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COVER THEME
Biking for Health

Lifestyle activities, including bicycling for active transportation, promote healthy weight and decrease the risk of cardiovascular outcomes, including mortality from cardiovascular disease. Two articles in this issue of *WMJ* explore initiatives to increase bicycling for health.

Cover design by Stefanie Klett

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The mission of *WMJ* is to provide a vehicle for professional communication and continuing education for Midwest physicians and other health professionals. *WMJ* is published by the Wisconsin Medical Society.

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The Problem With US Health Care: It Ain't Obamacare!

To the Editor:

The Affordable Care Act or ACA (aka Obamacare) is the most important health care legislation enacted in the United States since the creation of Medicare and Medicaid in 1965.[1] With the ACA, the uninsured rate declined by 43%, from 16.0% in 2010 to 9.1% in 2015.[1,2] Approximately 20 million individuals gained health insurance, including young adults covered under parental insurance, private insurance exchanges, and state Medicaid expansion.[1,2]

According to a 2017 US National Academy of Medicine initiative, critical issues central to the future of health and health care in the United States strongly transcend the ACA provisions receiving the greatest attention.[3] Health care costs remain alarmingly high with $3.2 trillion spent annually, equivalent to $9990 per person and accounting for 17.8% of the gross domestic product of which an estimated 30% is related to waste, inefficiencies, and excessive prices.[3] Health disparities are persistent and worsening, and the health and financial burdens of chronic illness and disability are straining families and communities.[3,4]

Medicare spending had grown nearly 3 times faster in the United States than in Canada since 1980 – this trajectory is unsustainable.[4,5] A 2012 US Institute of Medicine report revealed that US health care squandered $750 billion in 2009 through unnecessary or unneeded care, Byzantine paperwork, fraud and other wasteful activities.

The ACA Repeal Efforts

The repeal of ACA had been anticipated and written about for years. The proposed repeal bills failed to deliver on the promises to "have insurance for everybody," to be "much less expensive and much better," with "much lower deductibles" than the ACA. If anything, millions of Americans over time would lose health insurance coverage.

The Way Forward

Without prejudice to the politics of an ACA repeal, the fact of the matter is that no legislative posturing that fails to address these fundamental infrastructural challenges and deficiencies inherent in US health care would lead to sustainable and improved health care delivery in the United States.[3-5] Major changes such as payment reforms, significant cost-control measures across the entire spectrum of health care delivery processes, are warranted and mandatory.

I believe the federal government should establish a Health Care Commission to revisit all of the relevant ills plaguing US health care and to come up with clear-cut real solutions to these chronic problems. Such a Commission should have as members practicing physicians and economists, preferably headed by an MD MBA or an MD PhD in economics.

—Macaulay Amechi Chukwukadibia Onuigbo, MD, MSc, FWACP, FASN, MBA

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What Constitutes Prosperity

Editor's Note: The following editorial was published in WMJ, *September, 1917, Volume 16. No 4, p 134.*

"What profiteth a man that he gain the whole world and lose his own soul." In other words what does a man gain by the accumulation of riches if he is exposed daily to the living conditions in the filthy community? Men who move from city to city are even now asking "What is the typhoid death rate? What is the incidence of the acute diseases of childhood? What is the water supply? How are sewerage and garbage disposed of?" A time will come when a city merchants' association will offer as the chief inducement to prospective citizens (if some have not already offered) the vital statistics and sanitary activities. Industries, land, banks, libraries, parks, etc., will come after the principal attraction.

Education is having some appreciable effect. People now want to know how they and their children will be protected from disease. They have come to expect competent service from the Health Department.

Prosperity, now-a-days, thank God, is not built for the few upon the bodies of many. Society is half-blindly groping its way along the paths blazed by the leaders in Preventive Medicine. Were it not for crass political inefficiency we should not today have some diseases, which are absolutely preventable.

The saving feature is that with all our halting and stumbling we do move forward. Even the present world war, the most terrible of calamities, has developed a spirit of sacrifice and giving which, if properly managed, bids fair to continue and redound to the good of the world.

Prosperity is after all not the millions in the bank nor the bonds in the safety deposit vaults. It is the awakened conscience of people which radiates love for their fellow-beings. Let us hope that the day will soon come when the prosperity of a community is known not by its large purse, but by its large heart.

Let us hope that the day will soon come when the prosperity of a community is known not by its large purse, but by its large heart.

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As an approved Portfolio Program Sponsor, the Wisconsin Medical Society has been approved by the ABMS Portfolio Program to approve QI Efforts for MOC Part IV through Oct. 1, 2017.

Wisconsin Medical Society

Working With Communities Toward Health Equity

Sarina Schrager, MD, *WMJ* Associate Editor

According to Healthy People 2020:

Health equity[1] is the "attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities."

Health disparity[2] is "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage."

A person's health is related to much more than genetics and biology. Socioeconomic influences on health are powerful, and affect both the incidence and outcomes of disease. Availability of safe housing, food, high quality education, public transportation, health insurance, clean water, and culturally sensitive clinicians is intimately related to a person's baseline health. Improving health for people in underserved communities can expand what people are able to accomplish in the community.

Health disparities in Wisconsin are some of the worst in the country. According to the University of Wisconsin Population Health Institute's State Health Report Card in 2016,[3] Wisconsin earned a B- as a health grade (measuring length and quality of life) and a D in health disparities (measuring differences in health based on gender, geography, socioeconomic status, and race/ethnicity). The D health disparity grade has persisted since 2013. Highlighted in this report are death rates of African American babies under 1 year of age that are close to 3 times as high as those of non-Hispanic white babies.

Four papers in this issue of *WMJ* detail community interventions that aim to improve equity by addressing health disparities. The study by Abbs, et al[4] designed a stress reduction curriculum for Latina women living in poverty in Milwaukee, Wisconsin and Lima, Peru. This mindfulness-based program improved perceived health and decreased the presence of stress while improving confidence among participants to reduce stress in the future.

In "Biking for Health," Bernstein et al[5] tested a pilot intervention among 2 minority communities in Milwaukee. A biking instructor led a 12-week bicycling intervention and the people in the intervention group had access to a bicycle, a helmet, and a lock for the 12-week study period. People in the intervention group increased their comfort with bicycling and increased bicycling activity. Zellmer and Fleming describe Wheels For All, a program that pairs underserved recipients identified by local agencies in La Crosse, Wisconsin, with dontated bicycles to help them gain access to community resources.[6]

The fourth study to address health equity explored the use of a church-based intervention to reduce the risk of falls among African American seniors in Milwaukee.[7] This study demonstrated that using faith-based organizations for health interventions shows promise as a means to improve health within a community.

All of these studies evaluated the use of novel, community-based interventions focused on reducing health disparities and improving health equity among low income, underrepresented minority populations in Milwaukee and underscore the importance of expanding health care activities into the community. The challenge for the future will be to continue similar interventions after the study timeframe is complete. The health care community in Wisconsin can use these studies as examples to integrate health care beyond traditional offices, clinics, or hospital settings.

CULTURAL COMPETENCE

Another component of reducing health disparities is developing a health care workforce that is able to adjust evaluations and interventions based on the specific cultural background of each patient. Two papers in this issue explore the care of elderly Hmong patients. In the case report by Askar, et al,[8] an elderly Hmong man with advancing dementia develops vivid dreams and hallucinations that recall his time as a soldier in Laos during the war in the 1970s. Understanding his unique history of trauma through the assistance of a language and cultural interpreter was essential information for his primary care provider.

The second paper, in the "As I See It" section,[9] describes a case of an elderly Hmong woman who is losing her eyesight. The clinician evaluates her but finds no obvious cause for her vision loss and then listens as she tells him of her visit with a shaman who counseled her about a vision spirit who had taken away her sight. The shaman told her that there were no vision spirits in this country and that to have a chance to get her sight back, she would need to travel back to Laos, which she did not want to do.

Both of these examples demonstrate the need to understand patients of different cultures and their beliefs in order to provide excellent care, underscoring the need for an expanded approach to health care provision.

To optimize our vision of health equity and decrease health disparities, clinicians need to expand care models and incorporate patients' cultural and socioeconomic needs into daily practice. The Institute for Health Care Improvement suggests 5 focus areas for health care organizations to achieve health equity for all patients:[10]

- Make health equity a strategic priority.
- Develop structure and processes to support health equity work.
- Deploy specific strategies to address the multiple determinants of health on which health care organizations can have a direct impact.
- Decrease institutional racism within the organization.
- Develop partnerships with community organizations to improve health and equity.

Developing these focus areas can set the strategic course of a health care organization and give recognition to the significant effort needed to address the lack of health equity in our society.

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The Vision Spirit

Justin Yamanuha, MD; Xue Thao Xiong

An 87-year-old Hmong woman returned to my clinic to check on her only good eye
She had been without vision in her left eye for some time and was losing vision in her right eye

We reviewed the MRI along with her eye scans and tests
but the answer was still not obvious and a solution seemed to elude us

She told me very frankly, through the Hmong Interpreter, that she went to visit a Shaman
who entered a trance and connected to the spirit world

The Shaman told her that long ago when she lived far away in Southeast Asia
that a spirit had taken away her vision and there were no spirits who could help her here

If she were to travel back to Laos (where she was born) or Thailand (where she was a refugee),
there might be another Shaman who could find a spirit for her there

The patient told me that she could not go back there
and had accepted the fate the spirit had bestowed upon her

We concluded the visit for the day
but agreed to meet again soon after I had consulted other Doctors

I had not experienced such an encounter with a patient and a Shaman and a vision spirit
but there may have been others for whom I never asked or who just never told

While I could not solve this patient's diagnosis or determine the way to make her better
her simultaneous trust in me and her Shaman was humbling

The encounter gave me a deeper appreciation
for the role of the spirit world in health and disease for Hmong specifically but people generally

Not every symptom leads to a sign and not every test solves a mystery
but there is a need to listen and search and always continue to try

• • •

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Biking for Health: Results of a Pilot Randomized Controlled Trial Examining the Impact of a Bicycling Intervention on Lower-Income Adults

Rebecca Bernstein, MD; Robert Schneider, PhD; Whitney Welch, PhD; Anne Dressel, PhD; Melissa DeNomie, MS; Jennifer Kusch, PhD; Mirtha Sosa, BA

ABSTRACT

Introduction: This pilot study tested the efficacy of a bicycling intervention targeting inactive, low-income, overweight adults on reducing perceived barriers to bicycling, increasing physical activity, and improving health.

Methods: A nonblinded 2-site randomized controlled trial was conducted in Milwaukee, Wisconsin, in summer 2015. Participants included members from 1 largely Latino community and a second primarily African American neighborhood. A certified bicycling instructor led a 12-week bicycling intervention. Outcome measures including biking-related attitudes, self-reported physical activity, fitness as measured by the 6-minute step test, and biometric data were collected at baseline, 12 weeks, and 20 weeks.

Results: Thirty-eight participants completed the study. Barriers to bicycling declined significantly among intervention group participants at 12 weeks with some declines persisting to 20 weeks. Bicycling for leisure or non work transportation increased significantly more in the intervention than control group from baseline to 12 weeks but this difference attenuated by 20 weeks. Both groups increased their fitness between baseline and 12 weeks, with a trend towards greater gains in the bicycling intervention group. No significant change in biometric measurements was seen at either 12 weeks or 20 weeks.

Conclusion: Despite the small study size, this bicycling intervention decreased perceived barriers to bicycling and increased bicycling activity in low-income minority participants. These findings support a larger-scale study to measure fitness and health changes from bicycling interventions.

• • •

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CME available. See page 160 for more information.

BACKGROUND

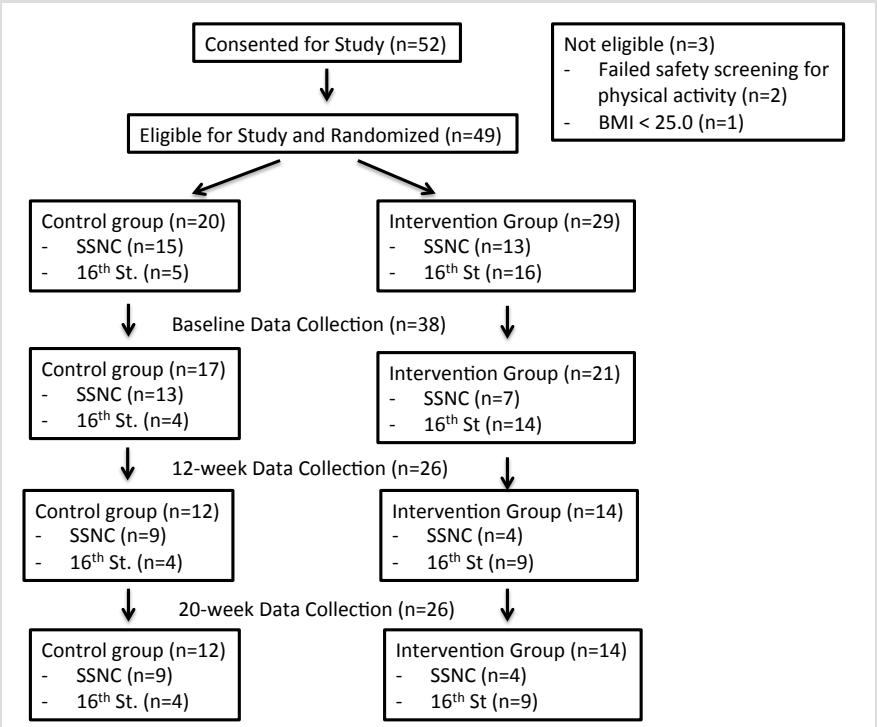
Physical activity is inversely related to many medical conditions, particularly obesity, type 2 diabetes, and coronary heart disease[1]—the leading cause of death in the United States.[2] Many factors ranging from individual to environmental and cultural contribute to widespread inactivity. Further, income disparities exist in the prevalence of physical inactivity.[3] Lifestyle activities, including bicycling for active transportation, have been found to promote healthy weight and decrease the risk of adverse cardiovascular outcomes, including mortality from cardiovascular disease.[4,5]

Nationally, bicycling rates are increasing,[6] while research suggests that lower-income and minority communities experience unique barriers to bicycling. These include lack of access to a working bicycle, bicycle theft, personal security, police harassment, safety from traffic, and cultural perceptions of bicycling as an indicator of low social status.[7–10] Increasing physical activity through bicycling in low-income communities and communities of color has the potential to improve personal and public health. The previous studies of bicycling in such communities have explored barriers to bicycling or provided case study descriptions of education and encouragement programs.[11,12]

Identifying successful interventions to promote physical activity in inactive adults is a critical public health need. Prior research on bicycling interventions has not specifically targeted inactive, overweight or obese lower-income adults. We are unaware of any studies utilizing a controlled trial to evaluate the impact of a bicycle training and promotion intervention using biometric and survey data collection.

We theorized that a bicycle education and promotion intervention would impact the personal attitudes and barriers towards bicycling for participants, resulting in increased bicycling activity that would lead to fitness and health improvements. Our intervention was based on the Theory of Planned Behavior[13] and the Transtheoretical Model.[14] A separate paper (R Schneider, et al, unpublished data, June 2016) focuses on attitudes and perceived barriers to bicycling among participants while the goals of this paper are to evaluate later stages of behavioral and health change: whether or not the bicycling intervention helped participants (1) increase bicycling and general physical activity levels, and (2) improve health, as measured by fitness testing and several biometric parameters.

Figure 1. Participant Consort Diagram, as Assigned



Abbreviations: SSNC, Silver Spring Neighborhood Center; 16th St, Sixteenth Street Community Health Centers

METHODS

Design

The study was a 2-site, nonblinded randomized controlled trial of a bicycling intervention for inactive adults in 2 lower-income neighborhoods in Milwaukee, Wisconsin. It was reviewed and approved by the Institutional Review Board of the Medical College of Wisconsin.

Participants

Eligible participants were 18 to 69 years old, spoke English and/or Spanish, were currently physically inactive—as defined by self reporting physical activity less than 3 days per week for 20 minutes or more[15]—and had a body mass index (BMI) ≥ 25.0. Those not meeting inclusion criteria, were currently pregnant, planning to become pregnant during the study period, or planning to relocate were excluded. Participants were screened for safety using validated physical activity readiness questionnaires[16,17] and, if necessary, physician clearance. Prior ability to ride a bicycle was not required.

The study was conducted at 2 sites. One, Sixteenth Street Community Health Centers (SSCHC), is a Federally Qualified Health Center that serves a predominantly Latino community on the south side of Milwaukee. The other, Silver Spring Neighborhood Center (SSNC), is a community center located within the Westlawn Gardens public housing development, serving a predominantly African American community on the north side of Milwaukee.

Enrollment Procedures

Participants were recruited using flyers and at community events, with assistance from community health ambassadors. Friends or family who enrolled were randomized individually. After obtaining informed consent and confirming study eligibility, participants were randomized 1:1 to the intervention or control groups, stratified by site. Random assignments were made using Research Electronic Data Capture (REDCap). It was not possible to determine group assignment prior to randomizing each individual. Neither participants nor researchers were blinded to the group assignment. Participants in the intervention group received bicycles, locks, and helmets at baseline; control group participants received gift cards at baseline. Both groups received gift cards for attending the subsequent data collections. The control group received bicycles, locks, and helmets after completing the final data collection.

Intervention

The bicycling intervention included 10 scheduled group sessions at each site over a 12-week period from June to August 2015. Intervention group participants were fitted with refurbished bicycles prior to the first session. Participants were able to keep their bicycles from that point forward and were encouraged to ride independently during and after the intervention. Sessions consisted of on-road education and group rides; bicycle safety classroom instruction occurred on rain dates. Ride lengths increased progressively from 2 to 7 miles, and pace increased from 4 miles per hour (mph) to 10 mph. Participants learned about accessing local paved bicycle trails, using bike lanes, hand signaling, and navigating traffic (eg, stops, turns). Licensed cycling instructors

Table 1. Participant Characteristics

Characteristic	Bicycling Intervention (n=21**), n (%)	Control Group (n=17**), n (%)	Test of Significance
Age*	40.14 (8.50), 22-57	43.76 (12.13), 24-65	0.8565
Sex			0.778
Male	3 (14.3%)	3 (17.7%)	
Female	18 (85.7%)	14 (82.4%)	
Preferred Language			0.099
English	9 (42.9%)	13 (76.5%)	
Spanish	7 (33.3%)	3 (17.7%)	
Both	5 (23.8%)	1 (5.9%)	
Highest Grade Completed			0.3883
< 9	1 (4.8%)	2 (11.8%)	
9 – 12/GED certificate	13 (61.9%)	11 (64.7%)	
> 12/GED certificate	7(33.3%)	4 (23.5%)	
Income			0.0021
Less than $15,000	5 (27.8%)	13 (81.3%)	
$15,000 - $34,000	6 (33.3%)	2 (12.5%)	
More than $34,000	7 (38.9%)	1 (6.3%)	
Race/Ethnicity			0.018
Hispanic/Latino Ethnicity	13 (61.9%)	4 (23.5%)	
Non-Hispanic/Latino ethnicity, African American race	8 (36.1%)	13 (76.5%)	
Non-Hispanic/Latino ethnicity, Other race	0 (0.0%)	0 (0.0%)	
Employment			0.706
Employed	11 (55.0%)	7 (41.2%)	
Unemployed	4 (20.0%)	3 (17.7%)	
Other	5 (25.0%)	7 (41.2%)	
Health Insurance			
Insured	14 (70.0%)	16 (94.1%)	0.062 (type)
Public Insurance	7 (35.0%)	10 (58.8%)	
Private Insurance	4 (20.0%)	1 (5.9%)	
Other	3 (15.0%)	5 (29.4%)	
Not Insured	6 (30.0%)	1 (5.9%)	0.102 (status)
Health Conditions			
Diabetes	5 (23.8%)	3 (17.7%)	0.643
High Blood Pressure	3 (14.3%)	7 (41.2%)	0.061
High Cholesterol	7 (33.3%)	2 (11.8%)	0.120
Other	7 (33.3%)	2 (11.8%)	0.231
Number of Health Conditions*	1.14 (1.4), 0-5	0.824 (1.1), 0-3	0.2248
Owns Bike	3 (14.3%)	4 (25.0%)	0.410
Knows how to Ride Bike	20 (95.2%)	15 (93.8%)	0.843

** mean (SD), range*
**Some participants did not report all variables, actual number reporting listed in table.

of the Bicycle Federation of Wisconsin administered the intervention. A bilingual instructor served the site located in the Latino community. The control group received no intervention.

A total of 52 participants were recruited for the study in the spring of 2015 between both sites. Of these, 49 were eligible to participate and were randomized, with 20 assigned to the control group and 29 to the bicycling intervention. There were 38 individuals who provided baseline data and 26 who provided follow-up data at both 12 weeks and 20 weeks. See Figure 1 for the participant flow diagram.

The intervention delivered with the SSCHC group adhered closely with the intended plan. Very low participant attendance at the SSNC site resulted in only a single group ride occurring. Many attempts were made throughout the study period to engage participants and reschedule rides at this site to increase intervention participation.

Outcome Measures

Data were collected from participants at baseline, after the 12-week intervention concluded, and 20 weeks after baseline. Intervention group bicycles were outfitted with cyclometers. In addition, the cycling instructors utilized structured field notes to record observations throughout the summer. The following outcomes were collected at each of the 3 data points: (1) self-reported bicycling, perceived barriers to bicycling, and overall activity; (2) fitness; and (3) biometrics.

Self-reported bicycling, perceived barriers to bicycling, and overall activity – The International Physical Activity Questionnaire (IPAQ)[18] longform, a previously validated tool, provided estimates of weekly physical activity within specific domains, including transportation and leisure. It was self-administered or interviewer-administered, at the preference of each participant. A Bicycle Attitudes Survey developed by the research team asked about bicycling activity and 19 possible barriers to bicycling. The ordinal response options for each barrier were "does not apply" (scored as 0), "not significant at all" (scored as 0), "somewhat significant" (scored as 1), "very significant" (scored as 2), and "so significant that it keeps me from riding" (scored as 3). We measured the change in perceived barriers by comparing the score at baseline with the score at 12 weeks or 20 weeks. Additional detail about this survey is available elsewhere (R Schneider, et al, unpublished data, June 2016). Both surveys were available in English and Spanish.

Fitness – The 6-minute step test,[19] a convenient and validated variation on the 6-minute walk test,[20] was used as a maximal exertion fitness test. Participants were instructed to step up and down a 20-centimeter step as many times as possible in 6 minutes, while the number of steps was recorded.

Biometrics – Baseline height and weight were collected, and weight was remeasured at 12 and 20 weeks; body mass index (BMI) was calculated; waist circumference was measured. Blood pressure was measured manually after participants sat quietly for 5 minutes; the average of 2 readings was used for each time point.

Table 2. Reported Bicycling Frequency, by Purpose: Intervention vs Control Group

Travel Purpose: How often in the past 7 days did you bicycle for the following purpose 2+ times?	Baseline Frequency (%) Intervention, Control	Week 12 Frequency (%) Intervention, Control	Week 20 Frequency (%) Intervention, Control	Baseline vs Week 12		Baseline vs Week 20	
				Sample Size (Intervention, Control)	*P*-value*	Sample Size (Intervention, Control)	*P*-value*
Ride to or from work	7.1%, 0%	7.1%, 0%	7.7%, 0%	14, 9	0.751	13, 8	0.752
Ride to shop, eat, visit friends, or to other activities besides work	7.1%, 10.0%	14.3%, 0%	15.4%, 0%	14, 8	**0.020**	13, 8	0.173
Take a bike ride for exercise or fun without a destination	0%, 10.0%	42.9%, 0%	23.1%, 0%	14, 8	**0.019**	13, 8	0.056

*The reported *P*-value evaluates the change in the number of days in the previous week that the respondent reported bicycling for a given purpose relative to the baseline survey; *P*-value less than 0.05 indicates that intervention group participants reported significantly greater increases in bicycling frequency than the control group participants.

Data Analysis

Participant characteristics were summarized using descriptive statistics. Tests for baseline differences between groups were assessed using *t*-tests for continuous variables, chi-square Fisher exact testing for proportions and categorical variables, and exact Wilcoxon rank-sum test for ordinal variables. Two-sample paired *t*-tests were used to identify significant changes in bicycle activity, fitness, and biometric measures between the bicycling intervention and control groups from baseline to 12 weeks and baseline to 20 weeks (STATA 14.1, College Station, TX). IPAQ was scored per established scoring protocol, utilizing minutes/day as the outcome. Within the transportation and leisure activity domains, comparisons were made between groups from baseline to 12 and 20 weeks, respectively, using ANOVA testing (SPSS, 22.0, Chicago, IL). Data were analyzed by group using intention-to-treat analysis.

RESULTS

Participant Characteristics

The participants were predominantly female (84%) and middle-aged (mean 41.8 years, range 22-65 years). Ninety-four percent of participants at the SSCHC site were Hispanic/Latino ethnicity and 100% of participants at the SSNC site were African American. Participants at both sites had low socioeconomic status, with 53% of participants overall reporting annual incomes of less than $15,000 and 71% of participants having less than high school completion or a GED certificate. However, the bicycling intervention group had a higher income than the control group (P = 0.0021). The intervention group was also more likely to report Latino/Hispanic ethnicity than the control group (62% vs 24%, P = 0.018). There were no other significant differences between study groups by age, education, gender, employment status, health insurance status, or chronic medical conditions. At enrollment, only 14% in the intervention and 25% in the control group (P = 0.410) owned a bicycle. See Table 1 for additional participant characteristics. There were no significant differences in age, gender, study group, site, or income between participants who dropped out either prior to baseline data collection or during the intervention period.

Barriers to Bicycling

Several barriers reported at baseline declined significantly more among intervention group members than control group members. At 12 weeks these barriers included not feeling healthy enough to bike (P = 0.036), being physically uncomfortable while bicycling (P = 0.012), not having a bicycle to use (P = 0.043), not having other people to bike with (P = 0.031), not knowing routes to use (P = 0.039), not feeling safe from crime (P = 0.020), not feeling safe from car traffic (P = 0.015), and adult bicycling not being socially acceptable in the respondent's neighborhood (P = 0.049). Two of these barrier reductions remained significantly greater for the intervention group at 20 weeks: not feeling healthy enough to bike (P = 0.045) and not feeling safe from car traffic (P = 0.015). Reductions in perceived barriers to bicycling are discussed in more detail elsewhere (R Schneider, et al, unpublished data, June 2016).

Physical Activity

The analysis explored overall self-reported physical activity. However, upon initial tabulation at baseline, on average, participants reported 270.5 minutes/day of vigorous intensity activity and 467 minutes/day of moderate intensity activity. Therefore, standard IPAQ scoring procedures were followed excluding participants reporting outlying values (>960 minutes/day of activity). Six participants' data were excluded from vigorous intensity analysis and 12 participants' were excluded from moderate intensity analyses. Many of the outlying values were reported in the occupation and household activity sections; therefore, only transportation and leisure time activity data are presented, as those are of interest to the current study.

Responses from the IPAQ revealed a significant difference in time spent bicycling for transport between control and intervention groups (mean difference +8.8 minutes/day in intervention group [95% CI, +0.2-17.4]) at the 20-week follow-up. Additionally, there was a significant increase in time spent biking in the intervention group from baseline to 20 weeks (+8.5 min/d, 95% CI, +1.3-15.8), with no significant increase in biking time in the control group.

Table 3. Biometric Testing by Study Group

	Baseline Mean (Min, Max), n	12 Week Mean (Min, Max), n	20 Week Mean (Min, Max), n	Difference 12 Week vs Baseline, by Treatment Group	Difference 20 Week vs Baseline, by Treatment Group
BMI				***P*-value, n**	***P*-value, n**
Control	38.2 (28.0-50.0), 16	36.5 (23.6-50.6), 12	36.7 (23.1-50.4), 12	0.515, 24	0.780, 24
Intervention	35.4 (25.5-51.2), 21	34.8 (25.1-51.1), 14	34.8 (25.0-51.5), 14		
Waist Circumference					
Control	110.3 (87.0-136.5), 16	107.0 (74.5-127.0), 12	108.8 (78.4-128.5), 12	0.069, 23	0.972, 24
Intervention	102.2 (72.5-136.5), 21	100.4 (76.0-136.0), 13	101.6 (74.5-134.0), 14		
Systolic BP					
Control	127.3 (96-146), 16	122.2 (99-141), 12	128.0 (106-166), 12	0.547, 23	0.258, 24
Intervention	121.3 (99-147), 21	125.0 (103-141), 13	121.4 (107-147), 14		
Diastolic BP					
Control	77.5 (64-93), 16	74.8 (63-91), 12	79.5 (67-94), 12	0.868, 23	0.237, 24
Intervention	77.5 (65-92), 21	76.0 (60-89), 13	76.6 (62-89), 14		
Steps					
Control	120.1 (83-160), 15	136.6 (97-201), 11	125.1 (105-158), 10	0.830, 20	0.659, 19
Intervention	128.4 (72-159), 15	145.2 (113-178), 13	140.4 (101-200), 13		

Abbreviations: BMI, body mass index; BP, blood pressure.

Further, time spent in moderate intensity leisure time physical activity was significantly different between groups at 12 weeks (mean difference +2.6 minutes/day in intervention group (95% CI, +0.8-6.0). There were no significant differences between or within groups for time spent in moderate intensity leisure time activity.

Self-reported bicycling for specific purposes also was compared between groups (Table 2). Bicycling for leisure and for non-work-related transportation both increased significantly more in the intervention than the control group ($P = 0.020$ and $P = 0.019$, respectively) from baseline to 12 weeks, while there was no significant difference between groups in bicycling to work ($P = 0.751$). None of these differences between groups persisted at 20 weeks.

Cyclometer data were available for 9 intervention group participants and reflected 23 to 72 days of data. These participants attended between 2 and 6 group rides and averaged 6.5 miles per week (range 1.0-15.0 miles per week), for a total recorded average riding distance of 38.6 miles (range 8.0-114.0 miles).

Fitness and Biometric Measures

Participants did an average of 124.3 steps on the baseline step test (95% CI, 116.0-132.6). The intervention group did an average of 128.4 (95% CI, 115.7-141.1) steps at baseline compared to 120.1 (95% CI, 108.2-132.0) in the control group; this difference was not statistically significant ($P = 0.15$).

Amongst baseline participants who remained in the study at 12 and 20 weeks, the group as a whole increased number of steps from 126.4 (95% CI, 117.3-135.5) to 138.5 (95% CI, 126.1-150.8) from baseline to 12 weeks (n=20, $P = 0.011$). BMI, waist circumference, and blood pressure did not change from baseline to 12 weeks for the group as a whole.

We compared the change in steps from baseline to 12 weeks and 20 weeks between intervention and control groups. There was a trend toward individuals in the intervention group having a greater increase in steps from baseline to 12 weeks by +13 steps (95% CI, +1.2 to +24.8) versus +11.1 steps in the control group (95% CI, -2.85 to +25.0), but this difference was not statistically significant. Both groups demonstrated some regression in fitness after the intervention period and summer months ended, with average number of steps trending back down between 12 and 20 weeks, from 136.6 to 125.1 in the control group and 145.2 to 140.4 in the intervention group; the change in steps from 12 to 20 weeks was nonsignificant ($P = 0.076$).

At baseline, average BMI was 36.6 (95% CI, 25.5-51.2) and waist circumference was 105.7 cm (95% CI, 72.5-136.5). Baseline average systolic blood pressure was 123.9 (95% CI, 95.5-147.0) and diastolic blood pressure was 77.5 (63.5-93.0). Baseline biometric measurements did not differ between study groups. BMI, blood pressure, and waist circumference did not change significantly between study groups throughout the study period. See Table 3 for additional biometric measurement data.

DISCUSSION

Our study generally supports the feasibility of conducting a bicycling intervention to improve the health of lower-income over-

weight or obese adults in urban communities of color. Intervention group participants experienced greater reductions in perceived barriers to bicycling and reported bicycling more for leisure and nonwork transportation purposes than control group participants.

There was interest in our target communities to recruit participants to the study. Our gender imbalance was notable; typically, bicycling is more common for adult men than women.[21] However, our recruitment tended to center around community events and health-related programming better attended by women. The implementation success of this intervention was highly discordant at the 2 sites. This led to smaller than expected sample size and dilution of the program effect, as the SSNC intervention participants each attended only 1 ride compared to the more robust intervention received by the 9 SSCHC intervention participants. Some possible factors include a more consistent ride schedule at SSCHC, a female cycling instructor (like the majority of participants), childcare availability, and different participant demographics.

However, the success of our SSCHC site intervention was notable. Participant engagement was high and bicycling skills, endurance, and comfort increased dramatically for active participants. Based on the success of our SSCHC site intervention implementation, we feel this program is feasible, with attention to the factors described above. Based on our pilot findings, we offer several recommendations for improvement and scaling for a larger study (see Table 4).

Our pilot experience supported our general approach to data collection, particularly the use of the step test, biometric assessments, and Bicycle Attitudes Survey. Even though IPAQ is widely used, validated for use in many languages and populations, and highly accepted for physical activity measurement, there are a number of documented limitations. Specific to our population, there is a well-documented overreporting of nonleisure time moderate to vigorous physical activity (MVPA) in multicultural samples or among cultural samples with higher levels of labor-based occupations.[22] Despite the availability of print and interviewer-administered IPAQ surveys in participants' preferred language, our participants appear to have overestimated their physical activity, as evidenced by the many participants reporting outlier activity levels. Direct measurement of physical activity would be preferable, although reliable capture of bicycling can be challenging.[23]

This pilot study was the first of its kind to test a bicycling intervention in a community-based setting using a randomized study design. Implementing this rigorous study design within community settings posed challenges, including regular participation, comprehension of technical survey questions, and social groupings.[24] However, its findings support additional research to refine bicycle program implementation and research methods in order to gain more knowledge about the potential impact of bicycling to improve the health of lower-income urban communities.

In addition to the sample size and variable intervention implementation discussed above, the study has additional limitations.

Table 4. Recommendations for Improvement and Scaling for Larger Study

Recruitment	• Recruit pairs or groups of friends or family to participate. • To recruit gender-balanced participant group: recruit for study at events well attended by men and women and utilize both male and female community health workers.
Study Design	• If using randomized controlled trial, consider crossover intervention design to increase equity for participants. Consider providing all participants a bicycle at baseline. • If feasible, follow participants further into the fall season or even the following spring or summer. • Block randomize by small units (5) within each group to ensure similar number of participants start in each group. • Analyze participant data by clusters for those recruited with friends or family members
Intervention	• Plan to begin the intervention as early in the spring/summer season as local weather allows, so crossover design and postintervention follow-up may be feasible. • Use a consistent schedule for group rides, and have this schedule available at the time of study recruitment. • Provide childcare for participants. • Utilize a cycling instructor who is a member of the participants' community.
Data Collection	• Consider use of direct physical activity measurement using a validated mobile application, if such a tool has been developed. • Substitute an alternate tool for self-reported physical activity for IPAQ when working with low-literacy participants, such as the Rapid Assessment of Physical Activity (RAPA).[26] • Consider measurement of insulin resistance in participants, as this outcome could be expected to change based on an intervention of this magnitude.

We recruited and enrolled participants who were family members or friends, but randomized them individually. When pairs were randomized to the intervention, they were observed to ride together frequently between group sessions. This finding is concordant with prior studies showing social support is an important facilitator of bicycling.[25] Our sample size was not adequate to consider recruiting and analyzing for this clustering effect. Another potential limitation results from the high proportion of participants without a bicycle at the beginning of the study. This instrumental barrier essentially prevented bicycling in the control group, which may have limited the usefulness of other information provided about barriers to bicycling. However, our experience was that the additional support and education provided by the intervention was necessary. Several of the intervention participants who were given access to their own bicycles either did not claim them or did not use them. Finally, our findings may not be applicable to other lower-income overweight urban populations, as we have identified that many cultural, structural, and other factors impact interest in and participation in bicycling.

Despite these limitations, this pilot study was the first of its kind to test a bicycling intervention in a community-based setting using a

randomized study design. Its findings support additional research to refine bicycle program implementation and research methods in order to gain more knowledge about the potential impact of bicycling as a feasible modality to improve the health of lower-income communities.

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Influences of a Church-Based Intervention on Falls Risk Among Seniors

Morgan Briggs, BA; Jeffrey A. Morzinski, PhD, MSW; Julie Ellis, PhD, RN

ABSTRACT

Background and Objectives: Prior studies illustrate that community-based programs effectively decrease falls risk in older adults and that faith-based programs improve health behaviors. The literature is unclear whether faith-based initiatives reduce seniors' fall risks. To tackle this gap, a long-term partnership led by 10 urban churches, a nearby nursing school, and a medical school developed a study with 3 objectives: determine baseline health concerns associated with falls (eg, depression, polypharmacy), implement a nurse-led, faith-based health education initiative for community-dwelling African American seniors at-risk of hospitalization, and assess pre- to post -program fall frequency.

Methods: The 100 Healthy, At-Risk Families study team implemented 8 monthly educational health sessions promoting self-care and social support. Community nurses led the 60- to 90-minute sessions at each of 10 churches. To collect study data, nurses interviewed enrolled seniors pre- and post-intervention. Descriptive and comparison statistics were analyzed in Excel and Statistical Package for Social Sciences.

Results: Senior data at baseline found high rates of polypharmacy and physical imbalance, and no significant depression or gaps in social support. There was not a statistically significant change pre- to post-program in fall frequency "in prior year."

Conclusions: Study findings reveal insights about African American senior health and fall risks. Church settings may provide a protective, psychosocial buffer for seniors, while polypharmacy and mobility/balance concerns indicate need for continued attention to fall risks. No increase in pre- to post-program falls was encouraging.

INTRODUCTION

Each year 1 in 4 adults aged 65 and older experience at least 1 fall. [1] These falls often limit mobility, lead to greater dependence —including social and financial costs of care—and increase premature death risk.[2-4] High incidence and impact make falls a critically important public health concern.

Studies of senior's fall risk examine factors such as depression, polypharmacy, and physical instability.[3,5,6] Community-based programs have effectively targeted these factors with balance assessments, balance and strength exercises, and education.[7-9] Traditional community initiatives may have difficulty reaching African American seniors.[10] However, church-based programs involving community churches are associated with improved health behaviors among African American seniors, such as improved nutrition, exercise, and cancer screening.[10-15] No available studies focus on church-based initiatives to reduce seniors' fall risks.

The 100 Healthy, At-Risk Families (100 HF) program is a church-based health initiative for African American seniors conducted by a partnership of 10 interdenominational churches, a nearby medical school, and an urban nursing school. A major component of this partnership was to examine the feasibility and influence of church-based health education and support on community-dwelling, African American seniors "at risk" for hospitalization due to multiple chronic diseases. We sought to achieve 3 outcomes: implement a nurse-led, church-based health education initiative for community-dwelling African American seniors at risk of hospitalization, determine a baseline of health concerns, and assess pre- to post-program health outcome changes.

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METHODS

Prior to initiating this study, the Medical College of Wisconsin Institutional Review Board reviewed and approved the study protocol.

Participants

Subjects were community-dwelling seniors, age 50 or over, with multiple chronic diseases and a recent history of hospital, emergency department, or urgent care use. Participants were members of one of 10 partnering churches. These longstanding cross-denominational churches were small to midsized with primarily African American members. All were in areas designated as health profession shortage areas, and none had experience with current or recent initiatives similar to 100 HF. All church pastors were enthusiastic and supportive. Pastors and project staff met about every other month during the 20-month initiative to hear nurses' updates and discuss community health advocacy.

Research team members recruited participants using print advertisements in church bulletins and word of mouth. Enrollment criteria were: (1) age 50 or older, (2) participating church member as determined by pastors, (3) 2 or more chronic illnesses, (4) hospitalization or urgent care use in prior 2 years, (5) able to make their own health care decision, (6) live in their homes or a homelike environment, and (7) displayed the potential to participate and benefit from the intervention as determined by a trained nurse.

Nurse Educators

The 100 HF study team recruited 6 community nurse educators (all registered nurses) who were currently or recently affiliated with one of the participating churches, had expertise in community health education with the African American community, and had adequate time to participate. A majority of the nurse educators were African American. All nurses met with and were approved by the pastor of the parish where they would be conducting the educational and support sessions, which were called "CHESS" sessions—Check Health, Evidence-based Education, Social Support.

Health Education Program

Development of the CHESS sessions began with a literature review to determine priority African American health issues. Study team members and community nurse educators then discussed multiple topics before arriving at 8 that became the main topics for the CHESS sessions. They were (1) Medication Management; (2) How to Talk to Your Doctor and Make the Most Out of Your Appointment; (3) Use It or Lose It, Keep Moving, Increase Physical Activity; (4) Staying Independent in Your Home: Preventing Falls; (5) Managing Stress in Your Life: The Blues, Social Isolation; (6) Eating for Health: Lower Sugar, Lower Salt, More Fruits and Vegetables; (7) Thanks for the Memory…Protecting Your Memory, Tips for Improving Memory; and (8) Managing Chronic Pain. Utilizing a balance between evidence-based sources and community engagement, the study team created a list of health topics based on current literature, discussed the topics with community members, and assembled handouts and worksheets for each topic based on the literature and discussions. These materials were previewed to determine an appropriate literacy level and to consistently check for cultural appropriateness. Materials were compiled and sent to each nurse educator.

Each CHESS session was 60 to 90 minutes long and occurred about monthly from late 2013 to mid-2014. Nurses used evidence-based, semistructured scripts for the 8 health topics. Sessions typically began with an introduction, distribution of handouts, and a 15-minute lecture-discussion. Seniors then discussed the topic, asked questions, and shared personal tips and lessons. Before the session concluded, nurses offered time for seniors to consult with them privately. These "Check Health" opportunities were guided by a brochure-sized "health trifold" developed in collaboration with a local team of family physicians. It contained panels for current medications, contact information for their health support team, and an area to enter "red flags"—conditions or concerns that, if left unchecked, could lead to deterioration in health and a possible need for acute care. Seniors were to keep their "health trifold" in their possession, bring it to health care appointments, and post it at home using a supplied kitchen magnet.

Study Instrument

The preassessment survey (13 pages, approximately 100 items) was developed by the project team. Survey items were adapted from previously validated instruments. Items included history of hospitalization, social support (MOS Social Support Survey),[16] independence in daily activities (Katz Index),[17] history of falls, depression (Geriatric Depression Scale or GDS),[18] spirituality and health (HOPE questions),[19] perception of health care coordination, and risk of falls and hospitalization (Managing Complex Chronic Care).[20] Surveys were checked for clarity and literacy level, then administered by nurses during an oral interview, pre-intervention and a shortened version was administered post-intervention.

Data Analysis

Data analysis used EXCEL and Statistical Package for Social Sciences (SPSS). Completed analyses produced descriptive sta-

tistics (means, sums, and standard deviations) and comparisons using McNemar's test and chi-square tests (significance $P<.05$). We used content analysis for text data.

RESULTS

Among the 84 seniors who began the program, a total of 64 (76%) completed both the pre- and post-assessment. A majority of study respondents were women (75%) and the age of subjects averaged 69 years, with a range of 47 to 94. Among participants, a total of 11% reported life experiences consistent with mild or moderate depression according to the Geriatric Depression Scale, 75% reported arthritis, 46.9% reported use of an assistive device, and 51.6% reported problems with balance. In addition, 100% reported 2 or more "medications I take," 62.8% reported 7 or more and 37.5% reported 10 or more. The most common medication types were cardiovascular medications, vitamins/supplements, and pain medications.

Pre-Post Assessment

The dropoff in participants from 84 at baseline to 64 at post-assessment was due to movement away from area, illness, scheduling conflicts, and death. From pre- to post-program, the difference in social support was not statistically significant [paired t (59) = .74, P = .46]. Also, there was not a statistically significant difference in depression from pre- to post-program [paired t (33) = -1.38, P = .18]. Fall frequency (number of individuals who fell) "in prior year" did not significantly change from 23 (36.5%) to 20 (33.3%). At baseline, there was a statistically significant association between fall frequency and the use of an assistive device (X^2 = 4.5, P = .03), as well as fall frequency and balance problems (X^2 = 7.3, P = .01). Our data showed that fall frequency did not have a statistically significant association with depression (X^2 = .01, P = .91), arthritis (X^2 = .82, P = 36), or poly-pharmacy (X^2 = 1.3, P = 73).

DISCUSSION

This pilot initiative demonstrated the feasibility of a nurse-led, church-based health initiative for seniors who are at risk of falls and related health risks. Key factors for the intervention's success included pastor engagement and a longstanding community-campus partnership. The pastors helped identify intervention participants and promoted the importance of health education. The partnership included nursing and family medicine collaboration with community members.[10] This partnership helped build rapport between research personnel and community members. Baseline data provide rich insights on senior health risks that will inform future studies pertaining to falls and prevention strategies.

Milwaukee County has a higher rate of inpatient hospitalizations due to falls than Wisconsin.[21] Therefore the nonstatistically significant difference in falls frequency in this at-risk population is encouraging by illustrating that a church-based initiative could help stabilize falls risk. Mobility assistive devices and balance were associated with falls at baseline. We found that 75% of seniors reported arthritis at baseline compared to the expected rate of 17% to 50%. This is an important finding requiring follow-up.[22] This result, in addition to the high rate of mobility concerns, calls for increased attention on mobility and movement disorders for falls prevention. Furthermore, the high rate of medication use in this population is a concern as literature associates older adult medication use with falls.[23,24]

This study was challenged with a high rate of noncompleters, and the absence of these subjects at post-assessment was a study limitation. Furthermore, enrollment criteria included hospitalization or urgent care use in the past 2 years. The survey did not specify if the participant used the urgent care for a chronic or acute problem. Therefore, this lack of specification is a limitation to the study. Greater power (eg, from a larger sample) or a more intense intervention focused on 1 factor (eg, poly-pharmacy) may have led to statistically significant results. The study team will continue efforts to prevent falls, and accurately assess and promote steps to limit falls and their impact on senior health.

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Wheels For All: Addressing Social Determinants of Health One Bicycle at a Time

Lucas Zellmer, BS; Nathan Fleming, MD, MPH

ABSTRACT

Background: Wheels For All provides bicycles to individuals in La Crosse, Wisconsin to address the transportation barrier that often inhibits low-income individuals' ability to access community resources.

Methods: Recipients are referred by social service, health care, or other community agencies based on their need for transportation or exercise. Donated bicycles are matched to a recipient, repaired, and delivered personally by volunteers.

Results: Through collaboration with social service agencies, health care systems, and the community at-large, Wheels For All received referrals from 21 different sources and provided 101 recipients with bicycles from April 2015 to July 2017.

Conclusion: Using a cost-effective, community-engagement model, Wheels For All provides a means of transportation for recipients, resulting in an enhanced ability to access community resources.

BACKGROUND

Bicycles offer riders exercise, opportunities for freedom and discovery, social interaction, and transportation.[1] What began as a way to show wealth and privilege[2] today is an activity enjoyed by all ages, races, and social classes. Wheels For All, UA (Unincorporated non-profit association) is designed to address health inequity by helping eliminate a transportation barrier to health care and social services,[3,4] enhance social capital through new relationships with volunteers and other community members, and increase the number of bicyclists on the road.

Recent literature describing the effects of social conditions on clinical outcomes has led to an increase in the prevalence of community outreach programs[5,6] that rely on cultural competence and community engagement to improve community-level health. An important component for these initiatives, which include La Crosse County's neighborhood-based social workers and St. Clare Health Mission's community health workers, is a means of transportation to and from the specific resource or service. Wheels For All aims to ensure qualified recipients are able to access available resources such as food, shelter, and health care.

This brief report describes a novel approach to addressing transportation issues among low-income populations in La Crosse, Wisconsin by utilizing a network of community partners. This cost-effective model directly benefits bicycle recipients while heightening area organizations' capacity to serve their target population.

METHODS

Wheels For All is a nonprofit social service organization that reaches underserved populations. Through stakeholder engagement and a novel referral process, the organization provides bicycles to individuals with the most urgent transportation needs.

From April 2015 to July 2017, all bicycles distributed to recipients were donated and most were converted to single-speed using new or high-quality used replacement parts. Single-speed bicycles require less maintenance and provide efficient riding on the relatively flat landscape of La Crosse. Bicycles not converted to single speed had fully functioning front and rear derailleurs with minimal wear on crankset and cassette teeth.

In addition to the bicycle, each recipient also received a new U-lock and tutorial on proper bike-locking techniques. Helmets were given to children but not adults due to budget limitations and adults' unwillingness to wear a helmet.

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Table 1. Recipient Demographics and Referral Rationale

	Primary Reason for Referral			Homeless Recipients	Total
	Transportation	Exercise	Recreation		
Women	19	3	2	2	24
Men	42	1	-	18	43
Children	-	-	34	-	34

Table 2. Referral Sources for Wheels For All Recipients

Type of Referral Organization/ Agency	Number of Referrals			
	2015	2016	2017	Total
Community member identified need	5	10	10	25
Faith-based organization	2	2	-	4
Healthcare	-	2	2	4
Homeless shelter	3	6	-	9
Social service	5	24	13	42
Soup kitchen	5	6	-	11
School	-	-	6	6

Stakeholder Engagement

Collaborative efforts with free clinic, shelter, and health and human service staff allowed Wheels For All to connect with individuals who otherwise might not know about the service. Staff met with community stakeholders to explain the referral process, and each community organization agreed the service is needed. No request for funding or support was made during the engagement process.

Recipient Selection

Shelter staff, social workers, and other social service and health care employees selected recipients for a variety of reasons including a need for transportation to and from work or appointments, a needed change in health behaviors, and recreational activities with friends and family members. (Table 1)

Once a recipient was identified, the referral organization called or e-mailed Wheels For All and an initial meeting was scheduled between the recipient and Wheels For All staff at a time and place chosen by the recipient.

The initial meeting typically was facilitated by the referral organization and was used solely for introductions and to assess the size of bicycle needed. An intake form was completed to obtain general information (name, phone number, referral source, use for bike) and to document each referral. During a second meeting, the bicycle and U-lock were provided to the recipient, along with general education on bicycle maintenance, such as proper tire pressure. In addition, the bicycle was evaluated for proper fit and the recipient's ability to safely ride a bike was assessed. All individuals identified by referral organizations received bicycles.

RESULTS

Since its inception in 2015, Wheels For All has provided 101 bicycles to area men, women, and children (Table 1). A diverse group of referral agencies (Table 2) ensures the allocation of Wheels For All's services is compliant with its goal to address transportation barriers in an equitable manner. During the study period, the organization received referrals from 21 different sources ranging from local churches to area homeless shelters.

The total time from initial referral to provision of a bicycle was 3 to 10 days, depending on the recipient's availability. Relationships with local bike shops and correspondence through Wheels For All's social media platform ensured a steady stream of bicycle donations, and the supply of bicycles consistently met demand.

DISCUSSION

Organizational Growth and Quality Improvement

Due to the influx of referrals and subsequent program growth, quality improvement and efficiency have been prioritized into 3 broad categories: communication, recipient outreach, and organizational growth.

Communication between Wheels For All and bicycle recipients has been enhanced. Each recipient is given contact information in order to communicate meeting times and general information, and also as a resource in the event a service need arises. The contact person at each referral organization also has contact information in case a recipient does not have access to a phone.

Since the majority of recipients are experiencing housing, financial, health, or employment insecurities at the time of the giveaway, substantial effort is made to reach individuals at locations most convenient to them. In addition, Wheels For All volunteers have provided countless repairs including tube/tire replacement, chain tensioning, brake adjustment, bottom bracket service, and derailleur adjustment to bicycles at locations throughout the city.

Increasing the number referral agencies through targeted engagement or word-of mouth continues to provide additional referrals and, in turn, more recipients. In addition, greater visibility in the community has led to an increase in service requests for non-Wheels For All bicycles. To date, no individual has been turned away for either bicycle or service requests.

Addressing the Transportation Barrier

Social determinants of health are the conditions in which people are born, grow, and work that are shaped by factors such as employment transportation, socioeconomic status, and educa-

Table 3. Cost Analysis of Bike-share and Bicycle Giveaway Methods

Method	Cost Per Bicycle
Purchase new	$149.99[11]
Refurbish used	$91.06[a]
Bike-share program	$946.50[12,b]

[a]Includes cost of bicycle (donated), chain, freewheel, U-lock, and chain tensioner.
[b]For initial year of bike-share program.

tion.[7] With over 50% of La Crosse's residents having an ALICE score below basic survival income level, as defined by the United Way,[8] a substantial subset of the population struggles to access fundamental resources for themselves and their families. In addition to the evident clinical benefits of bicycling,[9,10] Wheels For All was founded to allow recipients to address social determinants of health by eliminating the transportation barrier to community resources.

Community Participation

From its inception, Wheels For All has worked to align community engagement. The program utilizes its relationships with social service agencies, health care systems, area soup kitchens and shelters, faith-based organizations, and community members to ensure that the highest-priority individuals—those experiencing the greatest transportation barriers—receive bicycles. Partnerships with local bike shops and bicycle-related nonprofits offer knowledge, support, and sustainability for this model.

Prior to founding Wheels For All, research was done to determine the most cost-effective method for bicycle giveaways. As we learned, relying on bicycle donations and purchasing replacement parts is a less expensive alternative than buying a new single-speed bicycle or starting a bike-share program (Table 3). In addition to cost-effectiveness, our model was chosen because of its capacity to help form meaningful relationships with donors, recipients, and community organizations.

Limitations and Challenges

Since its inception, Wheels For All has faced some challenges, including bicycle theft—a glaring issue in the community. Even though recipients receive a U-lock, numerous bicycles have been reported stolen. Additional security measures, such as in-depth education on proper locking techniques and registering all bicycles with the La Crosse Police Department, will be considered for future recipients.

Additionally, while one of the intents for the program was to help recipients access resources by getting to appointments for health or social services, we have not analyzed these data sufficiently to determine whether these goals were met. Future research should determine the impact having a bicycle plays in accessing community resources, getting exercise, and decreasing social isolation.

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¡Venga Y Relájese! Pilot Stress Reduction Program for Migrant Latina Women Living in Low-Resource Settings From Milwaukee to Lima

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ABSTRACT

Latina women living in low-income communities frequently report a high prevalence of feeling physically and/or emotionally "unwell." Formative focus groups were used to design a 3-session stress reduction curriculum called ¡Venga y Relájese! (Come and relax yourself!). Survey data from 5 Milwaukee cohorts and 1 Peruvian cohort revealed statistically significant improvements in general health status, perceived stress status, and confidence to manage future stress among women who completed all sessions (n=54). The pilot ¡Venga y Relájese! stress reduction curriculum yielded benefits for Latina women living in low-income neighborhoods in Milwaukee, Wisconsin and Lima, Peru.

OBJECTIVE

The Well-Integrated Screening and Evaluation for Women Across the Nation (WISEWOMAN) program was a result of the 1993 congressional legislation that expanded the services offered within the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) to include cardiovascular prevention, screening, and referrals for medical services. In 2013, the Wisconsin Department of Health Services received a cooperative agreement from the Centers for Disease Control and Prevention (CDC) to implement the WISEWOMAN Program in various low-resource clinics across Wisconsin. According to preliminary community conversations and responses to initial WISEWOMAN intake questions, many Latina women living in these low-resource settings endorsed disproportionately high feelings of physical and/or emotional "unwellness."

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Women living in poverty, especially those with a history of migration, often live with chronic stress affected by psychological, economic, and environmental factors.[1] Stress results in a complex of physical and emotional responses that can increase risk for depression, anxiety, insomnia, weight gain, and cardiovascular and gastrointestinal problems.[2,3] Social support, meditation, and self-compassion have been shown to mitigate the negative effects of stress, reduce health risks, and provide pathways to healing.[4-6] This study aimed to evaluate stress in a cohort of Latina women in Wisconsin, design a sustainable stress mitigation program, and ultimately reduce chronic disease morbidity.

METHODS

Study Design

This study evaluated a pilot program implemented from March 2015 through June 2016 in a WISEWOMAN provider site in Milwaukee, Wisconsin and in a low-income community in Lima, Peru. Approval was obtained from the Institutional Review Board of the Universidad Nacional Mayor de San Marcos and deemed exempt by the University of Wisconsin-Madison. All parts of the pilot study were held in the Spanish language.

Formative focus groups with community women identified their perception of physiological and emotional causes of stress and access to coping strategies. These groups were also used to determine necessary factors for the successful implementation of a pilot intervention. These discussions were audio recorded and transcribed for qualitative analysis to aid the development of a community-responsive stress reduction program.

The intervention was modeled off of Professor Jon Kabat-Zinn's Mindfulness-Based Stress Reduction (MBSR), an 8-week program shown to reduce anxiety, depression, and pain in diverse patient populations by introducing participants to meditation, body awareness, mindfulness, and yoga.[4,5] Each session included didactic periods for group discussion, deep breathing, therapeutic movement, goal setting,

Figure 1. Implementation and Evaluation of ¡Venga y Relájese! Stress Reduction Program

Initial Focus Group (n = 10): What is stress for you?

Program Cohort (n = 20): ¡Venga y Relájese!

Week	Method of Evaluation
1	Demographic survey • Age, civil status, occupation, migratory history, education, past medical history Pre-intervention questionnaire • Perception of health, stress, effect on physical and emotional wellness, known stress reduction techniques • Likert Scale (1=good, 7= bad); reduction in posttest number viewed as improvement.
2	Life Change Index (1, 2) • Participants mark the presence of stressors and life changes within the last year. • Each "life change" carries a particular weight and provides an overall score. • Higher score correlates to probability of future illness.
3	Post-intervention questionnaire • Same questions as pre-intervention Testimonies • What did you learn? What tools will you use? • Open-ended

and guided meditation.[7,8] The second and third classes expanded upon lessons in mindful eating, self-compassion, and aromatherapy. Each cohort participated in 90-minute classes for 3 consecutive weeks and was encouraged to attend all sessions (detailed curriculum available in English-language, upon request).

Instruments

We collected demographic information regarding age, educational status, medical history, home environment, and migration history (country of origin, reason for immigration). During the first and last class, we quantified participants' perceived stress status and emotional and physical well-being on 7-point Likert scales. Open-ended questions evaluated present stressors, coping strategies, and awareness of community resources. During the second class, we applied the Homes and Rahe Life Change Index[9] to evaluate the presence of chronic stressors within the last year to predict probability of future illness; a score greater than 300 correlates to an 80% likelihood of enduring an illness in the near future.

No Spanish-language validated forms were available. However health professionals at Aurora Walker's Point Community Clinic who are native Spanish speakers helped revise numerous iterations of all program materials for language accuracy and cultural relevancy. Details of our qualitative and quantitative evaluation process are illustrated in Figure 1.

Participants

Latina women attending Aurora Walker's Point Community Clinic in Milwaukee were informed of the stress reduction class by posters in clinic, or by verbal invitations from clinic staff after responding to WISEWOMAN intake questions. If interested, clients provided contact information to the clinic receptionist for a reminder call prior to the first session. A comparable cohort in the peri-urban shantytown of Lomas de Zapallal, Puente Piedra, Lima, Peru was recruited by an invitation poster left outside of the community's secondary school, Colegio Pitagoras 8183. Attendance was voluntary and participants were informed their responses would be used for program evaluation.

Data Analysis

Data were collected and managed using REDCap, a secure web-based electronic data capture tool[10] and analyzed using STATA, version 14.1 (STATA Corp, Collegetown, TX). We analyzed qualitative data by thematic analysis to design our curriculum. Descriptive statistical analysis and paired *t*-tests were used to evaluate population demographics and behavioral change pre- and post-intervention both within and between geographical sites.

RESULTS

Thematic analysis of formative focus group data revealed the need for social support and stress reduction. One group member highlighted how she "always did everything for others and nothing" for herself. Immigration experiences negatively impacted by economic struggle and lost cultural identities were acknowledged as major sources of stress, as many participants noted "our culture is not important to our children." Many women identified church, being outside, and music as means of coping with stress. Further, they identified the need for brief, socially interactive, and fun activities to enhance their quality of life.

The mean age of participants (from both Milwaukee and Lima) was 45 years with a range of 29 to 77 years. Many women were married (39.1%); 21 (30.9%) identified as "housewives" and 17 (25%) reported unemployment. Nearly one-third (29.6%) reported primary school (1st -6th grade) as their highest education level; however, 23.9% had completed high school and 21.1% had some higher education. Fifty-nine (80.8%) were of Mexican nationality living in the United States and 11 (15.1%) were Peruvian living in Peru. All women endorsed a migratory history (to the United States or within Peru); 87.5% migrated more than 10 years ago (vs more recently) for economic reasons (46.5%) or to reunite with families (35.2%).

On average, Milwaukee participants reported that they spent 8.8 days (SD 9.2) physical and 7.9 days (SD 9.9) emotionally "unwell" each month. They noted being unable to complete activities secondary to stress-related illness an average of 6.6 days (SD 8.5) in the last month. Further, all but 2 surveyed women (96.7%) reported that their health could be improved. When Life Change Index scores were categorized, 38.9% scored between 150 and 299 and 11.1% greater than 300, reflecting an increased probability of illness within the next year by 50% and 80%, respectively.[9] No differences were found between women living in Peru or the United States in present or chronic stress indicators on pre-intervention questioning. The highest Life Change Index score was 495 among a Peruvian participant. Demographic and Life Change Index data are presented in Table 1.

Of participants who completed the program, significant changes in mean and SD were observed between pre- and posttest general perceived health (t = 2.03, P = 0.02), current stress level (t = 5.80, P <0.0001), and their confidence in their ability to reduce future stress (t = 2.43, P <0.01). Pre- and posttest data are presented in Table 2.

Table 1. Demographic and Life Change Index Data for ¡Venga Y Relájese! Stress Reduction Participants

Demographic Variable	N	n (%) Mean, SD	95% CI Range
Age (years)	70	45.3, 11.3	29-77
Civil Status	69		
Single		12 (17.4)	10.0, 28.5
Married		27 (39.1)	28.1, 51.2
Co-living		10 (14.5)	7.9, 25.2
Separated		12 (17.4)	10.0, 28.5
Divorced		6 (8.7)	3.9, 18.4
Widowed		2 (2.9)	7.0, 11.2
Vocational Status	68		
Housewife		21 (30.9)	20.9, 43.1
Fully employed		6 (8.8)	3.9, 18.6
Employed part-time		7 (10.3)	4,9, 10.4
Unemployed		17 (25.0)	16.0, 36.9
Number of people in house	56	3.8, 1.6	1-8
Educational level (n=71)	71		
0-6 (some primary school)		21 (29.6)	19.9, 41.5
7-12 (some secondary school)		36 (25.4)	16.4, 37.0
Completed secondary school		17 (23.9)	15.3, 35.5
13-16 (college) or higher degree		15 (21.1)	13.0, 32.4
Nationality	73		
Mexican		59 (80.8)	
Peruvian		11 (15.1)	
Other		3 (4.1)	
Duration in United States (or Urban Peru)	72		
≥ 10 years (4)		63 (87.5)	77.4, 93.5
< 10 years (1-3)		9 (12.5)	6.5, 22.6
Reason for Migration	71		
Economic		33 (46.5)	35.0, 58.3
Political		1 (1.4)	0.01, 9.7
Study		6 (8.5)	3.8, 17.9
Reunite with family		25 (35.2)	24.8, 47.2
Past Medical History (Self-Reported)	68		
Depression		23 (33.8)	
Anxiety		15 (22.1)	
Diabetes Mellitus		7 (10.3)	
Hypertension		6 (8.8)	
Life Change Index	54	128, 121.3	0-495
≥ 300 (80% to have illness in next year)		6 (11.1)	4.94, 23.1
150-299 (50% to have illness in next year)		21 (38.9)	26.6, 52.8
< 150 (30% to have illness in next year)		27 (50.0)	36.6, 63.4

DISCUSSION

The ¡Venga y Relájese! pilot stress reduction class enabled participants to achieve short-term reductions in stress, enhanced self-perceptions of wellness, and significantly improved participants' perceived control of their stress. Further, it achieved our goal to create constructive social spaces for Latina women to reduce isolation and share their stories while learning healthy stress reduction coping strategies.

The strength of this study is the evidence of positive effects on participants through a brief experience. The brevity of the curriculum helped attract many participants who may view longer wellness programs as too intensive or time-consuming. However, the brevity also may be considered a weakness if the coping strategies are only adopted in the short-term. As such, we plan to continue to evaluate the effects of the course 3, 6, and 12 months after completion. However, as many participants may be lost to follow-up, the long-term effects may be difficult to measure.

Table 2. Paired Pre- and Posttest Data from Milwaukee and Lima Women Who Completed the 3-Week Program Where Lower Scores Relate to Better Health

Variable	n	Pretest (Mean, SD)	Posttest (Mean, SD)	*t*	*P*-value
General perceived health	54	3.46, 1.13	3.17, 1.16	2.03	0.02
Present stress	52	4.37, 1.44	3.17, 2.78	5.80	<0.0001
Physical stress	52	4.27, 1.30	4.04, 1.63	1.02	0.156
Emotional stress	53	4.57, 1.39	4.23, 1.51	1.52	0.07
Confidence to reduce stress	45	3.76, 1.48	3.16, 1.54	2.43	0.009

The benefits reported by participants in Peru, albeit a small cohort, confirm that this curriculum may be beneficial for Latina women living in low-income communities both within and outside of the United States. No significantly statistical differences in baseline characteristic or program outcomes were found between geographical program sites. Of note, participant recruitment was easier and more sustainable in Milwaukee. This finding is most likely attributable to Wisconsin participants' relationship to the community health center, but perhaps also due to participants' higher comparative socioeconomic status and greater access to preventive health services.

We plan to sustain and advance this work by integrating class recruitment into primary care and mental health visits as well as training alumni to serve as future instructors. As we refined the curriculum, and gained experience and feedback from participants, we sought certification as an evidence-based Lifestyle Program (LSP) under the CDC's WISEWOMAN program and have created an English-language version of the program. These promising results provide evidence that pilot programs such as ¡Venga y Relájese! may benefit disadvantaged populations locally and globally.

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Recurring Vivid Dreams in an Older Hmong Man With Complex Trauma Experience and Cognitive Impairment

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ABSTRACT

Introduction: Health care workers need to consider the culture and ethnic preferences prevalent in the Hmong community in order to provide optimal care. We describe an older Hmong man to illustrate the challenges faced and competencies needed by primary care.

Case Presentation: An 80-year-old non-English speaking Hmong man with diabetes, nerve sheath tumor, and hypertension presented to the outpatient clinic with his grandson complaining of sleep problems. He had had 2 vivid recurring dreams during the previous few months. Memory assessment was significant for dementia.

Discussion: This case addresses the complexity in taking care of a non-English speaking Hmong older man who has memory loss, trauma in adulthood, multiple caregivers, and sleep problems.

Conclusions: A careful history from patient and family to get to know their cultural preferences and attitudes was helpful. Identification of the primary caregiver was critical in providing care.

INTRODUCTION

Wisconsin has the third largest Hmong community (N=49,420) in the United States with California being first and Minnesota second, according to 2010 US Census data.[1] This is a 190% increase in the Hmong population in Wisconsin from 1990 to 2010. Approximately half of the Hmong residents are foreign born and many came to the United States as refugees. Health care workers need to consider the culture and ethnic preferences prevalent in the Hmong community in order to provide optimal care. We describe an older Hmong man to illustrate the challenges faced and competencies needed by primary care. As the primary care team, we had the following questions: (1) How do we address cultural and language aspects in this case? (2) What is the role of trauma during adulthood on late life dementia? and (3) How does input from caregivers affect our care?

CASE PRESENTATION

An 82-year-old non-English speaking Hmong man with diabetes, nerve sheath tumor, and hypertension presented to the outpatient clinic with his grandson complaining of sleep problems. He had had 2 vivid recurring dreams during the previous few months, one of which reflected his military combat experience as a young man in Laos 40 years previously, the other a dream of happy resettlement in his homeland. He was not able to give more information due to memory loss.

The patient arrived in America as a refugee in the 1980s, together with his wife and 3 children. Prior to coming to America, he lived in a refugee camp for several years in Thailand after fleeing Laos, where he was a soldier, in the 1970s. He described being involved in direct combat during the war in Southeast Asia. At the time he presented to the clinic, he was living with his wife, son, daughter-in-law, and grandsons.

During this visit it was noted that he was not taking his antihypertensive medication or melatonin. Screens for posttraumatic stress disorder (PTSD) and depression were negative. Mini-Mental State Examination[2] score was 12/28, consistent with cognitive impairment. At a prior visit, an animal fluency test[3] had been administered (5 in 1 minute) and the Mini-Cog[4] (1/3 recall, 0/2 clock drawing) scores were consistent with cognitive impairment. The animal fluency test is performed by asking patients to say as many animals as possible in 1 minute (normal is > 14 animals). The Mini-Cog is a "3-minute" screening tool that consists of a short-term recall and clock drawing test. Further testing is recommended for abnormal scoring. However, the patient was nonliterate in either English or Hmong with only 2 years of schooling in Laos. His grandson's perception was that the patient didn't have

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any problems with memory. However, the patient was seen multiple times in the clinic, each time with a different family member who had different perspectives regarding his health. His daughter acknowledged observing his decline in cognition and function. She also noted that he was often depressed.

DISCUSSION

We describe an 82-year-old Hmong older man who was exposed to combat-related trauma and severe social upheaval 40 years earlier who now has sleep and memory problems and is nonadherent to his medicines. We held an interdisciplinary team meeting to consider several challenges faced in the care of a non-English speaking patient with dementia who has multiple caregivers.

First, cultural and language barriers can interfere with elicitation and interpretation of the information needed for accurate diagnosis, and the accuracy of cognitive and PTSD screens are poorly studied in Hmong patients. Dreams hold deep meaning in Hmong culture and memory loss may be considered a normal part of aging,[5] making it difficult to see either as symptoms of a medical condition; reluctance to accept western medical treatment might be a reason for his non-adherence to medication.[6] Hmong cultural practices commonly lead to denial of behavioral symptoms and delay medical attention until traditional healing practices fail, if then.[1]

Second, similar symptoms may be caused by different conditions. There is an association between a history of traumatic experiences and cognitive impairment. Many older Hmong in America have experienced cumulative trauma in adulthood, including displacement, life in refugee camps, or war.[7] In US combat veterans, the convergence of environmental stressors, physical illness, and age-related neurodegeneration may contribute to late life emergence of PTSD.[8] In US veterans, the prevalence and incidence of dementia in patients with PTSD is twice that of veterans without PTSD.[9] Trauma reenactment is common in aging veterans with dementia.[10] In patients with previously well-controlled PTSD, emergence of cognitive disorders may worsen PTSD symptoms.[11] PTSD screen could have been false negative due to cultural or language reasons. A possible reason could be the presence of a family member in the room causing the patient to not express his real feelings. Another well-known factor in a small community is that the medical interpreter is socially connected to the patient, leading to lack of privacy. However, overall we considered this patient to have experienced cumulative trauma during adulthood.

Third, the organization of family caregiving may critically influence what and how information is conveyed to clinicians. "Distributed" patterns of caregiving are common in many cultural groups; the person attending medical appointments may not be the best-informed regarding crucial aspects of the patient's health status and functioning, or may be reluctant to disclose information that might seem disrespectful to an elder.[12] We would have appreciated the wife's input in the patient's sleep problems because she was in the home with him all the time. The patient's wife, whose input might have helped clarify the nature of his sleep complaints, never accompanied him to clinic because of her frail condition. The patient was brought to the clinic by various family members who were involved in different aspects of his care, such as providing transportation or accompanying him. There was a lack of objectivity in the history depending on who accompanied him even though the medical interpreter was used every time. On further questioning, it was noted that one of his two daughters visited him daily and helped him with all cares. Once we understood that his daughter was his primary family caregiver at home, we arranged for her to come with him to the clinic. She acknowledged observing his decline in cognition and function. She also noted that he was often depressed. With the help of the medical interpreter, the patient voiced that he did not want to take antidepressants.

CONCLUSIONS

This case report highlights the challenges faced by a primary care geriatrician in the care of a Hmong American patient complaining of sleep problems. A careful history from patient and family to come up with a plan of care was important.

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Segmental Arterial Mediolysis: An Unusual Case Mistaken to be a Strangulated Hernia

Russell D. Japikse, MD, PhD; James E. Svenson, MD, MS; Perry J. Pickhardt, MD; Michael D. Repplinger, MD, PhD

ABSTRACT

Introduction: Segmental arterial mediolysis (SAM) is a rare nonatherosclerotic, noninflammatory vasculopathy causing arterial wall necrosis that leads to strictures, dissections, and aneurysms, particularly in medium-sized abdominal arteries. Awareness of SAM is important because, unlike vasculitides, immunosuppressive treatment may worsen the disease process.

Case: A 58-year-old man with multiple medical comorbidities presented with acute epigastric pain and a right incarcerated inguinal hernia that was interpreted as showing bowel strangulation on computed tomography. The hernia was unable to be reduced in the emergency department, so the patient was taken for open reduction by the surgical service. Intraoperatively, he was noted to have a ruptured superior mesenteric artery aneurysm. Conventional angiography demonstrated a bead-like appearance of several jejunal branches of the superior mesenteric artery, raising concern for a vasculitis. His hospital course included rheumatologic consultation, and initial recommendations were to start immunosuppressive therapy for treatment of polyarteritis nodosa. Further testing demonstrated normal antinuclear antibody, antineutrophil cytoplasmic antibodies, and complement levels. Due to a lack of systemic symptoms or signs and otherwise unremarkable laboratory evaluation, the patient ultimately was diagnosed with SAM and immunosuppressive therapy was halted.

Discussion: Unexplained medium arterial stenosis, dissection, aneurysm, and hemorrhage should raise suspicion for possible SAM. The initial management approach should focus on treatment of the acute hemorrhage, usually involving endovascular stenting or coil embolization. Unlike vasculitides, SAM does not benefit from, and may actually be harmed by, immunosuppressive therapy.

Conclusions: Clinicians involved in the longitudinal care of emergency department patients should be aware of this rare clinical entity in order to initiate appropriate treatment.

INTRODUCTION

Segmental arterial mediolysis (SAM) is a rare vasculopathy causing degeneration of the medial layer of arteries, particularly medium-sized abdominal vessels. First described in 1976, this noninflammatory, nonatherosclerotic disease of unknown origin has been reported to have mortality rates as high as 50%.[1,2] While SAM may present at any age, it is most frequently reported in the middle age and elderly and is generally noted to have an equal distribution between sexes, though 1 case series noted a slight male predominance.[2–6] The most common acute presentations involve hemorrhage, dissection, or occlusion of the celiac artery (50%-60%) and superior mesenteric artery (30%) with less common manifestations in the intracranial, carotid, iliac, coronary, and pulmonary arteries.[7] Perhaps due to the difficulty of diagnosis, stenoses secondary to SAM are a rarely diagnosed cause of chronic ischemic abdominal pain.[8] In this case report, we describe the presentation of a patient ultimately diagnosed with SAM, followed by a more in-depth discussion of the diagnosis and management of this rare entity.

CASE REPORT

A 58-year-old morbidly obese man presented to the emergency department (ED) with acute onset of severe, paroxysmal periumbilical pain that radiated bilaterally. His past medical history was significant for paroxysmal atrial fibrillation, venous thromboembolism with inferior vena cava filter placement, chronic kidney disease, umbilical hernia with a mesh repair, and a right inguinal hernia. The pain was variably described as sharp or tearing and was accompanied by nausea, vomiting, and a swollen and tender right hemiscrotum. On physical examination, his abdomen was soft, but diffusely tender to palpation. Additionally, his right hemiscrotum was enlarged and tender, consistent with an inguinal hernia.

Due to concern for aortic dissection, the patient underwent computed tomographic (CT) angiogram of his abdomen/pelvis, which was read as showing a right inguinal hernia with inflammatory changes consistent with a closed obstruction, though no

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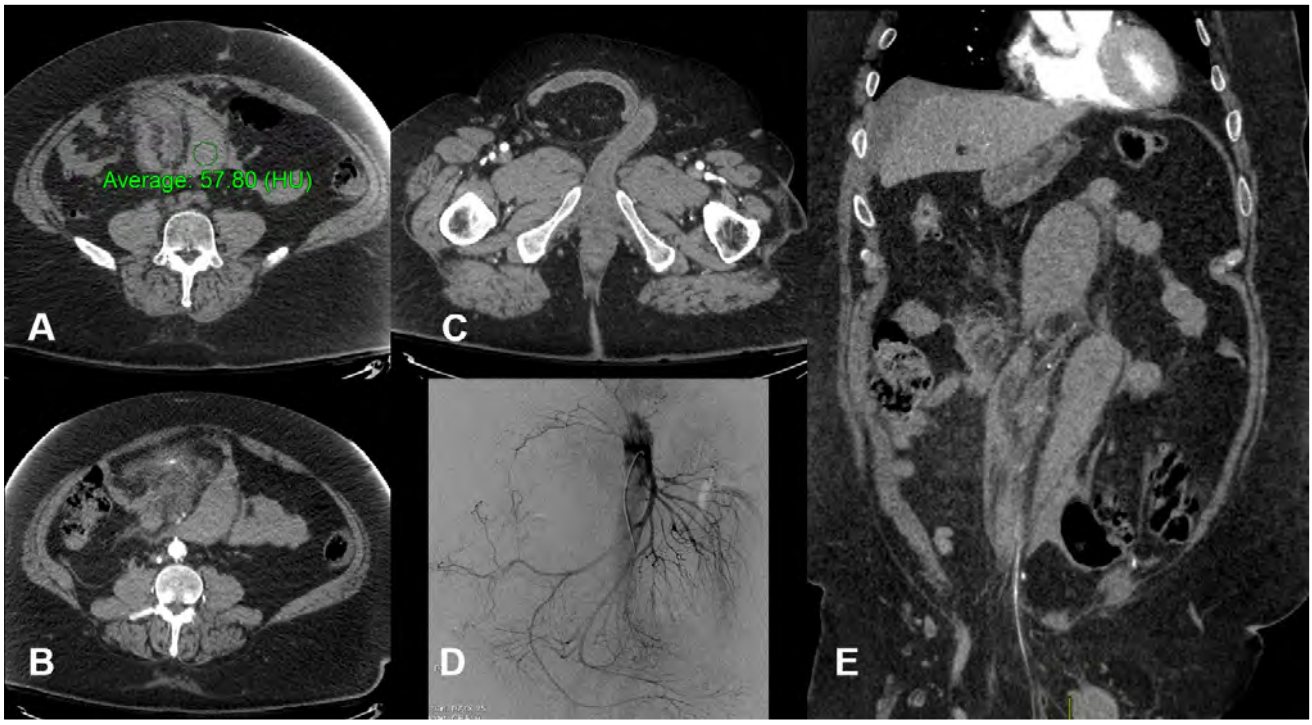
Figure. Computed Tomographic Imaging for the Patient at the Time of His Emergency Department Visit



(A) High attenuation (57 HU on noncontrast imaging) crescentic mesenteric collection, consistent with mesenteric hematoma; (B) blush from a branch of the superior mesenteric artery, indicating the site of active bleeding; (C) right inguinal hernia with unremarkable small bowel; (D) conventional angiography demonstrating subtle beading of small superior mesenteric artery branches; (E) coronal depiction of 2 large hematomas and part of the inguinal hernia.

abnormalities of the abdominal vasculature were seen, specifically no evidence of aortic dissection. Routine laboratory testing included sodium 140 mmol/L, potassium 4.4 mmol/L, chloride 110 mmol/L, carbon dioxide 24 mmol/L, anion gap 6 mmol/L, blood urea nitrogen 33 mg/dL, creatinine 2.6 mg/dL, glucose 116 mg/dL, albumin 3.4 g/dL, calcium 8.7 mg/dL, total protein 7.9 g/dL, troponin I <0.02 ng/mL, alkaline phosphatase 145 U/L, alanine aminotransferase 16 U/L, aspartate aminotransferase 8 U/L, total bilirubin 0.3 mg/dL, lipase 147 U/L, C reactive protein 3 mg/dL, white cell count 9,700/uL, hemoglobin 14.2 g/dL, hematocrit 43%, and platelet count 277,000/uL.

Attempts to reduce the hernia were unsuccessful and manipulation markedly increased the patient's pain. Therefore, the emergency surgery team decided to proceed with operative reduction of the incarcerated right inguinal hernia. Intraoperatively, the patient was noted to have hemoperitoneum with a "massive small bowel mesenteric hematoma at the root of the superior mesenteric artery…with a…palpable thrill." There was "a rough cobblestoned appearance…of the…entire small bowel mesentery." The jejunal branch of the superior mesenteric artery was ligated intraoperatively. The patient then proceeded to interventional radiology for endovascular intervention. During that procedure, a superior mesenteric arteriogram showed no evidence of active extravasation, however multiple small jejunal branches were noted to have a beaded, irregular appearance, consistent with polyarteritis nodosa (PAN). One of these branches that was near the known mesenteric hematoma was coil embolized due to concern that it may have been the culprit vessel causing the hematoma.

Over an extended hospitalization, the patient had surgical correction of his hernia and a repeat laparotomy for evaluation of possible abdominal compartment syndrome due to hemodynamic instability. During this subsequent operation, the previously identified hematoma was noted to be significantly decompressed and there was no evidence of active mesenteric bleeding nor signs of mesenteric ischemia. Additional laboratory testing during his hospital stay included a negative antinuclear antibody titer, negative anti-neutrophil cytoplasmic antibody, total C3 complement level 105 mg/dL, and total C4 complement level 19 mg/dL. Due to the beaded appearance of the superior mesenteric artery during conventional angiography and the elevated C reactive protein level, the consulting rheumatologist recommended that the patient start methylprednisolone for treatment of medium-vessel vasculitis, specifically PAN. Additional diagnoses entertained at the time included systemic lupus erythematosus, Behcet's disease, fibromuscular dysplasia, Ehlers-Danlos syndrome, and SAM. Lack of constitutional symptoms, however, argued against a systemic vasculitis like Behcet's and systemic lupus erythematosus. The "string of beads" appearance of the angiogram was noted to be most con-

sistent with either PAN or SAM. Biopsy of either a kidney or the mesentery, while potentially diagnostic for PAN, was not pursued because the consulting rheumatologist felt that a negative result would not be sufficient to rule out the disorder. Empiric steroids and cyclophosphamide were therefore recommended for treatment of PAN on initial consultation.

However, on further consideration, just prior to discharge, the consulting rheumatologist began to consider SAM as the most likely diagnosis. Reasons for this change in diagnosis included the fact that the patient exhibited no other system involvement, particularly no skin, pulmonary, central nervous system, or peripheral nervous system signs. Additionally, the conventional angiogram demonstrated abnormalities in only 1 medium-sized vessel instead of several, which favored the diagnosis of SAM over PAN. Further, the presenting symptom of mesenteric artery rupture was viewed as more consistent with the case reports of SAM available in the literature. Though the patient was continued on prednisone and azathioprine at the time of discharge, he was advised to taper off all immunosuppressive medicines at his 1-month follow-up visit due to the rheumatologist's final determination that the patient's disease process was most consistent with SAM and not PAN. Review of the initial CT noted a misinterpretation of an extensive hematoma as small bowel inflammatory changes (Figure). Further imaging evaluation of the patient's abdominal vasculature has not been available.

DISCUSSION

Though considered a unique disease entity, the etiology of SAM is not well understood. What is known is that mediolysis, characterized by vacuolization and lysis of outer smooth muscles cells in the media on histopathology, is characteristic of SAM. Tears can then develop, separating the outer medial muscle from the adventitia, leading to areas of weakness between the arterial lumen and adventitial layer and ultimately formation of intramural hematomas and dissecting aneurysms.[9] Minimal to no inflammatory changes are present and atherosclerotic plaques are absent. These dissections may thrombose, dissect further, or rupture. Stable lesions are filled with granulation tissue; subsequent resolution ranges from radiographically normal vessels to vessel stenosis.[7,10]

Classically, the presentation of SAM has been described as nonspecific abdominal or flank pain affecting middle-aged and older patients, perhaps with a slight male predominance.[11] More profound presentations due to aneurysm rupture occur in up to one-third of patients and are associated with a 50% mortality.[11,12] Cases have been reported to resolve over days to weeks while others resolve over years.[1,13,14] Most case reports document a single clinically significant presentation without repeat exacerbations. Though this occurs in 50% to 80% of cases, up to 40% of patients in the literature have disease recurrence.[15,16]

Angiographic findings of SAM include single or multiple areas of medium visceral artery dissection (the hallmark image finding of SAM), dilation, or occlusion and do not have a predilection for bifurcations as is seen with mycotic aneurysms.[9,13] Large vessel involvement would argue against SAM as a diagnosis, rather pointing toward a collagen vascular disease like Ehlers-Danlos syndrome or Marfan's syndrome. Though multiple aneurysms are noted in one-third of cases, isolated arterial dissection of a visceral artery is more characteristic of SAM.[1,17] Intramural hematomas along the course of the affected artery cause a beaded appearance, which can be also be seen in PAN and fibromuscular dysplasia.[5] Notably, while conventional angiography assists in the treatment of SAM, CT or magnetic resonance angiography are sufficient for the diagnosis and follow-up of patients with SAM.[13,18] Due to the significant overlap between the image findings of SAM and other vasculopathies, correlation with physical examination and laboratory findings are often required when histopathology is not pursued.

The differential diagnosis of SAM, as discussed in the case report, includes several rheumatologic conditions. Acute phase reactants (C reactive protein and erythrocyte sedimentation rate) as well as rheumatologic tests like anti-nuclear antibody, anti-neutrophil cytoplasmic antibody, and complement levels can corroborate or argue against systemic diseases like systemic lupus erythematosus, Behcet's disease, and PAN. Physical examination is also key to evaluating for non-SAM diagnoses. Joint hypermobility, lens subluxation, and skin laxity, for instance, would point toward a collagen vascular disease instead of SAM. Neurologic findings, caused by involvement of the carotid arteries, are more common in PAN and fibromuscular dysplasia.[19] Further, fibromuscular dysplasia typically affects the renal arteries of young females, causing stenosis and subsequent premature hypertension, while SAM is typically observed at an older age, affects primarily the celiac and superior mesenteric arteries, and causes arterial dissections and hemorrhage.[8] Though histopathology remains the reference standard for the diagnosis of SAM, guidelines for its diagnosis without histopathology have been described and incorporate the findings noted above.[17] In particular, patients should have no evidence of atherosclerosis on imaging, normal inflammatory markers, and no findings suggestive of collagen vascular diseases. One case series of 85 patients reported that nearly one-third of patients are diagnosed with only image findings.[11]

Initial management for SAM presenting with intraabdominal hemorrhage is focused on surgical or endovascular repair of structural complications with stenting, coiling, and resection being described.[16,20] Due to a 10% intraoperative mortality for patients undergoing surgical management, an endovascular approach has become preferred and is successful in nearly 90% of cases.[11] Subsequent medical management of SAM, as well as management of patients without intraabdominal hemorrhage, is unclear; immunosuppression has been described as either potentially worsening the natural course or, at best, being ineffective.[7,19] Use of antihypertensive medicines is indicated for those with exist-

ing aneurysms.[21] Antiplatelet and anticoagulation medicines have no definite role in the treatment of SAM. Mortality of the acute phase is estimated in the 40% to 50% range, however this is likely an overestimate given greater scrutiny applied to catastrophic presentations of SAM.[1] Of those who survive the acute phase, most case reports found patients to generally be asymptomatic, with follow-up imaging showing complete resolution or no change in the angiographic findings.[11]

The aim of this case report is to describe an unexpected presentation of SAM, which coincided with signs of a strangulated hernia that had been thought to be the cause of the patient's symptoms. We also highlight the importance of not treating this disease with immunosuppressive medications, as would otherwise be standard treatment for other vasculitides.

CONCLUSIONS

Segmental arterial mediolysis represents a rare cause of medium-vessel acute arterial hemorrhage as well as acute and subacute ischemia. Its presenting symptoms overlap considerably with other acute abdominal conditions commonly seen in the ED. Although it would appear that a high degree of clinical curiosity would be needed to evaluate for SAM, a standard CT abdomen/pelvis protocol using intravenous contrast is adequate for many presentations. Care should be taken, however, to ensure that the interpreting radiologist is aware of the potential vascular pathology questioned: CT angiography can definitively evaluate for this disease process.[13] Initiation of a vasculitis workup early in the treatment of these patients expedites their long-term care. Due to its apparently unique pathophysiology, empiric immunosuppression may worsen both SAM and wound healing from surgical repair.

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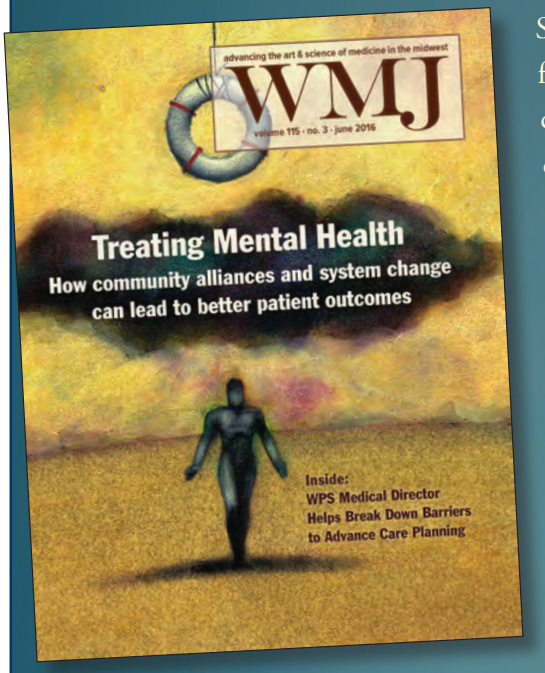

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Elizabeth Petty, MD

Robert N. Golden, MD

Embracing Innovation in Medical Education

Elizabeth Petty, MD; Robert N. Golden, MD

There has been a widespread call for revolutionary change in American medical education, reminiscent of the environment that led to the game-changing Flexner Report in the prior century. Abraham Flexner's landmark report on medical education in 1910 included an endorsement of a model medical curriculum that had been proposed a few years earlier by the American Medical Association (AMA). This "two-plus-two" model of medical education consisted of 2 years of medically relevant basic sciences followed by 2 years of immersive clinical instruction.[1,2] It became the cornerstone of medical education in the United States and Canada for more than a century. Flexner also noted the important role that physicians should play in addressing social and preventive issues, but public health and the humanities were not emphasized in his model.[3,4]

Medical education leaders made many incremental improvements in the "two-plus-two" model over the ensuing century, including an increased focus on the clinical relevance of basic sciences, more clinical specialty content, improvements in assessment tools, the addition of research training and service learning, and enhanced curriculum delivery methods. During the past decade, the pace of innovative and transformative change in medical education has accelerated dramatically in response to rapidly evolving changes in health care delivery. Adding to the momentum for change is a growing appreciation of the importance of public health perspectives, interprofessional training, health equity issues, and expanded pipelines of training for physicians committed to working with underserved populations.

Driven by the sense of urgency for curricular change, the nation's medical schools have developed and adopted new ways to prepare students for leadership roles in addressing individual and societal health care needs across the full continuum of rural, urban, and global communities.

Driven by the sense of urgency for curricular change, the nation's medical schools have developed and adopted new ways to prepare students for leadership roles in addressing individual and societal health care needs across the full continuum of rural, urban, and global communities. National organizations, including the AMA, the Association of American Medical Colleges, and the Association of Academic Health Centers—in partnership with assessment and accreditation bodies (eg, the National Board of Medical Examiners, the Liaison Committee on Medical Education)—have challenged schools to develop the most meaningful and relevant basic sciences, public health, health care delivery science, and interprofessional content. At the same time, the "milestones" assessment approach that has been developed by the Accreditation Council for Graduate Medical Education is shaping the evolution of longitudinal medical student training and development. The confluence of these factors has stimulated an exciting era of medical education reform and has inspired the University of Wisconsin School of Medicine and Public Health (SMPH) to develop innovative educational programs that will serve as models for the entire nation.

From its launch more than a century ago, the SMPH has been a nationally renowned innovator in medical student education, beginning with the creation of the nation's first statewide, community-based preceptorship program in 1926,

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and more recently—in 2006—its transformation into the first US school of medicine ***and*** public health.[5] Major innovations include unique medical student education programs designed to address major health needs in rural and urban areas of our state: the Wisconsin Academy for Rural Medicine (WARM) and the Training in Urban Medicine and Public Health (TRIUMPH) program.[6,7] These two tracks are designed to recruit and educate medical students who are committed to serving underserved rural and urban populations. They also represent a strong, dynamic partnership via our statewide academic campuses with Aurora Health Care, Gundersen Health System, and the Marshfield Clinic. To date, these innovative programs are achieving their goals. Most WARM graduates have chosen to practice medicine in rural Wisconsin after completing their residency training. The majority of the TRIUMPH medical students pursue residency training in urban "safety net" health centers, and a few of the earliest graduates have returned to Milwaukee to serve as faculty members in the TRIUMPH program. The relatively recent creation of our school's Native American Center for Health Professions is showing promise in achieving the goal of increasing the opportunities and workforce of Native American physicians. A robust, fully accredited Master of Public Health degree program, which includes dual-degree programs for medical, physician assistant, nursing, pharmacy, and other health professions students, is well established.

In 2016, after 4 years of intensive, thoughtful planning, the SMPH abandoned the "two-plus-two" model of medical education and launched its new, highly integrated ForWard Curriculum, which has 3 phases over 4 years. This interdisciplinary curriculum includes early immersion within interprofessional clinical teams; robust small-group, case-based active learning; increased career exploration options; and strong internship preparation (http://www.med.wisc.edu/md-program-forward-curriculum/48018). We also have carefully aligned our curriculum and career development programs with graduate medical education milestones to enhance the longitudinal professional development of our students. SMPH medical students continue to benefit from robust, statewide clinical education experiences at different health systems and academic campuses, with major hubs located in Green Bay, La Crosse, Madison, Marshfield, and Milwaukee.

Under the leadership of the Medical College of Wisconsin, we recently have partnered with 6 other medical schools from throughout the United States, as a founding member of the Kern Institute National Transformation Network, to develop major innovations in medical education (https://www.mcw.edu/Kern-Institute.htm). These transformations align well with the reinvigorated national emphasis on medical education reform that is designed to meet the changing landscape of health care and population health.

We remain deeply committed to ongoing innovative change and continuous quality improvement. Specifically, we are working on additional innovations and improvements that will promote:

1. An **integrated, interdisciplinary curriculum** that is highly relevant and responsive to current and predicted health care, public health, and societal needs in our state and throughout the world.
2. An **interprofessional collaborative learning environment** that prepares learners to serve effectively on high-functioning teams that promote patient safety, high quality care, and optimal health outcomes.
3. I**mmersive, hands-on, experiential learning approaches—**in clinics, classrooms, and communities**—**that are robust and meaningful and foster problem solving, critical thinking, and analytic skills.
4. **Individualized, flexible learning opportunities** that encourage scholarly pursuits in biomedical research, global health, public health, rural medicine, and urban medicine.
5. **Internship preparation and career exploration options** that enable students to become highly competent and confident from the start of their residencies.
6. An **inspirational professional learning environment and culture** that is built on a foundation of respect, humility, integrity, and empathy.
7. **Independent, lifelong learning skills** that nurture curiosity and enhance learners' ability to critically analyze data.
8. **Inclusion, equity, and diversity** that challenge students to identify and address health disparities and advance health equity.
9. **Resilience and individual wellness** that foster career satisfaction, professional fitness, and personal satisfaction.
10. **Integration into diverse communities across Wisconsin** and beyond.

All of what we are building is based on the foundation of the "Wisconsin Idea." Our priorities and strategies are shaped by the needs of the people of Wisconsin. We embrace all opportunities to form partnerships with communities, health care systems, and individual practitioners throughout the state. While we continue to grow our national reputation for excellence, our primary focus remains serving the people in our state. We currently receive approximately 10% of our budget from state funds, and we reserve approximately 70% of our medical student slots for applicants from Wisconsin (over the past 10 years, on average, 77% of our enrolled medical students have been Wisconsin residents). We will continue to develop pipeline and educational programs that are designed to attract the most highly qualified applicants with diverse interests, talents, experiences, backgrounds, and perspectives. We embrace change and educational innovation aimed at creating a new generation of physicians who, collectively, will address the unmet and evolving needs of the people and communities in our state, and ultimately the nation.

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Alcohol Use Increasing Among Adults 65 and Older

Jon Glover, LCSW; Jay A. Gold, MD, JD, MPH

New Tools Available to Improve Screening

Problem alcohol use continues to increase in Wisconsin. Most recently, it has been identified as a growing problem for Wisconsin adults age 65 and older by the Wisconsin Department of Health Services in *Wisconsin Epidemiological Profile on Alcohol and Other Drugs, 2016*, with rates of alcohol use, binge drinking, and heavy drinking reportedly higher than in the previous year.[1] The report aligns this concern with another unfortunate statistic: fall deaths.

The report states, "Overall, approximately 85% of fall deaths occur in the age group 65 and older; thus, it is likely that in 2015, approximately 365 fall-related deaths attributable to alcohol involved adults in this age group."[1]

The National Institute on Alcohol Abuse and Alcoholism (NIAAA) guidelines for alcohol use[2] recommendations for adults age 65 and older, regardless of gender, are the same as the recommendations for women. (No more than 3 drinks on any single day and no more than 7 drinks per week)[3]. The NIAAA reports "Older adults generally experience the effects of alcohol more quickly than when they were younger. This puts older adults at higher risks for falls, car crashes, and other unintentional injuries that may result from drinking." [3]

The guidelines point out that heavy drinking can contribute to health problems and have negative interactions with medications that adults age 65 and older may be taking. Some medications can be dangerous to take with alcohol, while others can be deadly.

In addition, the most commonly used brief screening tool, the Alcohol Use Disorders Identification Test (AUDIT)-C,[4] does not account for sex- or age-related differences. The AUDIT-C is based on European alcohol amounts (a standard drink = 10 grams) and has not been adjusted to reflect the alcohol amounts used in the United States (a standard drink = 14 grams). Furthermore, the AUDIT-C does not accurately measure alcohol consumption in comparison to the NIAAA guidelines described above, which can lead to confusion and misunderstanding when attempting to compare the scoring results with these recommendations.

Fortunately, a new option for more effective alcohol screening has been proposed by the Centers for Disease Control and Prevention (CDC) in its *Planning and Implementing Screening and Brief Intervention for Risky Alcohol Use – A Step-by-Step Guide for Primary Care Practices.*[5] A new version of the AUDIT, called the US AUDIT, has been developed to address these issues and adjust the first 3 questions of the original World Health Organization (WHO) AUDIT to accurately correlate with the NIAAA guidelines for men, women, and adults 65 and older. The brief version of this tool is called the US AUDIT 1-3 and it provides 2 additional levels of specificity that improve the ability to identify at-risk alcohol use in all populations.

According to the CDC guide mentioned above, at-risk drinkers make up approximately 29% of the population, 4% drink at the dependent level, and 25% at the nondependent level. The 25% in the nondependent drinking category have shown to be the most amenable to brief interventions and recommendations to decrease their alcohol use.

The Lake Superior Quality Innovation Network—a 3-state consortium of quality innovation network-quality improvement organizations that includes MetaStar—has been working to provide physicians and clinics that are part of its behavioral health initiative with updated tools. We believe this improved initial screening tool, the US AUDIT 1-3, along with increased physician attention to this issue, can be a significant help to identifying patients who could benefit from a medical recommendation that they consider decreasing their alcohol consumption. Screening for

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Jay A. Gold, MD, JD, MPH, is chief medical officer at MetaStar. Jon Glover, LCSW, is a project specialist at MetaStar. This material was prepared by the Lake Superior Quality Innovation Network, under contract with the Centers for Medicare and Medicaid Services (CMS), an agency of the US Department of Health and Human Services. The materials do not necessarily reflect CMS policy. 11SOW-WI-G1-17-36 050817.

alcohol use, using this new tool, can improve patient health and may even save lives.

For more information about this initiative, or to find helpful resources, visit www.lsqin.org/behavioralhealth.

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