Time since Last Dental Clinic Visit and Self-Reported Health among the Elderly

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Abstract

Background. This study determined the association between time since last dental clinic visit and self-reported health among the elderly (age ≥ 65 years).

Methods. Data were from the 2010 Behavioral Risk Factor Surveillance System. A logistic regression analysis was conducted to identify factors that affect the self-reported general health of the elderly. Additionally, a negative binomial regression analysis was conducted to explore the association of time since last dental clinic visit and the self-reported number of physically unhealthy, mentally unhealthy, and sad days during the past 30 days.

Results. Six predictors were identified affecting the self-reported general health of the elderly. Respondents were more likely to self-report "good, very good, or excellent" general health if they: visited the dental clinic within the past year, were non-Hispanic, had healthcare coverage, had fewer permanent teeth removed, received better education and were younger. A larger lapse of time since respondents' last dental clinic visits was associated with increased number of mentally and physically unhealthy days and an increased number of sad days during the past 30 days.

Conclusions. The positive association between better general health, fewer mentally and physically unhealthy days, and fewer sad days during the past 30 days and shorter periods of time between dental visits warrants further investigation to determine a possible causal relationship between overall health and dental visits.

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Introduction

The American Dental Association (ADA) recommends individuals visit a dentist regularly for an exam and professional teeth cleaning to avoid oral health problems.[1] Professional oral health-care is effective in reducing the number of oropharyngeal bacteria and preventing respiratory infection.[2,3] Though oral health related problems usually are not associated with mortality, there are more than 8,000 oral-cancer related deaths in the United States each year, and the elderly (those ≥ 65 years) account for more than half of those deaths.[4]

Tooth loss is a nuisance and health hazard for the elderly.[5] Twenty-five to 52.5% of the elderly have lost all of their teeth.[6,7] Tooth loss has many complications including mouth dryness, bleeding gums, social embarrassment,[8,9] eating problems, oral pain,[10] and nutritional deficit[11,12]. Elderly individuals with complete tooth loss are less likely to consume at least 400 grams of fruit and vegetables, which contributes to an increased risk of chronic disease and obesity.[13,14] Those with 20 or more remaining teeth tend to be more active in leisure sports and travel compared to those

with fewer than 20 remaining teeth.[15] Moreover, oral problems are associated with depression among the elderly.[16]

Although poor oral health and tooth loss have negative consequences on the self-reported quality of health for the elderly, the effect of time since their last dental clinic visit has not been explored sufficiently. In this study, the association between time since participants' last dental clinic visit was analyzed with self-reported health and the number of physically unhealthy, mentally healthy, and "sad, blue or depressed" days during the past 30 days.

Methods

Participants. The data in this study were from the 2010 Behavioral Risk Factor Surveillance System (BRFSS). Eligible participants included those who were 18 years or older, had a land-based telephone line, and did not live in an institution such as a nursing home. The population of interest in our study was the elderly (ages 65 years and older). Respondents whose reported ages were *"do not know/not sure"* or *"refused"* were excluded from this study.

Instrument. The BRFSS survey was designed to collect data regarding health risk behaviors, preventive health behaviors, and access to healthcare relating to chronic diseases and injury. It is a cross-sectional, random-digit dialed telephone survey facilitated by the Centers for Disease Control and Prevention (CDC) in collaboration with state health departments. The core module is a standard set of questions for all states. It includes questions about current health-related perceptions, conditions, and behaviors. This study utilized the oral health module, which belongs to the core module domain. The questionnaire was available in English and Spanish. Cellular telephones were not included as part of the regular 2010 BRFSS survey.

Procedures. The BRFSS was administered to one adult per household. Participating states used a Computer-Assisted Telephone Interview (CATI) system to collect responses from individuals. The CDC used the Ci3 WinCATI software package to support the CATI programming and provided guidelines for the state coordinator or interview supervisor to train data collectors. Additionally, all BRFSS surveillance sites monitored the interviewers for quality control. The data were transmitted to the CDC for editing, processing, weighting, and analyzing. The Human Subjects Committee at the University of Kansas School of Medicine-Wichita approved this study.

Statistical analysis. All analyses were conducted using SAS for Windows version 9.3 (Cary, North Carolina). Frequencies and percentages were presented for categorical variables and means and standard deviations were presented for continuous variables.

Dependent variables (Outcomes). The dependent variables in this study were: (a) self-reported general health (*excellent, very good, good, fair, and poor*), (b) number of days physical health was not good during the past 30 days (*continuous variable*), (c) number of days mental health was not good during the past 30 days (*continuous variable*), and (d) number of sad, blue, or depressed days during the past 30 days (*continuous variable*). Responses to self-reported general health were stratified into a dichotomous variable ("*excellent, very good, or good*" or "*fair or poor*").

Independent variables (Predictors). There were six independent variables. The primary independent variable was "time since last dental clinic visit." Possible responses included: *within the past year, one year but less than two years ago, two years but less than five years ago, five or more years ago,* and *never.* Additional independent variables included ethnicity

(*Hispanic, non-Hispanic*), healthcare coverage (*yes, no*), number of permanent teeth removed (*none, 1 to 5, 6 or more*, and *all*), education, and age (*in years*). The four possible education responses included: *Did not graduate High School, Graduated from High School, Attended College or Technical School*, and *Graduated from College or Technical School*.

A logistic regression analysis was conducted to identify predictors for the perceived general health of the elderly. The selected factors included time since last dental clinic visit, ethnicity, and healthcare coverage, number of permanent teeth removed, education, and age. These six factors were selected specifically because they were the dental-related questions in the oral health core of the BRFSS.

A negative binomial regression analysis was conducted to determine the association between time since last dental clinic visit and the number of physically unhealthy days, mentally unhealthy days, and sad days during the past 30 days. The selection of variables included in the final logistic regression model was conducted in a stepwise fashion. Survey weight and strata were used in the statistical analysis to account for sampling bias. All statistical analyses were two-sided. A p-value ≤ 0.05 was considered significant.

Results

Of the 451,075 respondents to the 2010 BRFSS survey, 152,096 (34.0%) were 65 years or older. Among the elderly, more than half (57.4%) were female, most (92.6%) were non-Hispanic, and more than half (53.1%) attended or graduated from college or technical school (Table 1). The average age was 75 years. The majority (75.6%) of respondents reported having lost at least one permanent tooth. Additionally, 16.5% reported having lost all of their permanent teeth. Approximately two-thirds of respondents (67.5%) reported having visited a dental clinic within the last year.

Poor general health was reported more frequently by those who never visited a dental clinic (17%) than those who visited a dental clinic within the past year (5.6%; Table 2). A Chi-square analysis revealed a significant correlation between the self-reported general health and time since last dental clinic visit ($p < 0.0001$).

A logistic regression analysis was conducted to identify predictors affecting the self-reported general health. Six significant predictors are presented in Table 3. Respondents who visited a dental clinic within the last year had increased odds (odds ratio (OR) = 1.72, 95% confidence interval (CI) [1.50, 1.97]) of rating their general health as *"good, very good*, or *excellent"* than those who never visited a dental clinic.

There was a linear effect of "time since last dental clinic visit" on self-reported general health. Respondents were more likely to report their general health as being "*good,*" "*very good,*" or "*excellent*" with shorter periods of time between dental visits. Non-Hispanics had increased odds (OR = 2.02, 95% CI [1.92, 2.14]) to report their general health as being "*good,*" "*very good,*" or "*excellent*" compared to Hispanics. Respondents with healthcare coverage were more likely (OR = 1.14, 95% CI [1.04, 1.25]) to report their general health as "*good,*" "*very good,*" or "*excellent*" compared to those without healthcare coverage.

The fewer permanent teeth removed, the more likely the respondents' self-reported general health was "*good,*" "*very good,*" or "*excellent.*" The better education participants received, the more likely they self-reported general health as "*good,*" "*very good,*" or "*excellent.*" For every five years increase in age, respondents had decreased odds (OR = 0.92, 95% CI [0.91, 0.93]) to

report their general health as "*good, very good,* or *excellent*".

Among those who reportedly visited a dental clinic within the last year, the average number of self-reported physically unhealthy, mentally unhealthy, and sad days during the past 30 days were 4.6, 2.0, and 2.0 days, respectively (Figure 1). Additionally, respondents who reportedly never visited a dental clinic, the average number of self-reported physically unhealthy, mentally unhealthy, and sad days during the past 30 days were 7.6, 3.2, and 0.3 days, respectively. A negative binomial regression analysis revealed a significant overall association of time since the last dental clinic visit and the number of physically and mentally unhealthy and sad days during the past 30 days ($p < 0.001$ for all three outcomes).

Table 1. Demographic characteristics (N = 152,096).

	Frequency	Percent	Weighted Percent*
Sex			
Male	54044	35.5	42.6
Female	98052	64.5	57.4
Race			
White	1391	67.1	65.2
Black or African American	165	8.0	11.6
Asian	119	5.7	3.1
Native Hawaiian or Other Pacific Islander	172	8.3	4.3
American Indian, Alaska Native	174	8.4	11.5
Other	51	2.5	4.4
Ethnicity			
Hispanic/Latino	6699	4.5	7.4
Not Hispanic/Latino	143910	95.6	92.6
Number of Permanent Teeth Removed			
1 to 5	49918	34.0	34.9
6 or more, but not all	34908	23.8	24.1
All	26821	18.3	16.5
None	34981	23.9	24.4
Education			
Did not graduate High School	20446	13.5	13.8
Graduated from High School	53414	35.3	33.1
Attended College or Technical School	36756	24.3	23.7
Graduated from College or Technical School	40844	27.0	29.4

*Percentages are calculated based on the sampling weight of survey items to correct for sampling bias.

Table 2. Time since last dental clinic visit and general health.

	Self-Reported General Health					
	Excellent	**Very Good**	**Good**	**Fair**	**Poor**	**P-value**
Time since Last Dental Clinic Visit						< 0.0001
Within the Past Year	14,074 (14.3%)	30,858 (31.4%)	32,900 (33.5%)	14,964 (15.2%)	5,457 (5.6%)	
Between 1 and 2 Years Ago	1,226 (9.2%)	3,167 (23.8%)	4,704 (35.3%)	2,876 (21.6%)	1,345 (10.1%)	
Between 2 and 5 Years Ago	1,004 (8%)	2,663 (21.3%)	4,365 (34.9%)	2,980 (23.8%)	1,494 (12%)	
5 or More Years Ago	1,628 (6.7%)	4,569 (18.9%)	7,824 (32.3%)	6,291 (26%)	3,921 (16.2%)	
Never	70 (7.1%)	161 (16.3%)	317 (32.1%)	273 (27.6%)	168 (17%)	

Table 3. Odds Ratios estimate of the self-reported general health as "*Good*", "*Very Good*," or "*Excellent*".

	Unadjusted OR [95% CI]	Adjusted OR [95% CI]
Time since Last Dental Clinic Visit		
Within the Past Year	3.07 [2.7,3.48]	1.72 [1.50,1.97]
Between 1 and 2 Years Ago	1.73 [1.52,1.98]	1.27 [1.10,1.46]
Between 2 and 5 Years Ago	1.45 [1.27,1.65]	1.15 [1.00,1.32]
5 or More Years Ago	1.11 [0.97,1.26]	1.04 [0.91,1.20]
Never	1	1
Ethnicity		
Non-Hispanic	2.58 [2.45,2.71]	2.02 [1.92,2.14]
Hispanic	1	1
Healthcare coverage		
Yes	1.58 [1.45,1.71]	1.14 [1.04,1.25]
No	1	1
Number of Permanent Teeth Removed		
None	3.66 [3.53,3.8]	1.98 [1.89,2.07]
1 To 5	2.7 [2.62,2.79]	1.57 [1.50,1.63]
6 or More	1.46 [1.41,1.5]	1.01 [0.97,1.05]
All	1	1
Education		
Did not graduate High School	1	1
Graduated High School	2.38 [2.3,2.46]	1.83 [1.77,1.90]
Attended College or Technical School	3.26 [3.14,3.38]	2.24 [2.15,2.33]
Graduated College or Technical School	5.56 [5.35,5.78]	3.21 [3.07,3.35]
Age (based on a five-year increment)	0.89 [0.89,0.9]	0.92 [0.91,0.93]

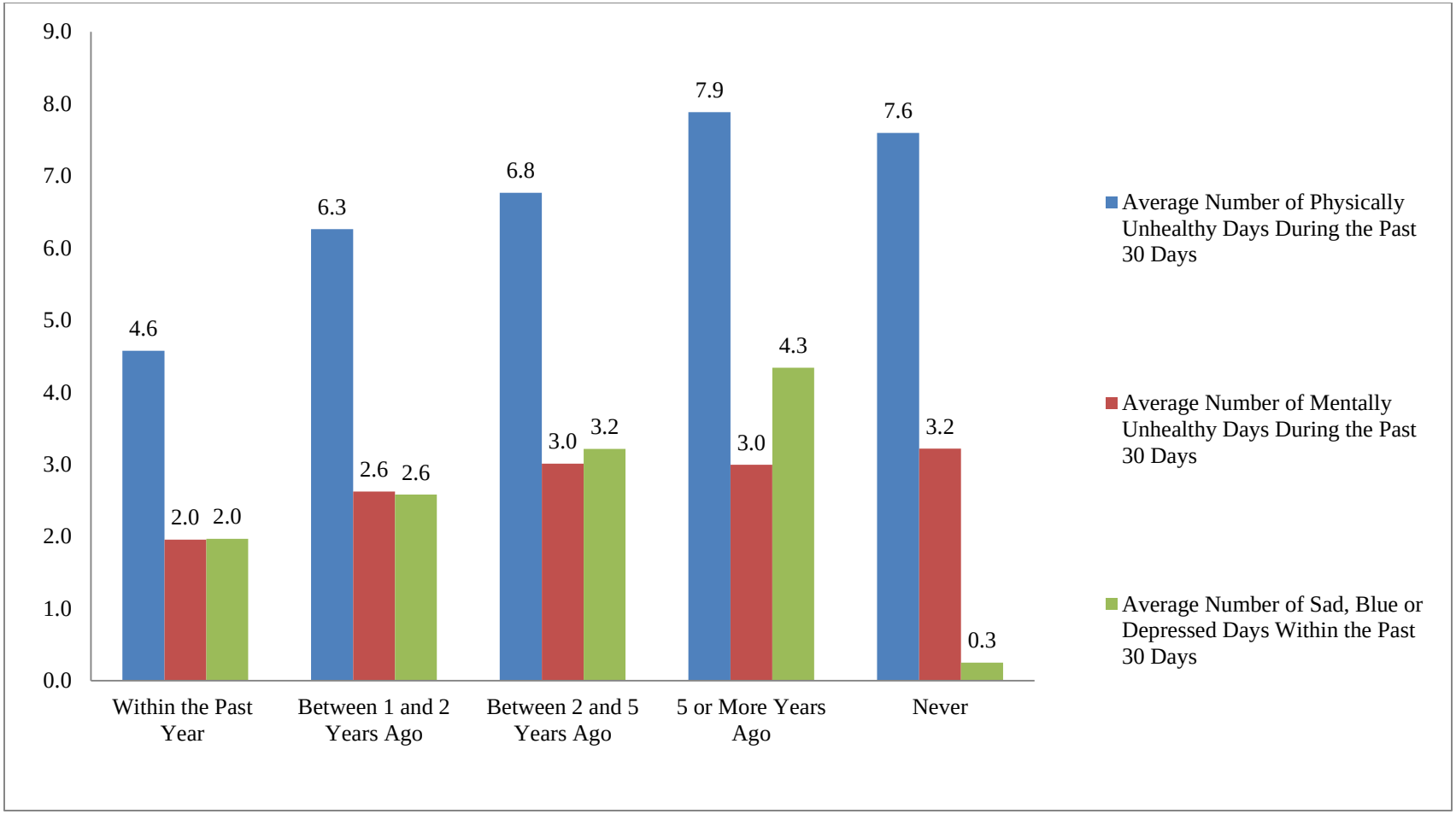

Figure 1. The average number of physically and mentally unhealthy and sad days within the past 30 days.

Discussion

A positive association was identified between shorter time period between dental clinic visits and fewer self-reported mentally and physically unhealthy days, and fewer sad days during the past 30 days. This study is unique in that no previous research systematically had explored the association between time since last dental clinic visits and self-reported mentally unhealthy, physically unhealthy, and sad days during the past month. Further, previous research suggested that tooth loss causes disorders in quality of life, including psychological discomfort, physical pain, psychological disability, physical disability, functional limitation, and social disability.[17]

Additionally, the current study suggests that "*good,*" "*very good,*" or "*excellent*" general health was associated with more frequent dental clinic visits, being non-Hispanic, having healthcare coverage, having fewer permanent teeth removed, having received better education, and being younger. Though many factors are associated with self-reported general health, this study concluded that more frequent dental clinic visits are associated with better self-reported general health. Non-Hispanics are more likely to report better general health compared to Hispanics.[18] Healthcare coverage is associated with regular dental clinic visits.[19-22] As respondents' age increases, a negative association exists with reporting their general health as "*good, very good,* or *excellent*".[23]

Limitations. This study has several limitations, one of which is self-reported data. The results were based on subjective responses from participants, which do not guarantee accuracy. However, this study was designed to identify individuals' perceptions of their health. As such, the self-reported nature of these data is appropriate. Second, respondents could experience survey fatigue as there were more than 200 items in the survey. This could lead to missing answers to survey items. Lastly, race was not included in the statistical analysis. The majority of respondents (98.6%) did not answer the race question in the BRFSS survey. However, the focus of our study was to determine the effect of time since last dental clinic visit on the general health, number of mentally unhealthy, physically unhealthy, and sad days during the past month.

Conclusions

A positive association was identified between a better self-reported general health, having fewer mentally and physically unhealthy days, and having fewer sad days during the past 30 days and shorter time period between dental clinic visits. Therefore, a recommendation for the elderly to seek regular dental care may be warranted, pending further research into the relationship between these five variables.

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Health Care Seeking and Risk Behaviors among High School Students in the Context of a School-Based Health Center

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Abstract

Background. To address adolescent health needs in urban Wyandotte County, Kansas, a school-based health center (SBHC) was opened in March 2012. Students were surveyed to inform SBHC operations.

Methods. All Wyandotte High School students were invited to complete an online survey in class in May 2012. Questions on demographics, health care seeking behaviors, behavioral risk factors, and missed school days were included.

Results. Of 1,240 eligible students, 398 responded (32.3%). Nearly half (45.8%) reported that the emergency room or hospital was the location where they usually would seek health care. Females were more likely than males to report less access to mental health counseling (15.1% vs 10.8%, $p = 0.01$) or reproductive health care (7.7% vs 5.7%, $p = 0.03$) when needed and were more likely to miss school due to a health problem (54.0% vs 37.9% missed ≥ 1 day in past 4 weeks, $p = 0.006$). Males were more likely to report having had sex (59.2% vs 46.9%, $p = 0.02$) while females were more likely to report never using a condom when having sex (30.6% vs 18.3%, $p = 0.001$). Almost two-thirds (61.9%) of respondents were aware of the SBHC; 18.7% had used the SBHC.

Conclusions. Students do not have adequate access to primary care, including sexual and mental health care. Using these data, the SBHC can be better adapted to meet student needs.

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Introduction

School-based health centers (SBHCs) are on-site health care facilities aimed at addressing the preventive, acute, and chronic health needs of students.[1] These centers are often a collaboration between schools and other community partners, including local/state health departments, hospitals, medical schools, and other community-based organizations. SBHCs are a rapidly-growing model of adolescent health care delivery in communities with historically inadequate access to care. In 1988, 120 SBHCs existed; by 2008, that number had climbed to over 1,900.[2] SBHCs are positioned to facilitate the coordination of comprehensive care for adolescents and meet the mental health and medical needs unique to this population.[3]

Over half of SBHCs are in urban settings. The National Assembly on School-Based Health Care (NASBHC) reported that students in schools with SBHCs are "predominantly members of minority and ethnic populations who have historically experienced under-insurance, uninsurance, or other healthcare access disparities".[2] Based on data from the 2007-2008 school year, 36.8% of the students served by SBHCs were Hispanic or Latino, 29.5% were white, and 26.2% were black. This

distribution also describes the demographics of adolescents in Wyandotte County, Kansas.[4]

In 2012, Wyandotte County was 97 out of the 100 ranked counties in the state of Kansas by the Kansas Health Institute, based on health outcomes (morbidity and mortality) as well as health factors (health behaviors, clinical care, socioeconomic factors, and physical environment).[5] Wyandotte County's population is predominantly urban,[4] with over 20% of households falling below the poverty line, compared to 12% for Kansas as a whole. Wyandotte County is undergoing drastic demographic changes as well. Between 1990 and 2011, the Hispanic population of Wyandotte County increased from under 7% to just over 26%.[4]

The adolescent population magnifies the differences between Wyandotte County and the rest of the state. Over 75% of children qualify for free and reduced lunches and 31% live below the poverty line, and 37% of Wyandotte County youth are Hispanic.[4] Adolescents in Wyandotte County have other risk factors contributing to adverse health outcomes; in 2011, Wyandotte County represented over 10% of all reported chlamydia cases in Kansas,[6] despite including only about 5% of the state's population.

In March 2012, a community partnership consisting of USD 500 (Kansas City, KS public schools), the University of Kansas (KU) School of Medicine, *A Better KCK*, Communities Creating Opportunities (CCO), and administrators and teachers at Wyandotte High School (WHS) was formed. The goal of this partnership was to address health issues in the adolescent population in the urban core of Kansas City, KS. The partnership conducted a needs assessment that showed far-reaching deficits in the accessibility, quality, and scope of the care that adolescents receive in Wyandotte County (unpublished data). Based on this needs assessment, a school-based health center, named BullDoc by the student body, was implemented and opened in the spring semester of 2012 at WHS. To evaluate the BullDoc pilot and capture data to inform any changes in clinic operation, a cross-sectional survey of students enrolled in WHS was conducted to document health-related behavior and health care access issues.

Methods

Participants. Wyandotte High School is one of four high schools in USD 500, the school district serving urban Kansas City, KS. BullDoc, the onsite SBHC at WHS, operates every Wednesday morning during the academic school year from 9:00 am to 12:30 pm and is staffed by volunteer KU medical students and family physicians. Students can access BullDoc through appointments or as walk-ins, as long as adequate parental consent (a completed clinic registration form) is on file. All students enrolled at WHS are eligible to attend the SBHC and were invited to participate in a survey assessing health-related issues in May 2012.

Instruments. WHS students were invited to complete an online survey assessing health care seeking behavior, basic health and nutrition practices, health-related reasons for missing school days, risk behaviors, and BullDoc awareness and utilization. The survey was based upon an existing, validated survey used to conduct the California Healthy Kids Survey in September 2011.[7]

To assess healthcare access and utilization, students were asked how often they seek medical attention, where they go for their medical care, when the last time they saw a doctor or dentist was, and whether or not specific types of health care (including counseling) were available when the student needed it. Students also were

asked how many days they missed school in the last four weeks due to health-related concerns: illness, stress, depression, family problems, alcohol use, and drug use. Questions included an assessment of health behaviors such as sexual activity, alcohol, tobacco, and drug use, and diet. Finally, students answered questions concerning BullDoc awareness, use, and desired clinic services. Demographics included sex, grade level, race, and ethnicity.

Procedure. The 32-question survey was anonymous and voluntary and was introduced by teachers in the classroom on May 1, 2012. Two weeks after the initial survey launch, on May 14, 2012, teachers were asked to provide one additional reminder to students to encourage them to complete the survey. Students, each of whom had their own laptop computer, were given the opportunity to complete the survey during their homeroom class. The survey was administered in May 2012, two months after the BullDoc SBHC was opened, and remained open for two weeks.

Data analysis. Data analysis was conducted using SAS (Version 9.3, Cary, NC). Response frequencies were summarized, and differences in proportions between sexes were accessed using a Chi-square test.

Results

Approximately 1,240 students were eligible and invited to complete the survey. Of these, 399 students responded to the survey (32.2%). Most surveys were completed fully and most questions were answered by at least 99% of respondents. A comparison of student respondent demographics and the total population of Wyandotte High School is shown in Table 1.

Table 1. Demographic characteristics of survey respondents, Wyandotte High School, 2012.

Characteristic	Number of Survey Responders (n, %)	p-value	Proportion of WHS student body*
Sex		0.004	
Male	159 (42.6)		50.0%
Female	214 (57.4)		50.0%
Grade Level		< 0.001	
Freshman	132 (35.2)		37.4%
Sophomore	89 (23.7)		26.3%
Junior	122 (32.5)		20.3%
Senior	32 (8.5)		16.0%
Ethnicity		0.213	
Not Hispanic	198 (53.2)		52.0%
Hispanic	174 (46.8)		48.0%
Race		< 0.001	
Black	98 (48.8)		N/A
White	33 (16.4)		
Asian	38 (18.9)		
Other	5 (2.5)		
Multi-race	27 (13.4)		

N/A = not available

*Based on published 2011 enrollment data.

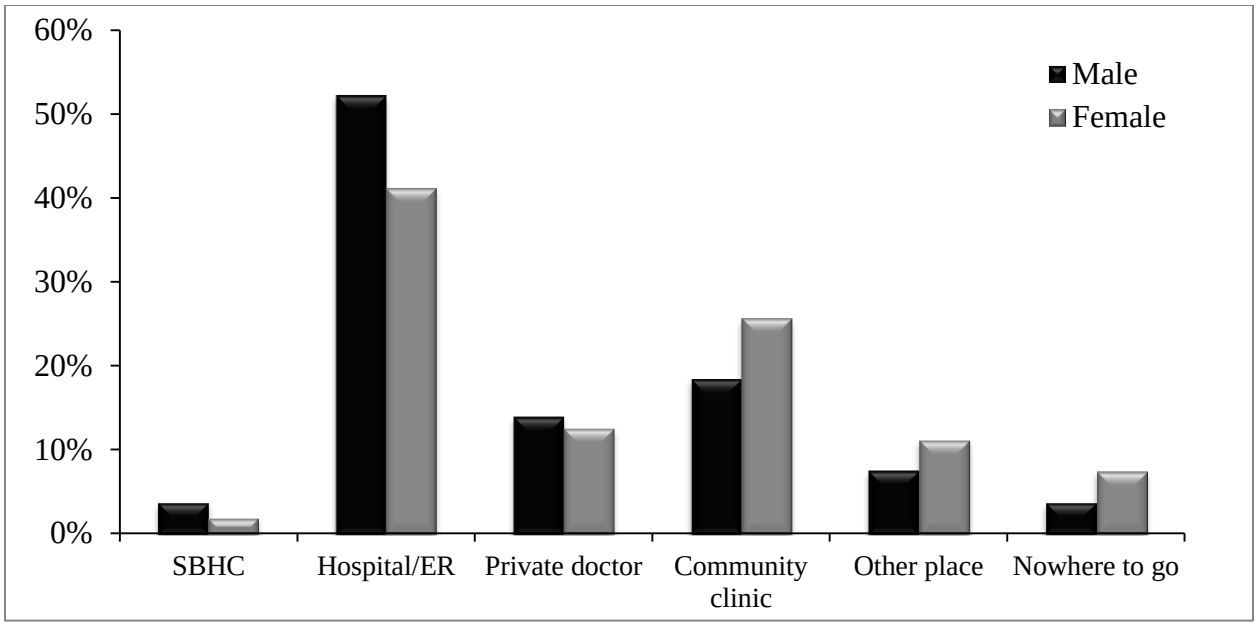


Figure 1. Usual location where students seek health care, Wyandotte High School, 2012.

Access to health care. Nearly half (45.8%) of respondents reported that the emergency room or hospital was the location where they would usually seek health care (Figure 1). The next most frequently reported venue for seeking health care was a community clinic (22.6%), followed by a private doctor (13.2%). While the vast majority of respondents reported having somewhere to access health care services, 5.9% reported having nowhere to go.

Overall, the distribution of health care seeking locations was similar between males and females ($p = 0.10$). Almost two-thirds (66.5%) of respondents reported that they had seen a doctor or nurse within the last year; 19.6% did not know the last time they had seen a doctor for any reason (Table 2). When asked about the last time they had seen a dentist, 53.2% of respondents reported a visit in the last year; 8.9% reported never having seen a dentist. Female respondents were more likely than males to report that mental health counseling was rarely available when they needed it (15.1% vs. 10.8%, respectively, $p = 0.01$). This was likewise true for reproductive health services.

School absence. Over half of all female respondents reported that they had missed at least one day of school in the past four weeks due to a health problem (e.g., cold/flu, illness, injury, toothache, stomachache, asthma) compared to 37.9% of male respondents ($p = 0.006$; Figure 2).

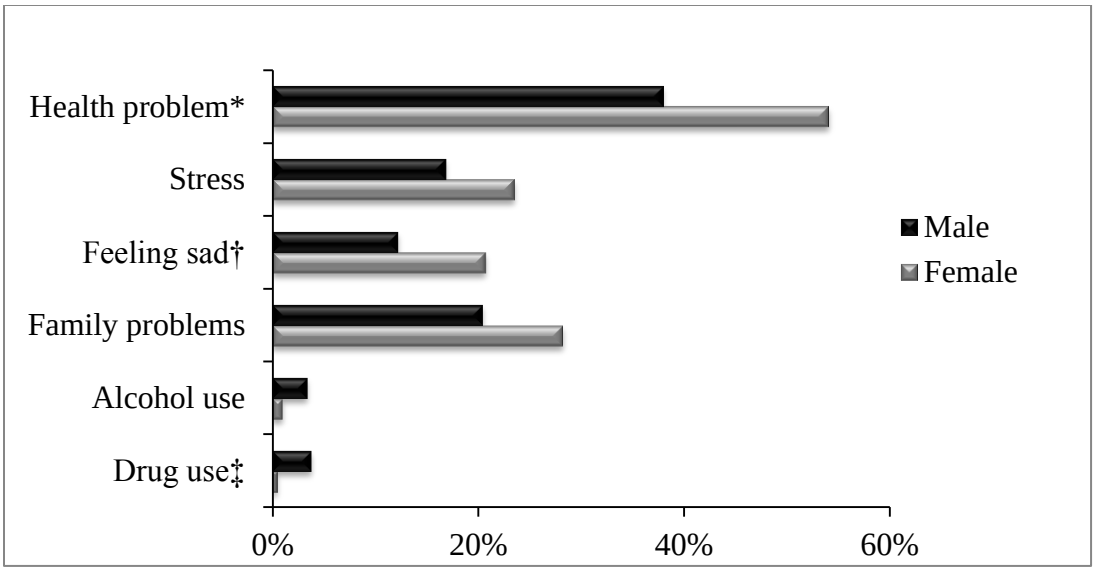
When asked how many days they missed due to stress, 75.1% responded that they had missed no days, 14.1% reported missing one to three days, and 5.4% reported missing four or more days. A similar distribution of missed school days due to feeling sad/depression and family problems was seen. Few respondents reported missing school due to alcohol or drug use.

Nutrition and food security. On the day the survey was completed, half of respondents reported that they had eaten breakfast that morning and half did not (Table 3). Over a quarter of respondents (28.4%) reported that they had at some time cut their meal size or skipped meals because there was not enough money for food.

Table 2. Health care seeking behaviors and SBHC awareness among Wyandotte High School students, 2012.

	Number of Survey Responders (n, %)			
	Males	**Females**	**Total**	**p-value**
Last time saw doctor for any reason				0.38
< 1 year	103 (64.8)	145 (67.8)	248 (66.5)	
1-2 years	16 (10.1)	26 (12.2)	42 (11.3)	
> 2 years	3 (1.9)	7 (3.3)	10 (2.7)	
Don't know	37 (23.3)	36 (16.8)	73 (19.6)	
Last time saw doctor for check-up				0.31
Never	8 (5.0)	13 (6.1)	21 (5.6)	
< 1 year	90 (56.6)	131 (61.2)	221 (59.3)	
1-2 years	28 (17.6)	24 (11.2)	52 (13.9)	
> 2 years	6 (3.8)	14 (6.5)	20 (5.4)	
Don't know	27 (17.0)	32 (15.0)	59 (15.8)	
Last time saw dentist				0.79
Never	14 (8.9)	20 (9.4)	34 (9.2)	
< 1 year	79 (50.0)	118 (55.7)	197 (53.2)	
1-2 years	30 (19.0)	34 (16.0)	64 (17.3)	
> 2 years	13 (8.2)	13 (6.1)	26 (7.0)	
Don't know	22 (13.9)	27 (12.7)	49 (13.2)	
Care rarely available when needed				
Medical care	30 (18.9)	36 (17.0)	66 (17.8)	0.18
Mental health counseling	17 (10.8)	32 (15.1)	49 (13.2)	0.01
Reproductive health	9 (5.7)	16 (7.7)	25 (6.8)	0.03
Help with diet/exercise	20 (12.6)	31 (14.8)	51 (13.8)	0.24
Dental care	23 (14.6)	26 (12.3)	49 (13.3)	0.14
Aware of SBHC (BullDoc) existence	96 (61.9)	132 (62.3)	228 (62.1)	0.95

Risk-taking behaviors. Male respondents were more likely to report ever having been sexually active than female students (59.2% vs 46.9%, respectively, p = 0.02; Table 3). Among those who had sex, only 28.6% of females reported always using a condom when they have sex, compared to 53.8% among males (p = 0.001); 30.6% of female respondents reported that they never used condoms during sex. Similarly, 43.9% of females reported using no contraceptive method the last time they had sex. Only 21.5% of males and 13.3% of females reported dual contraceptive methods, condoms and birth control, at the last sex event. Among sexually active females, 62.2% (61 of 98 respondents) reported that they had taken a pregnancy test at some point; 17.4% (17 of 98 respondents) reported having ever been pregnant. About two-thirds of respondents (65.8%) reported that they had never smoked cigarettes. Only 4.3% of respondents reported being regular smokers currently. When respondents were asked if they had any interest in changing any of their behaviors (e.g., behaviors related to sex, drugs, or drinking), 13.9% of students said yes. Many open-ended responses concerned a desire to change behaviors related to drugs or alcohol, despite a low proportion of respondents reporting use.



* p = 0.006; †Or depression; ‡ Other than alcohol

Figure 2. School absences (> 1 day) due to health-related issues or concerns among Wyandotte High School students, 2012.

Table 3. Health risk behaviors among Wyandotte High School students, 2012.

	Number of Survey Responders (n, %)*			
	Males	**Females**	**Total**	**p-value**
Ever had sex	93 (59.2)	98 (46.9)	191 (52.2)	0.02
Condom use during sex **				0.001
Never	17 (18.3)	30 (30.6)	47 (24.6)	
Rarely	10 (10.8)	7 (7.1)	17 (8.9)	
Sometimes	16 (17.2)	33 (33.7)	49 (25.7)	
Always	50 (53.8)	28 (28.6)	78 (40.8)	
Contraception use during last sex **				0.01
Nothing	22 (23.7)	43 (43.9)	65 (34.0)	
Condom only	45 (48.4)	31 (31.6)	76 (39.8)	
Birth control only	5 (5.4)	10 (10.2)	15 (7.9)	
Condom and birth control	20 (21.5)	13 (13.3)	33 (17.3)	
Pregnancy (females only)				N/A
Ever taken pregnancy test	N/A	61 (62.2)	N/A	
Ever been pregnant	N/A	17 (17.4)	N/A	
Nutrition				
Ate breakfast this morning	85 (54.1)	98 (46.2)	183 (49.6)	0.13
Meals cut or skipped due to financial concerns	44 (28.0)	61 (28.6)	105 (28.4)	0.89
Ever smoked cigarettes	58 (36.7)	72 (34.1)	130 (35.2)	0.93

* Totals were calculated from the overall number of subjects with available data (e.g., 366 men and women had sexual history data; 191 (52.2%) reported having ever had sex.

** Respondents reporting having had sex at least once (93 males, 98 females, 191 total).

Awareness and usage of BullDoc. At the time of survey administration, BullDoc had been operational only for about two months. Despite the short time frame, 61.9% of respondents stated that they were aware of BullDoc, the school-based health center at their high school. About one-fifth (18.7%) of student respondents stated that they had used the clinic for information or services; 23.1% stated they planned to use the clinic in the next six months, while 48.6% were not sure. Respondents generally reported positive associations with the presence of BullDoc (data not shown). Females (74.5%) and males (65.8%) agreed or strongly agreed with the statement "I like having it at my school" ($p = 0.02$).

Discussion

Students attending Wyandotte High School, an urban Kansas City school, reported sub-optimal access to care and several risk factors with the potential to impact their health. Almost half of the respondents reported that a tertiary care facility (emergency room or hospital) was their primary source of healthcare. Furthermore, females reported rarely receiving care they needed in areas such as reproduction and mental health.

After two short months of operation, a majority of respondents were aware of the BullDoc clinic at WHS. Almost one-third of respondents reported that they would like more information on BullDoc. Student reviews from other SBHCs illustrated that the health center in their schools filled a void where teenagers find it difficult to access medical care, that they trusted those who worked at the health center, and that their care left a lasting impression of prioritizing their health in the future.[8] Students at schools with SBHCs have greater improvement in their Health-Related Quality of Life (HRQOL) scores compared to students who do not.[9]

While survey participation was satisfactory, results may not represent the whole WHS student body and may not be generalizable to adolescents attending urban public high schools. However, nearly one-third of the school population responded to the survey in its entirety. Responses to some questions emphasized that the survey seemed to represent issues impacting students. For example, over 90% of WHS students qualify for free and reduced lunches, which could suggest that a significant portion of the school population suffers from food insecurity, although direct data are not available. About half of survey respondents reported that they did not eat breakfast and over a quarter reported missing a meal due to lack of food or money.

Respondents clearly noted a need for mental health care. The survey data, however, did not provide them an opportunity to describe issues in their lives that would lead to that need. It is important for clinicians to differentiate among needs for academic counseling, diet and exercise education, sexual health counseling, and drug and alcohol use counseling. To maintain a short survey length, however, only a small group of questions was asked. Nonetheless, even a short survey resulted in valuable insights into the health needs of WHS students. Students answered questions individually and anonymously, providing a unique insight into adolescent views on their own health.

Implications for School Health

WHS students demonstrated a clear lack of access to primary care and increased use of tertiary facilities like the emergency room, in contrast to a 2011 national CDC-sponsored health survey in which 74.9% of youths aged 12-17 responded that they had a doctor's office as a regular source of healthcare, 22.8% responded that they used

a clinic, and only 0.9% used an emergency room.[10] Recent research has described specific benefits of SBHCs for students. In schools with SBHCs, children with asthma are found to have fewer visits to the emergency department, fewer hospitalizations, and better school attendance.[11] SBHC users are also more likely to have more primary care physician visits than visits at other sites when compared to their counterparts who had never used an SBHC. Likewise, students attending an SBHC are more likely to have had an influenza vaccine, a tetanus booster, and a hepatitis B vaccination.[12]

SBHC availability has been associated with decreases in missed school days.[13] Half of female and 40% of male WHS respondents reported missing at least one day of school in the past four weeks due to a health- or family-related reasons, a concern that might be improved by an ongoing SBHC presence. The availability and use of mental health services also has been linked with a statistically significant increase in grade point average.[14] With such information, efforts can be made to advocate for additional resources to continue to serve an underserved adolescent population.

Another specific area of need identified through the survey and common throughout adolescence is sexual health. Many students reported being sexually active, but relatively few reported using adequate contraception or barrier protection to prevent pregnancy and sexually transmitted infections. The high proportion of sexually active females reporting no barrier or hormonal contraception, along with many females reporting having taken a pregnancy test suggested that programs targeted toward adolescent females would be of great importance, addressing a clear need for sexual health education.

Survey findings clearly show that adolescents at WHS, and likely in many urban high schools in Kansas City and across the county, need more access to primary, preventive health care, with an emphasis on sexual and mental health. All of these findings support the goal of school health. BullDoc should continue to address these areas and make efforts to improve and expand the availability of services.

Acknowledgement

This survey was conducted under the authority of the Principal of Wyandotte High School as an internal quality-improvement measure with agreement from USD 500 (Kansas City, KS, public schools), faculty in Family Medicine and Preventive Medicine at the University of Kansas (KU) School of Medicine, *A Better KCK*, Communities Creating Opportunities (CCO), and administrators and teachers at Wyandotte High School.

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*Keywords***:** school health services, reproductive health, sexually transmitted diseases, health services accessibility, healthcare quality, access, and evaluation

Atrial Flutter Converted to Sinus Rhythm by Adenosine Infusion

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Introduction

Atrial flutter (AF) is the reentrance of signals in the atria resulting in beating up to five times faster than normal (i.e., 240-400 bpm).[1] Common symptoms experienced during an episode of atrial flutter includes palpitations, dizziness, chest tightness, shortness of breath, and fatigue. To manage atrial flutter, four major concerns must be addressed: (1) reversion to normal sinus rhythm (NSR), (2) maintenance of NSR, (3) control of the ventricular rate, and (4) prevention of systemic embolization. Antiarrhythmic (AA) medications can be used to either ‘‘pharmacologically convert” a person to NSR or to maintain it following an external electrical cardioversion.[2]

Several medications are available for the treatment of atrial flutter including diltiazem, digoxin, and amiodarone. Adenosine, which is used for the treatment of paroxysmal supraventricular tachycardia (PSVT), is not indicated for the treatment of AF primarily due to its very short half-life.

We present a case of atrial flutter with rapid ventricular response, which was converted to NSR by administering a single dose of adenosine in a patient who underwent a surgical resection of cardiac leiomyosarcoma.

Case Report

A 51-year-old Caucasian male presented with abdominal pain and palpitations. On electrocardiogram, he had atrial fibrillation with a heart rate of 90 bpm. There was evidence of a large right atrial mass on 2-D echocardiogram. He was started on diltiazem infusion and rapidly converted to NSR. He also had tamponade and underwent pericardiocentesis successfully.

The patient was discharged home on diltiazem 120 mg daily then later readmitted to the hospital for surgical removal of the cardiac mass. The pathology was positive for leiomyosarcoma. Postoperatively (Day 0), he developed AF and was treated with amiodarone. On post-operative day 1, he developed another episode of rapid AF which was treated with digoxin. The next day, he had a third episode of AF with a rate of 114 bpm (Figure 1). The electro-cardiogram was misinterpreted as supra-ventricular tachycardia rather than atrial flutter with atrioventricular (AV) block. Adenosine 12 mg was administered intravenously resulting in atrioventricular block (Figure 2) followed by rapid conversion to NSR. An electrocardiogram taken about 15 minutes after adenosine infusion showed a NSR (Figure 3).

Figure 1. Atrial flutter with a rapid ventricular response.

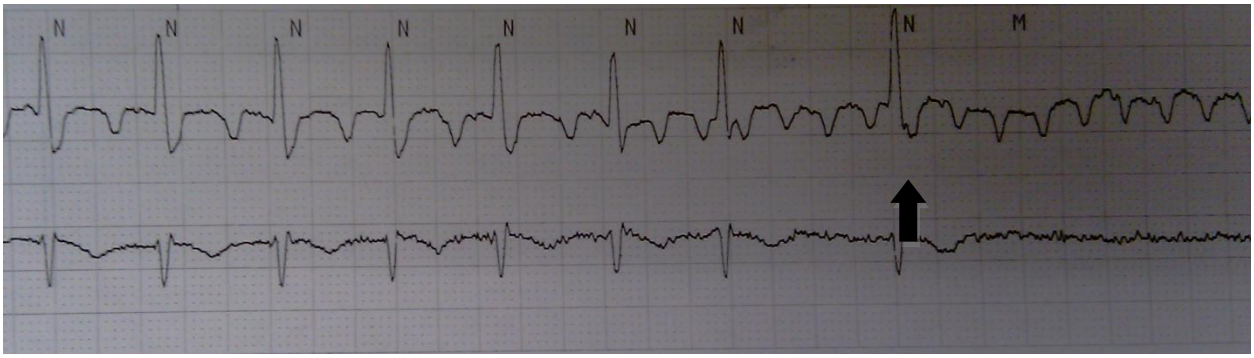

Figure 2. Atrial flutter/fibrillation shown with the administration of adenosine (black arrow).

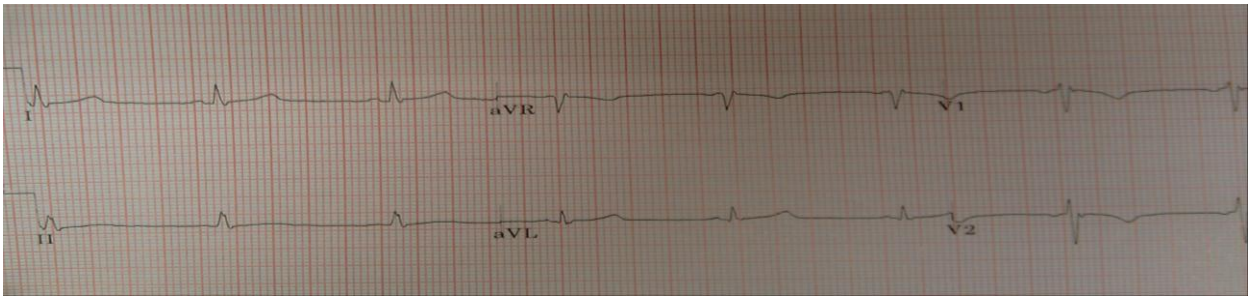

Figure 3. Normal sinus rhythm shown three hours after administration of adenosine.

Discussion

Adenosine is a potent chemical which has cardiac electrophysiologic effects including a negative chronotropic action on the sinus node and a predominant negative dromotropic action on the AV node.[3] The negative dromotropic action has led mainly to the use of adenosine as a potent antiarrhythmic agent for paroxysmal supraventricular tachycardia (PSVT) mediated by a reentrant mechanism involving the AV node. The effects of adenosine are dose-dependent and of very short duration since the half-life is less than 10 seconds.[4] This effect likely is related to the activation of the autonomic nervous system, mainly sympathetic, that occurs after administration of adenosine. Due to the short half-life, the sympathetic effects of adenosine are short-lived. The onset of 1:1 conduction most likely further increases sympathetic stimulation, thereby preventing return to 2:1 atrioventricular nodal conduction.[5]

There is limited reported experience of the use of adenosine in patients with atrial arrhythmias and 2:1 AV block. In one study,

adenosine administered to patients with atrial flutter and 2:1 block was not associated with acceleration of ventricular rate.[5] No adverse effects were noted when adenosine was administered to 14 patients with intra-atrial reentrant tachycardia, though the number of patients who received the drug in the presence of 2:1 atrioventricular nodal block was not reported.[6] These studies together with the fact that rhythm acceleration was not seen when adenosine was given to eight patients with atrial flutter and 2:1 conduction block through an accessory atrioventricular connection (where there are no counter-acting effects of adenosine-induced conduction block) suggested that the effect of adenosine-induced sympathetic stimulation is likely to be small.[6,7] In this case, the fact that it was sufficient to allow 1:1 atrioventricular nodal conduction likely was related to a combination of a relatively slow flutter rate (because of previous anti-arrhythmic therapy), an unusually short AV nodal refractory period in the baseline state, and the use of a relatively high dose of adenosine.[8]

Conclusion

Our case suggested a possible role of adenosine in the rhythm control. The current medications (i.e., amiodarone, procain-amide, and sotalol) used for this purpose require multiple administrations and have a wide range of toxicities making the possibility of using a single intravenous dose of adenosine an excellent alternative. Further studies are required before recommending adenosine, except as a last resort when more standard treatment has failed.

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Keywords: atrial flutter, cardiac arrhythmias, adenosine

Amiodarone-Induced Thyroid Storm Treated with Plasmapheresis and Thyroid Artery Ablation

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Introduction

Amiodarone is a class III anti-arrhythmic drug commonly used for treatment and prevention of cardiac arrhythmias. It is associated with a number of side effects including thyroid dysfunction due to its high iodine content and direct toxic effects.

In the United States, 3 to 5 percent of patients treated with amiodarone develop hyperthyroidism.[1] Amiodarone-induced thyrotoxicosis (AIT) is divided into 2 types. Type 1 is associated with increased synthesis of thyroid hormone, whereas type 2 is associated with excessive release of thyroxine (T4) and triiodothyronine (T3) from a destructive process. The diagnosis of thyroid storm is based upon clinical findings which are exaggerations of typical hyperthyroidism involving the central nervous, gastrointestinal, and cardiovascular systems.

The most accepted criteria to diagnose thyroid storm was created by Burch and Wartofsky who introduced a scoring system in 1993.[2] It provided a criterion to grade severity of thermoregulatory, cardiovascular, and central nervous system dysfunctions with scores greater than 45 being highly suggestive of thyroid storm. Medical therapy for thyroid storm is centered on thionamides, glucocorticoids, and beta-blockers. Plasma exchange and thyroidectomy have been used in patients whose hyperthyroidism is refractory to aggressive medical therapy. In our case, thyroid artery ablation also was utilized when too ill to undergo surgical thyroidectomy.

Case Report

A 64-year-old Caucasian male with a history of ischemic cardiomyopathy and recurrent ventricular arrhythmia was maintained on amiodarone therapy. He had no known prior thyroid disease. He was admitted to an outside facility after experiencing three separate automatic implantable cardioverter defibrillator (AICD) events. An AICD interrogation showed recurrent episodes of ventricular fibrillation. Left heart catheterization, with associated iodinated contrast exposure, revealed no ischemic disease.

On transfer to our facility, the patient had a temperature of 38.0 degrees Celsius, respiratory rate of 28 breaths per minute, heart rate of 99 beats per minute, and blood pressure of 100/58 mmHg. His examination showed an anxious, mildly diaphoretic male with irregular tachycardia, a fine tremor, trace lower extremity edema, and no thyromegaly or nodularity. His Burch and Wartofsky score was 40, suggestive of impending thyroid storm. The thyroid stimulating hormone (TSH) level was 0.01 mIU/mL, with a free thyroxine (FT4) level greater than 6.0 ng/mL, and a free triiodothyronine (FT3) level of 13.3 ng/dL.

Thyroid autoantibodies were not detected. He was started on prednisone, methimazole (MMI) 20 mg by mouth three times daily, and an intravenous (IV) esmolol drip.

The patient continued to have frequent episodes of ventricular fibrillations and AICD shocks. Given his clinical instability and lack of sufficient response to medical therapy, we pursued additional possible treatments. He received three, 1:1 total exchanges on three separate days with improved thyroid function studies (TFTs), but his mental status and hemodynamics worsened, culminating in cardiac arrest requiring five minutes of cardiopulmonary resuscitation. In lieu of conventional surgical thyroidectomy given his unstable clinical status, urgent bilateral thyroid artery ablation was performed in interventional radiology on hospital day 5. Plasmapheresis was resumed the next day along with medical therapy. The patient underwent nine total plasma exchanges with improvement of TFTs (Figure 1), resolution of arrhythmias, and improvement in his clinical status. He eventually underwent thyroidectomy on post-hospital day 17 with pathology showing a benign multinodular thyroid gland. He was started on weight-based levothyroxine replacement after his TFTs normalized.

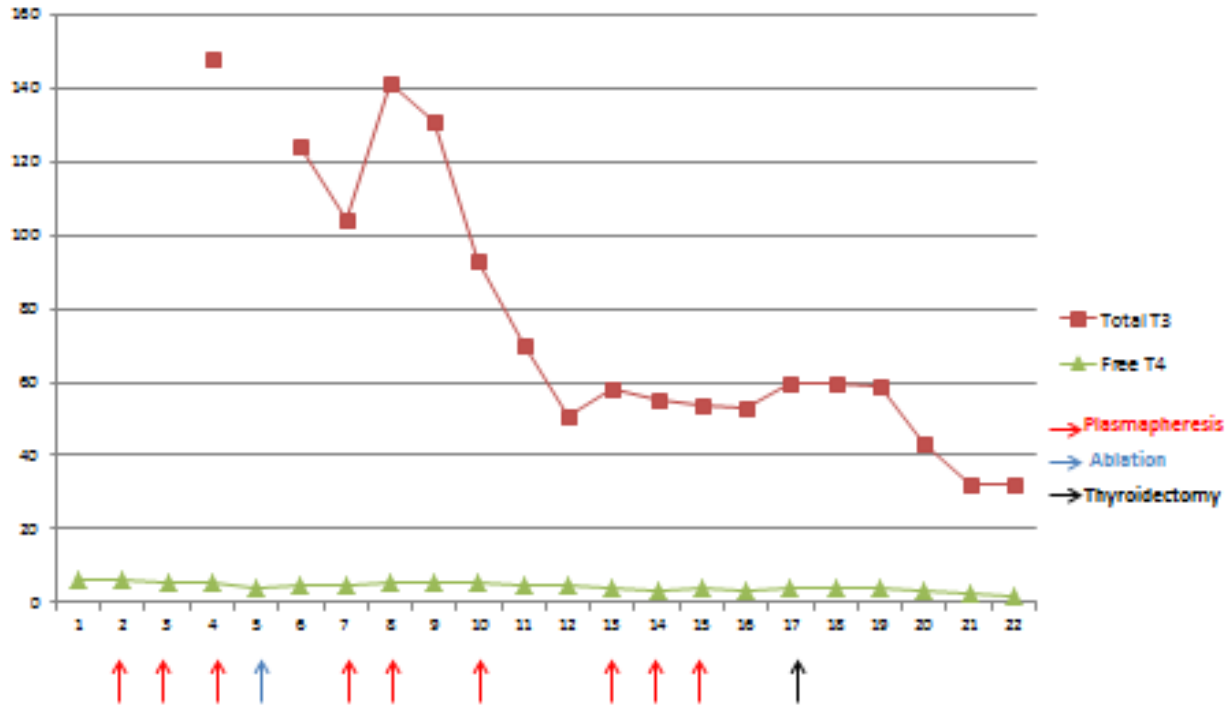

Figure 1. Variations in total T3 and free T4 over the course of treatment.

Discussion

Amiodarone induced thyrotoxicosis has occurred in 3% of patients treated with amiodarone.[3] In hospitalized patients, the incidence of thyroid storm was 0.20 per 100,000 patients per year.[4] In patients with underlying thyroid abnormalities, type I AIT occurred due to iodine-induced excessive thyroid hormone synthesis. Its pathogenesis could be related to effects of iodine overload on an abnormal thyroid gland, such as latent Graves' disease, autonomous nodules, or multinodular goiter.[5]

Beta blockers, thionamides, and glucocorticoids are typically the first line treatment for thyroid storm.[6] Beta blockers work by inhibiting 5'-monodeiodinase, thus inhibiting conversion of T4 to T3. Propanolol is a nonselective beta blocker and can be given emergently and intravenously as well as in oral form for long term use. Esmolol competitively blocks response to beta 1 adrenergic stimulation and beta 2 receptors at high doses, but is limited to IV use.

Thionamides include propylthiouracil (PTU) and methimazole and work slowly by blocking de novo thyroid hormone synthesis without affecting levels of preformed thyroid hormones.[6] PTU also has additional effects of blocking T4 to T3 conversion. Glucocorticoids reduce conversion of T4 to T3.

Given our patient's recent iodinated contrast exposure, he was not a candidate for radioactive iodine ablation. In addition to conventional therapy with MMI, esmolol, and prednisone, lithium and cholestyramine were discussed, but not utilized, because of their side effects and lack of efficacy. Plasmapheresis was initiated in lieu of thyroidectomy given his unstable clinical status.

The purpose of plasmapheresis is to remove plasma containing preformed thyroid hormones from circulation and replace it with plasma containing normal levels of thyroid hormones. Removal of circulating autoantibodies against the thyroid gland also could contribute to improvement in patient's TFTs and subsequent clinical status.[7] However, there have been no clinical trials evaluating plasmapheresis as a treatment modality in thyrotoxicosis.

In published reports using plasmapheresis for treatment of thyrotoxicosis,[7-11] some used two exchanges while others used up to eight exchanges. No reports studied the optimal number of plasma exchanges and most discontinued plasmapheresis after clinical improvement rather than improvement in TFTs. Most demonstrated benefit from plasmapheresis.[7-10] Of note, the use of plasmapheresis often improved the patients' clinical status until they could undergo thyroidectomy.[7,8,10] The use of plasmapheresis in treatment of other conditions is associated with thyroid hormone disorders.[13,14]

Pasimeni et al.[8] reported a 57-year-old female with a known multinodular goiter who developed thyrotoxicosis induced by an iodinated contrast agent received for a computed tomography scan, a mechanism similar to type 1 AIT. She ultimately was treated with two sessions of therapeutic plasma exchange. Her FT3 and FT4 levels and clinical symptoms improved to enable a thyroidectomy without complications.

Indications for thyroid artery embolization in AIT are not well elucidated. Few cases described thyroid artery embolization for treatment of thyroid disease. Xiao et al.[14] described the utilization of thyroid artery embolization in 22 patients with Graves' disease in patients unable to tolerate or not accepting of current therapies (oral medication, radioactive iodine, or surgery). Six received embolization followed by thyroidectomy with the remaining 16 receiving embolization only. Fourteen remained euthyroid. Only two patients required maintenance doses of antithyroid drugs. No adverse effects were described from the thyroid artery embolization.

Zhao et al.[15] used thyroid arterial embolization in 37 patients with Graves' disease to study pathological changes of the thyroid gland. They discovered ischemia, then necrosis, of the gland at seven days post-embolization. Of the 37 patients, 26 were rendered euthyroid at follow-up in

three years and all improved TFTs in seven days along with some improvement in clinical status.

In our case, the patient was clinically unstable despite three plasma exchanges and he continued to have elevated TFTs. His TFTs briefly increased after ablation which was attributed to destruction and necrosis of his thyroid gland and release of preformed thyroid hormones. After two additional plasma exchanges, his clinical status and TFTs improved, allowing the patient to undergo thyroidectomy. Our case illustrated the potential severity of AIT and the successful use of plasmapheresis and thyroid artery embolization in its treatment.

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Keywords: thyroid storm, plasmapheresis, ablation techniques, amiodarone

NMDA Receptor Antibody Associated Encephalitis: Unexplained Encephalitis

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Introduction

N-methyl D-aspartate (NMDA) receptors are glutamate receptors and responsible for controlling memory function and synaptic plasticity.[1] Activation of these receptors requires binding with glutamate or aspartate. These receptors are present in the limbic system, hypothalamus, and forebrain.[2] Binding of antibodies to these receptors lead to their removal from synaptic sites, thus leading to changes in functions.[3,4] Under-activity of these receptors is linked to development of psychotic symptoms as seen in schizophrenics and also in patients on PCP (angel dust) or ketamine.[3,5]

NMDA-receptor antibody encephalitis was first seen in young women with underlying ovarian teratoma.[6] Recent reports have shown that only 60% of patients have underlying tumor and the rest are idiopathic.[7,8] The disease is known to effect young women predominantly (< 50 years) more than males,[2] but cases involving children as young as eight months to two years also have been reported.[7,9] Neoplasm is seen rarely in children and adolescents.[10]

Case Report

Liaison service was consulted regarding a 26-year-old female. She presented to the emergency room with acute onset of aphasia, auditory hallucinations, and agitation. She reported that the voices were instigating her to kill her own children. This patient was transferred from another hospital where she was admitted for difficulty in speaking and agitation.

The patient had a history of anxiety and depression. She recently was started on clonazepam (1 mg every 8 hours) and hydroxyzine (25 mg TDS PRN) after her selective serotonin re-uptake inhibitors were discontinued due to anticipation of possible serotonin syndrome.

The patient denied having a history of alcohol or substance abuse. In the ER, she was agitated and aggressive and had to be put on haloperidol (5 mg IV) and lorazepam (2 mg). Her vitals were normal and physical examination was unremarkable. The patient was not oriented. Her mental status was notable for incoherent speech, echolalia, and agitation. She was put in 4-point restrain.

Routine lab investigation revealed a significant increase in blood glucose. Cerebrospinal fluid (CSF) analysis showed mild pleocytosis. Chest x-ray, electrocardiogram, and electro-encephalography were normal.

The patient was transferred to neurology because of the altered mental status. She continued to have frequent episodes of agitation and confusion. Her speech was

largely incoherent and showed significant mood lability. The psychiatry consult team remained involved in this patient's care, offering treatment for psychiatric symptoms, and helping in diagnostic formulation.

No diagnostic clarity was achieved. She had a broad differential diagnosis including serotonin syndrome, schizophrenia, mood disorders, neuroleptic malignant syndrome, autoimmune disorders, and endocrine disorders. Causes, such as infection and inflammation, were considered. Throughout her stay, her metabolic panel was unremarkable, except blood glucose levels were elevated. Screening for autoimmune disorder also was negative.

On hospital day 15, the patient was started on methylprednisolone with a presumptive diagnosis of NMDA encephalitis. CSF analysis confirmed the presumed diagnosis (elevated IgG index). Plasmapheresis was included in her management. The following day, her agitation decreased and slowly her symptoms resolved. She responded to simple commands and formed simple sentences.

Discussion

Anti-NMDA receptor encephalitis is potentially lethal, but reversible if recognized early.[8] It was considered as part of paraneoplastic syndrome,[4] but recently a number of cases have been reported which are not associated with neoplasia.[4,8] It should be suspected in young patients (especially females) who present with psychiatric symptoms, autonomic instability, hypoventilation, and movement disorders.[8,11]

Pathogenesis. Tumors (ovarian, testicular, mediastinal) that express ectopic NMDA receptors or infections **(**Epstein-Barr virus**,** herpes simplex virus**,** mycoplasma, influenza A and B, chlamydia via molecular mimicry) activate specific antibody mediated immune responses, resulting in formation of memory B cells that can cross the blood brain barrier.[8] Memory B cells produce NMDA receptor antibodies that bind to the receptors and internalize it resulting in loss of inhibition of excitatory pathway.[6-9]

Clinically, the disease is divided into three stages.[9,12,13] In the prodromal stage, patients experience fever, headache, fatigue, and lethargy. In the second stage, the patient develops behavioral abnormalities, impulsivity, confusion, stupor, and fluctuating consciousness. Patients often are presented to the psychiatrist or admitted with a diagnosis of schizophrenia, drug abuse, or acute psychosis. Autonomic instability is the third stage. The patient develops bradycardia, tachycardia, fluctuating blood pressure, heart block, and hypoventilation.

If anti-NMDA receptor encephalitis is suspected, NMDA antibody titres in CSF and serum should be evaluated, followed by screening for tumor (whole body CT scan, chest x-ray) or infections (complete blood count with differential, urinalysis, CSF viral PCR, and cultures).[2,14] In most cases, lumbar puncture shows elevated CSF IgG index with mild pleocytosis as compared to viral encephalitis.[15] Brain magnetic resonance imaging may show mild cortical or subcortical increased signal on fluid attenuated inversion recovery sequence.[14,15] Anti-NMDA receptor encephalitis is confirmed by screening NMDA antibody titers in serum and CSF. The titers of antibodies are higher in CSF than in serum indicating intrathecal synthesis.[11]

Management. The goal of initial management should be resolution of psychiatric symptoms, plasmapheresis, plasma exchange, immunosuppression (steroids, immunoglobulins), and removal of tumor if present.[8,9,12] However, there is lack of information on specific management of psychiatric symptoms. In case of poor clinical response or relapse, rituximab (monoclonal antibody that depletes B cell)

or cyclophosphamide can be tried. Psychotropic medications used to control behavioral symptoms include haloperidol, atypical antipsychotics (olanzapine, risperidone, ziprasidone), and benzodiazepines.

Given the complex nature and presentation of this disorder, a multidisciplinary approach (psychiatry, neurology, and surgery) is required. There is slow but continuous improvement and the majority of patients make a good recovery.[8-10] Patients are at risk of relapse so long term therapy and surveillance is required.[12]

Conclusion

Anti-NMDAR encephalitis is a common cause of encephalitis. Its relative frequency is close to some common infectious etiologies for encephalitis like HSV-1 in young individuals.[6,11] There has been an increase in reporting of anti-NMDAR encephalitis in recent years. Therefore, it is important to keep it high on the differential diagnosis. This will avoid unnecessary diagnostic and treatments cost and help in timely diagnosis and effective treatment. More research is required to clarify the exact pathogenesis and best treatment.

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Keywords: encephalitis, NMDA receptors, neuronal plasticity, paraneoplastic syndromes

Esophagitis Dissecans as a Cause of Upper GI Bleeding

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Introduction

Esophagitis Dissecans Superficialis (EDS) is a rare benign condition of the esophagus, which results in sloughing of large fragments of esophageal mucosal epithelium.[1] The esophageal mucosal tear may be horizontal or vertical with cracks, and the sloughed fragments may be within or tethered, easily detachable from the mucosa, and can be coughed up or vomited.[1] Although an association has been made with medications,[1-3] skin conditions,[4-5] heavy smoking,[4] and physical trauma (hot beverages, nasogastric tube, chemical irritants, and large meals),[3,5,6] EDS rarely has been reported as a cause of upper gastrointestinal (GI) bleeding.

Case Report

A 90-year-old white male presented to the emergency department with multiple episodes of coffee-ground emesis. He had no melena. He lived in a nursing home. He had a history of expressive aphasia, therefore, history-taking was limited. Previous records revealed a history of gastroesophageal reflux disease, esophagitis, and hiatal hernia. Medications included aspirin, ferrous sulfate, potassium chloride, and acetaminophen.

The patient's vital signs on admission included a temperature of 97.8^{o}F, pulse of 120 bpm, blood pressure of 137/70 mmHg, respiratory rate of 18 bpm, and oxygen saturation of 99%. On physical exam, there were no skin lesions, blisters, or bullous lesions. Epigastric tenderness was noted on the abdominal exam.

Laboratory results showed hemoglobin of 14.4 g/dL, white blood count of 12.7 g/dL, blood urea nitrogen between 20-33 mg/dL, and creatinine between 1.4-1.7 mg/dL. Other results included thyroid stimulating hormone of 1.93 mU/L, aspartate aminotransferase of 23 U/L, alanine aminotransferase of 24 U/L, alkaline phosphatase of 77 U/L, total bilirubin of 0.5 mg/dL, serum albumin of 3.3 g/dL, and calcium of 8.9 mg/dL. Electrolytes were within normal limits and troponins were negative.

The patient was treated with pantoprazole, 80 mg IV bolus and 8 mg/hr for 72 hours, made hemodynamically stable, and transferred to the medical intensive care unit for monitoring. He underwent esophagogastroduodenoscopy the next day revealing esophagitis dissecans with sloughing of the superficial mucosa from the proximal esophagus to gastroesophageal junction (Figure 1) and a medium-sized hiatal hernia. His stomach was otherwise normal; the duodenal bulb and the second portion of the duodenum were within normal limits. Following endoscopy, the patient had no further bleeding. Proton pump inhibitors (PPI) were switched from IV to oral twice daily for eight weeks.

The pathology report noted an intact esophageal squamous mucosa, non-specific reactive epithelial changes, focal surface

mucosal exfoliation, and degenerative changes associated with focal bacterial colonization. No intestinal metaplasia or dysplasia was identified. Helicobacter pylori antigen testing was negative. These findings were consistent with EDS (Figure 2).

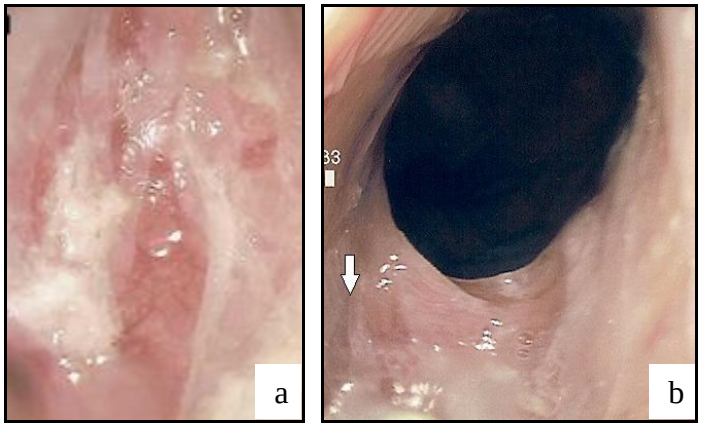

Figure 1. Endoscopic view of esophagitis dissecans superficialis: (a) diffuse sloughing of the lower esophagus mucosa and (b) vertical sloughing at the lower gastro-esophageal junction (see arrow).

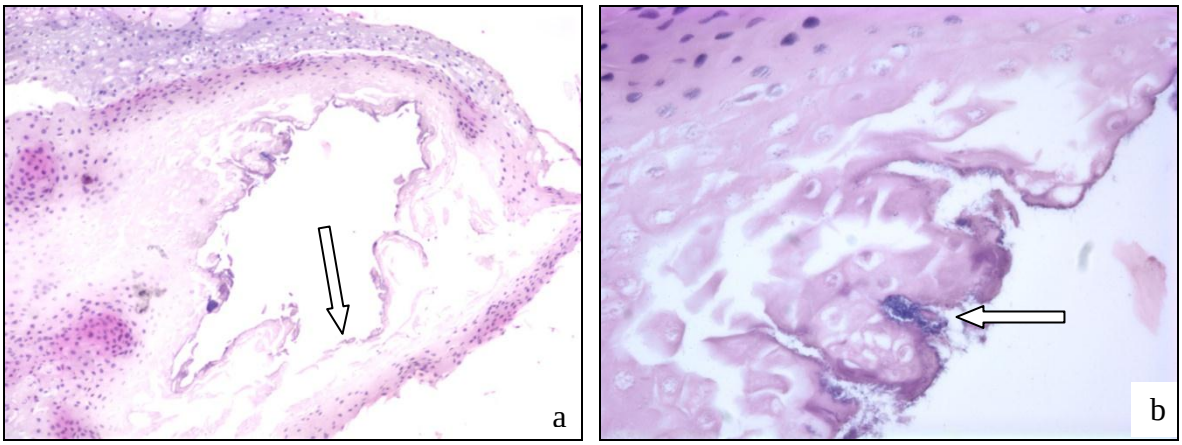

Figure 2. Histological examination of the mucosa showed (a) focal bacterial colonization (arrow) and (b) detached squamous epithelium (arrow).

Discussion

Upper GI bleeding is one of the most commonly seen medical emergencies with high morbidity and mortality in some age groups.[2] The annual incidence of acute upper GI bleeding is 102/100,000. GI bleed can be caused by a wide range of causes, but it rarely has been reported with EDS.

EDS is a rare endoscopic finding.[1] Its usual symptoms include dysphagia, odynophagia, and heartburn.[1,7] It can be caused by non-steroidal anti-inflammatory drugs,[1] bisphosphonates,[3] potassium chloride,[3] hot beverages,[3] collagen disease,[4] autoimmune bullous dermatoses,[4] and celiac disease.[8] Our patient had no bullous lesions or skin rash. He had never been on bisphosphonates. His history did not reveal any physical trauma. He had been on potassium chloride and aspirin which may have contributed to the development of EDS.

Endoscopy did not reveal any other potential sources of his GI bleeding. A rare lesion, such as a Dieulafoy's lesion, which was not actively bleeding at the time of endoscopy, cannot be ruled out completely. The mild decrease in his hemoglobin and lack of melena suggests against such a lesion. Endoscopy did not reveal any gastric or duodenal ulcers, masses, or any lesions suggesting hemorrhage which makes EDS a highly likely cause for his upper GI bleeding.

Conclusion

EDS, a very benign chronic condition of the esophagus, can be a cause of upper GI bleeding. It occurs with many iatrogenic, avoidable, and reversible conditions. EDS is an entity that we should be aware of, especially when prescribing bisphosphonates, potassium chloride, or during nasogastric tube placement. The physical exam should be of value as presence of skin lesions with upper GI bleed may point toward EDS. Endoscopy should be manipulated with experienced endoscopists due to the very fragile consistency of the mucosa.

Acknowledgment

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Keywords: esophagitis, gastrointestinal hemorrhage, upper gastrointestinal tract

CLINICAL INQUIRY

Probiotics for the Prevention of Antibiotic-Associated Diarrhea

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Clinical Question

Do probiotics reduce the risk of Antibiotic-Associated Diarrhea (AAD) in adult patients?

Evidence-Based Answer

Probiotics reduce the risk of developing antibiotic-associated diarrhea (Strength of Recommendation (SOR) A). (See appendix for the Strength of Recommendation taxomony.) *Saccharomyces boulardii* and *Lactobacillus* species have been shown to reduce the risk of antibiotic-associated diarrhea (SOR A). Probiotics should be recommended for the prevention of antibiotic-associated diarrhea (SOR C). However, the duration and dosage for effective treatment have not been established.

Methodology

A tertiary review of existing systematic reviews was conducted. PubMed was searched for articles unrestricted by language from inception to 6/11/2013. Terms were searched as text words and included: probiotics, diarrhea, and meta-analysis. Abstracts of the 77 results were reviewed to eliminate any that did not pertain to prevention of antibiotic-associated diarrhea in adults, resulting in 26 articles. The plethora of recent randomized controlled trials and meta-analyses allowed a focus on the five relevant meta-analyses published in the past five years that included at least 10 randomized controlled trials (RCTs) each.[1-5]

Data were included on all types of probiotics used in adults (at least 16 years old). The meta-analyses used both inpatient and outpatient settings and defined AAD in various ways. Where meta-analyses included minors or treatment studies, only the subset of data relevant to prevention in adults was examined.

Evidence Summary

The occurrence of AAD ranges from 5 to 30% in outpatient use and has been reported as high as 39% in hospitalized patients,[6] leading to significant healthcare costs due to associated morbidity. AAD is also a reason that many patients are noncompliant with antibiotic use. Therefore, finding a way to reduce AAD has become of increasing interest, particularly with the use of probiotics. Probiotics have been defined as "live microorganisms, which when administered in adequate amounts, confer a health benefit on the host".[7] The use of probiotics in

the prevention of AAD has been studied widely and overall has positive results in reducing AAD.

Probiotics reduce the risk of developing AAD. Hempel et al.[2] performed the most exhaustive meta-analysis on randomized control trials (RCTs) of probiotics for the prevention of AAD. Their subgroup analysis of 14 RCTs limited to participants aged 18 to 65 years demonstrated that probiotic administration was associated with reduction of AAD by 46% (RR = 0.54, 95% CI: 0.34 - 0.85, NNT = 13).[3] A pooled analysis of all 45 study arms meeting our inclusion criteria gave similar results (RR = 0.59; 95% CI: 0.53 - 0.67, NNT = 15). The results suggested that probiotics are efficacious in the prevention of AAD. Though the majority of studies focused on *Lactobacillus*, many strains and combinations of probiotics were used and reporting often was insufficient to determine the exact regimen used in a particular study. Importantly, regardless of subgroup analysis, the results remained statistically significant. This meta-analysis was unable to identify which strains or doses were truly beneficial.

A recent Cochrane meta-analysis focused on AAD studies that included a measure of *C. difficile*.[1] The subset of 19 studies in adults with AAD showed a 37% reduction in risk (RR = 0.63; 95% CI: 0.51 - 0.76). A risk reduction of 64% was reported in the 19 studies in adults with *C. difficile*-associated diarrhea (RR = 0.36, 95% CI: 0.24 - 0.52).

S. boulardii and *Lactobacillus* reduce the risk of developing AAD. Some meta-analyses have looked at RCTs that specifically evaluated the effect of *S. boulardii* and *Lactobacillus species* on AAD.[2-5] Overall, the results consistently have shown a significant reduction in AAD with the use of each of these probiotics.

McFarland's meta-analysis included 10 RCTs comparing *S. boulardii* to placebo and found a significant protective effect against AAD with number needed to treat being 10.2 (pooled RR = 0.47, 95% CI: 0.35 - 0.63, $p < 0.0001$, NNT = 10.2).[5]

Two meta-analyses included 12 RCTs (8 overlapping) using *Lactobacillus* species only. Pooled analysis of each showed that there was a 34% reduction in risk of AAD.[2,3] Overall, the trials showed a benefit to the use of *S. boulardii* or *Lactobacillus* in the reduction of AAD.

Probiotics should be used for the prevention of AAD. The use of probiotics repeatedly has demonstrated a reduction in AAD.[1-5] Hempel showed that the number needed to treat to prevent one case of AAD was only 13.[2] Furthermore, studies consistently note that adverse effects of probiotics rarely were reported.[6] Based on the available data, probiotics should be used for the prevention of AAD. However, research is inconclusive regarding the best probiotic regimen. More research is needed to determine clear recommendations including which strain or combination of strains to use, dosage, and duration of treatment. Many of the meta-analyses identified heterogeneity among probiotic regimens as a concern.

Recommendations from Others

An expert panel convened for the third time at Yale University in 2011 to evaluate the use of probiotics.[8] Their consensus was that there is grade A evidence (strong, positive studies in the literature) for prevention of AAD with *L. rhamnosus GG* and *S. Boulardii*, and the evidence for the mixture of *L. casei* DN-114 001, *L. delbrueckii* subspecies *bulgaricus*, and *S. thermophilus* is also strong. However, the Society for Healthcare Epidemiology of America (SHEA) and Infectious Diseases Society of America (IDSA) in their 2010 guidelines on *Clostridium difficile* infections have recommended that probiotics not be used for primary prevention of *C. difficile*. They also noted that reported cases of fungemia have occurred with the use of *S. boulardii* in severely ill and immunocompromised patients and advised against its use in these patients.[9]

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Keywords: probiotics, diarrhea, anti-bacterial agents

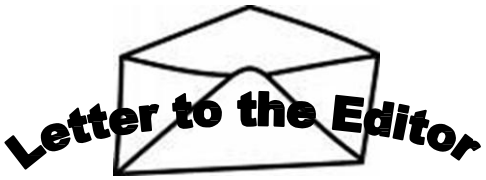
Appendix
(Adapted from American Family Physician*)

Strength of recommendation	*Basis for recommendation*
A	Consistent, good-quality patient-oriented evidence**
B	Inconsistent or limited-quality patient-oriented evidence**
C	Consensus, disease-oriented evidence** (usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening)

*http://www.aafp.org/dam/AAFP/documents/journals/afp/sortdef07.pdf

**Patient-oriented evidence measures outcomes that matter to patients: morbidity, mortality, symptom improvement, cost reduction, and quality of life.

Disease-oriented evidence measures intermediate, physiologic, or surrogate end points that may or may not reflect improvements in patient outcomes (e.g., blood pressure, blood chemistry, physiologic function, pathologic findings).



Erratum

A Modified CD-RISC: Including Previously Unaccounted for Resilience Variables

The authors of the article, A modified CD-RISC: Including previously unaccounted for resilience variables,[1] wish to make two manuscript amendments. First, the content from the CD-RISC we utilized (from Connor and Davidson[2]) was an incomplete version of the 25 item CD-RISC. In fact, three forms of the CD-RISC have been approved (25, 10, and 2 item scales) and can be accessed only through the authors of the original scale or at www.cd-risc.com, where full details of the scale and conditions of use can be found. Second, the original CD-RISC items are scored on a range from 0 to 4 (yielding a total of 0 to 100). Our study added three new items to determine if a stable factor structure could be achieved. We changed the scale from the range CD-RISC employs (0 to 4) to a different range (1 to 5). However, we transformed our data back to the 0-4 scale to make the two scales comparable.

Sincerely,
Elizabeth Ablah, Ph.D., M.P.H.
Frank Dong, Ph.D., M.S.

Reference

1 Dong F, Ablah E, Nelson C, Shah S, Khan A. A modified CD-RISC: Including previously unaccounted for resilience variables. KS J Med 2013; 6(1):11-20.
2 Connor KM, Davidson JR. Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). Depress Anxiety 2003; 18(2):76-82. PMID: 12964174.