research, our findings underscore that accelerated dental development among the US pediatric population is a real phenomenon with implications for clinical and dental public health practice.

Author Contributions

B.T. Pahel, contributed to conception, design, data acquisition, analysis, and interpretation, drafted and critically revised the manuscript; W.F. Vann Jr, R.G. Rozier, contributed to conception, design, and data interpretation, critically revised the manuscript; K. Divaris, contributed to conception, design, data analysis, and interpretation, critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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