MAYO CLINIC

Use of an Electronic Medical Record to Track Adherence to the Mediterranean Diet in a US Neurology Clinical Practice

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Abstract

Objective: We describe our experience with routinely capturing and analyzing Mediterranean diet data via structured clinical documentation support tools built into the electronic medical record and describe adherence to the Mediterranean diet in patients at risk for either stroke or dementia in a US neurology clinical practice.

Patients and Methods: The Mediterranean diet is associated with a reduced risk of stroke and dementia. The Department of Neurology at NorthShore University HealthSystem routinely evaluates patients at initial and annual outpatient visits using structured clinical documentation support (SCDS) tools built into the electronic medical record (EMR). For patient evaluations in our Vascular Neurology and Brain Health subspecialty clinics, SCDS tools in the EMR include the validated 14-item questionnaire for Mediterranean diet adherence (PREvención con DIeta MEDiterránea [PREDIMED]) that autoscores, auto-interprets, writes to the progress note, and electronically captures data. Our study population includes patients seen at these clinics from July 1, 2015, through November 29, 2017.

Results: At their initial office visit, 25.5% (95/373) of Brain Health patients scored 10 or more points ("strongly adherent") on the PREDIMED (median, 8; range, 0-14) whereas 6.7% (55/829) of Vascular Neurology patients achieved a score of 10 or more points (median, 6; range, 0-12). By contrast, 34.7% (2586/7447) of individuals in the original PREDIMED cohort were strongly adherent to the Mediterranean diet.

Conclusion: PREDIMED scores can be electronically captured to tailor nutrition interventions by assessing baseline adherence at the time of their initial neurology clinic visit. Patients in our Midwestern US clinics were weakly adherent to the Mediterranean diet. This suggests a major opportunity for nutrition intervention and education in US neurology clinical practices, toward preserving and improving brain health.

The Mediterranean diet is based on the dietary practices observed in the early 1960s in Greece, Spain, and southern Italy.[1,2] These dietary practices are also well documented in regions of other olive-cultivating countries bordering the Mediterranean Sea.[2,3] The Mediterranean diet includes high consumption of olive oil, fruits, vegetables, legumes, nuts, and unrefined cereals; moderate to high consumption of fish; moderate consumption of dairy products (cheese and yogurt); moderate wine consumption; and low consumption of nonfish meats (favoring white over red meats). The Mediterranean diet initially attracted attention because of its association with reduction in cardiovascular risk factors but also because of its association with a reduced risk of stroke and other

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vascular events.[3-7] More recently, the Mediterranean diet has been associated with improved cognition, reduced risk of Alzheimer disease, and delayed conversion to Alzheimer disease from mild cognitive impairment.[8-18]

Within the Department of Neurology at NorthShore University HealthSystem, the Mediterranean diet is promoted as a method to reduce disease risk. Patients are routinely evaluated at initial and annual outpatient visits using structured clinical documentation support (SCDS) tools built into the electronic medical record (EMR) that define best practices.[19] A 14-item questionnaire (PREvención con DIeta MEDiterránea [PREDIMED]) that measures adherence to the Mediterranean diet was developed and validated in the Spanish population and subsequently used in an Italian population.[20-25] Higher scores (≥10 of 14 points) were associated not only with fewer strokes but also with improved cognitive function.[26] For patients evaluated in 2 of our subspecialty clinics—Vascular Neurology (primary and secondary prevention of stroke) and Brain Health (primary prevention of dementia)—our SCDS toolkits include an electronic documentation flow sheet version of the PREDIMED screener.[20] The flow sheet provides clinical decision support (auto-scoring and auto-interpretation), writes to the progress note, and electronically captures data that can be analyzed for quality improvement and practice-based research. The overall scores and per-item responses are reviewed with patients as an initial step toward improving adherence to the Mediterranean diet. Patients with weakly or moderately adherent Mediterranean diet scores (<10) are routinely referred to a registered dietitian employed by the Department of Neurology for the assessment of nutritional status, education on the Mediterranean diet, and development of a personalized plan (overlaying nutritional guidelines for any comorbid conditions).

To our knowledge, there is no information published in the US population about the use of the 14-item PREDIMED screener. We describe our experience with routinely capturing and analyzing PREDIMED data via SCDS built into the EMR and examine how this diet is expressed in a US population. We believe that by describing these scores and examining covariates we can learn more about our population, improve quality of care, and tailor interventional programs to best meet our patients' needs.

PATIENTS AND METHODS

Study Design

The patient population of NorthShore University HealthSystem (NorthShore) consists primarily of individuals living in the northern suburbs of Chicago, an upper middle class community with high levels of education. For this study we included consecutive outpatients encountered in the Department of Neurology over a 29-month period (from July 1, 2015, through November 29, 2017), presenting for evaluation either in the Center for Brain Health (for primary prevention of Alzheimer disease or dementia; n=373) or in the Vascular Neurology program (for primary or secondary prevention of stroke; n=829). Among the stroke subtypes, there were 623 arterial ischemic strokes (75.2%) and 206 transient ischemic attacks (24.8%). The mean National Institutes of Health Stroke Scale score was 1.06.

Patients report Mediterranean ancestry information as part of the SCDS toolkit. We were particularly interested a priori in Mediterranean ancestry, as these individuals may be more likely to adhere to a Mediterranean diet. We defined Mediterranean ancestry in 2 ways: purely Mediterranean (strict definition) or partly Mediterranean (liberal definition). *Purely Mediterranean ancestry* was defined as having all maternal and paternal ascendants from a country of origin abutting the Mediterranean Sea: Gibraltar, Spain, France, Monaco, Italy, Malta, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Albania, Greece, Turkey, Cyprus, Syria, Lebanon, Israel, State of Palestine, Egypt, Libya, Tunisia, Algeria, and Morocco. *Partly Mediterranean ancestry* was defined as at least 1 maternal or paternal ascendant from a country abutting the Mediterranean Sea.

Electronic Medical Record and Structured Clinical Documentation Tools

As part of a quality improvement initiative aimed to transform neurological care and allow neurology practice-based research using the EMR, we have built and implemented SCDS tools within the EMR (Epic Systems

Corporation). In total, 11 toolkits have been built to include 10 neurological disorders as well as brain health. The toolkits were built to support clinical practice and research through standardizing office visits, streamlining documentation with auto-writing to the progress note, and capturing data that can be used for quality improvement and practice-based research. The toolkits contain custom navigators for each workflow (assigned to different members within the care team) that also link to electronic forms and allow for free text. Through collaboration between neurologists and the EMR optimization team, content was built, tested, and revised at biweekly meetings until the project was complete. Each of the 11 toolkits took approximately 3 months to build and implement. Of the 11 toolkits, 2 include assessment of the Mediterranean diet, as described below.

Assessment of the Mediterranean Diet

All Center for Brain Health and Vascular Neurology patients were evaluated using SCDS toolkits that include custom navigators (an index of electronic forms, assigned to medical assistants, nurses, neurologists, or research assistants as appropriate), electronic forms (discrete fields and variables, including cascading smart data elements), and summary flow sheets. These subspecialty-specific toolkits capture up to 411 fields ("Brain Health" toolkit) and 727 fields ("Stroke" toolkit) of data per encounter that define the disorders, measure outcomes, and also measure covariates.[19]

Adherence to the Mediterranean diet was assessed using the PREDIMED questionnaire that was built into Brain Health and Stroke SCDS toolkits within the EMR (Figure 1). This 14-item Mediterranean diet questionnaire was developed as part of the PREDIMED trial and later validated in older Spanish men and women.[4,22,27] The translation of the originally Spanish-written questionnaire was validated in English by using forward and backward translation to maintain equivalence of the 14-item questionnaire in English. Each item of the questionnaire is binary, with individuals receiving 1 point or 0 points per response, depending on the frequency with which they consumed food items that are either included

in or excluded from a strongly Mediterranean diet or depending on their food preferences. Different criteria were assigned for earning a point on the basis of the frequency of daily or weekly intake of a particular food or beverage item. Points are added up, giving each individual a PREDIMED score. The minimum possible score is 0, and the maximum score is 14. A score of 10 or more classifies an individual as "strongly adherent" to the Mediterranean diet, whereas a score of less than 10 classifies an individual as "weakly adherent."

Statistical Analyses

For continuous measures we described medians (ranges) and means ± SDs of the values; recorded the number of missing values; and visualized the distributions of the values using box and whisker plots by strata of the sample (eg, by sex). For categorical measures we described the frequencies of the values overall and by strata (eg, by sex). For demographic characteristics, analysis of variance was used to compare age and χ^2 tests for all other variables. For analyses of differences in Mediterranean diet score between categorical variables, P values derived using analysis of variance tests were used. For multivariable analysis, tests of linear regression were performed. Statistical significance was set at the $P=.05$ level, and all analyses were completed using R software (R Development Core Team).

RESULTS

Demographic Characteristics

Patient characteristics are summarized in Table 1. Of the 373 patients evaluated at the Center for Brain Health, 260 (70%) were women. All patients (100%) reported 12 or more years of education, with 196 (52.5%) having more than 16 years of education. Of the 829 patients evaluated in our Vascular Neurology outpatient clinic, 374 (45.1%) were women, 764 (92.2%) patients reported 12 or more years of education, and 219 (26.4%) had more than 16 years of education.

Compared with the Vascular Neurology cohort, the Brain Health cohort was significantly younger ($P<.001$), more likely to be female patients, more likely to have higher levels of education, and tended to be more partly or

FIGURE 1. Screenshots of the PREvención con DIeta MEDiterránea questionnaire built into Brain Health and Stroke structured clinical documentation support toolkits within the electronic medical record. ©2017 EPIC Systems Corporation, used with permission.

purely Mediterranean. Compared with the PREDIMED cohort (in which all participants reside in a Mediterranean region), our US

neurology clinical practice patients (from the Chicagoland region), both Vascular Neurology and Brain Health cohorts combined, had

TABLE 1. Descriptive Characteristics of Brain Health, Vascular Neurology, and PREDIMED Cohorts[a,b]					
Characteristic	Brain Health cohort (n=373)	Vascular Neurology cohort (n=829)	P value[c]	PREDIMED cohort (n=7447)	
Age (y)	61.6±10.9	71.5±13.4	<.001	Age (y)	67.0±6.2
Sex			<.001	Sex	
Male	113 (30.3)	455 (54.9)		Male	3165 (42.5)
Female	260 (69.7)	374 (45.1)		Female	4282 (57.5)
BMI (kg/m^2)			.36	BMI (kg/m^2)	
<18.5 (underweight)	7 (1.9)	7 (0.8)			
18.5-24.9 (normal weight)	105 (28.1)	255 (30.8)		<25	563 (7.6)
25-29.9 (overweight)	140 (37.5)	301 (36.3)		25-29.9	3401 (45.7)
≥30 (obesity)	103 (27.6)	217 (26.2)		≥30	3483 (46.8)
Unknown	18 (4.8)	49 (5.9)			
Years of education			<.001	Education[d]	
<12	0 (0)	47 (5.7)		Primary or less	(77.7)
12-16	172 (46.1)	545 (65.7)		Secondary	(15.1)
>16	196 (52.5)	219 (26.4)		Higher	(7.1)
Unknown	5 (1.3)	18 (2.2)			
Mediterranean ancestry[e]			.03	Region of residence[d]	
Non-Mediterranean	244 (65.4)	758 (91.4)		Northern Spain	(22.8)
Partly Mediterranean	19 (5.1)	29 (3.5)		North-east Spain	(32.0)
Purely Mediterranean	14 (3.8)	29 (3.5)		Eastern Spain	(23.4)
Unknown	96 (25.7)	13 (1.6)		Southern Spain	(21.7)

[a]BMI = body mass index; PREDIMED = PREvención con DIeta MEDiterránea.
[b]Data are presented as mean ± SD or as No. (percentage).
[c]P value comparing Brain Health and Vascular Neurology cohorts using analysis of variance (age) and χ^2 tests (BMI, ancestry, and education).
[d]Numbers unknown from published PREDIMED data. Only percentages shown.
[e]Strictly defined.

higher levels of education and lower prevalence of being overweight or obese.
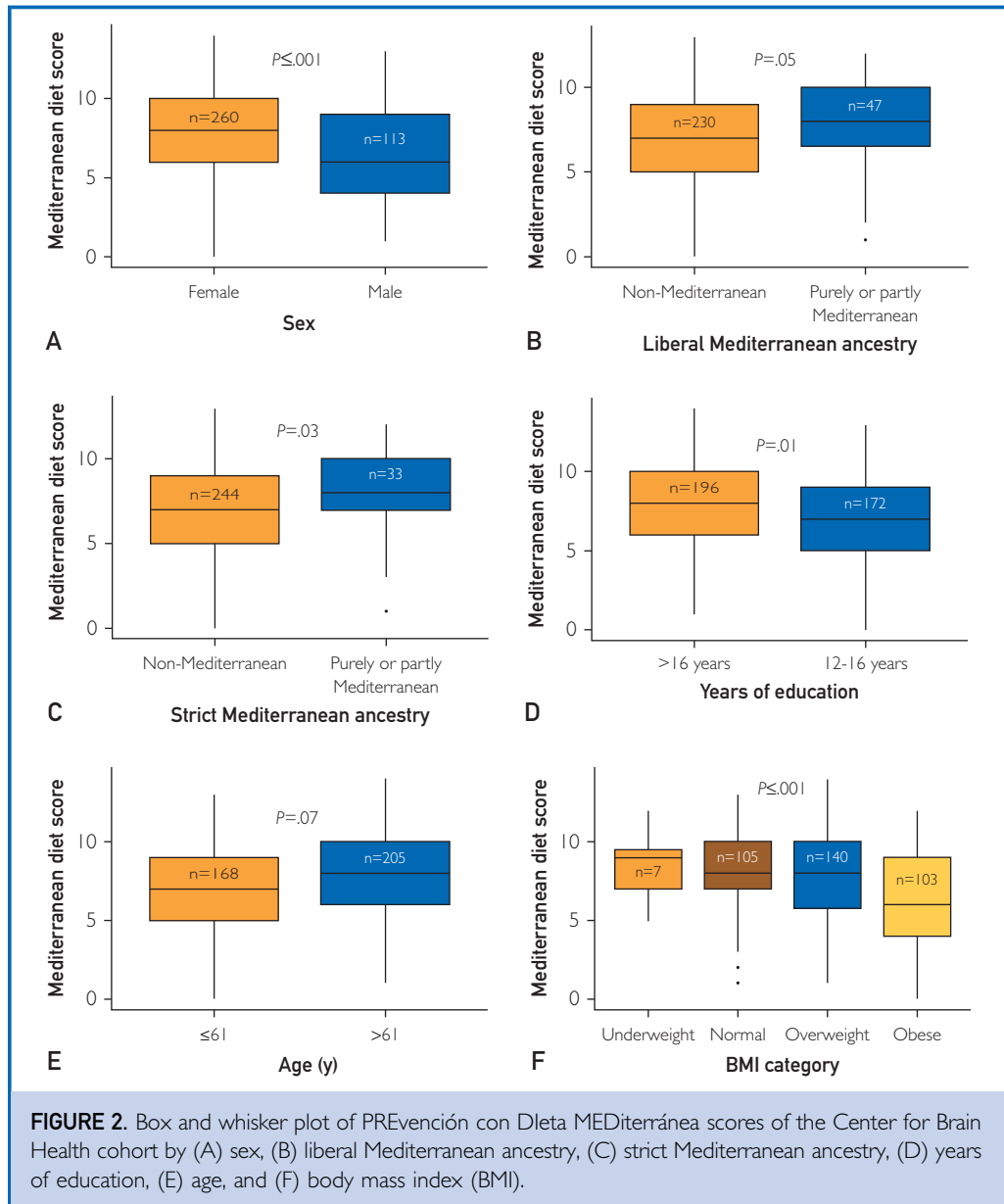
PREvención con DIeta MEDiterránea Score

Twenty-six percent of Brain Health patients scored 10 or more points on the PREDIMED questionnaire (mean, 7.4±2.7; median, 8; range, 0-14), whereas 7% of Vascular Neurology patients scored 10 or more points on the PREDIMED questionnaire (mean, 5.9±2.3; median, 6; range, 0-12). The difference in means (1.5) was statistically significant (95% CI, 1.2-1.8; P<.001).

In the Brain Health cohort (Figure 2), 85% (317/373) of patients were willing or very willing to modify their diet. Women had a significantly higher PREDIMED score than did men (P<.001). Persons with a purely or partly Mediterranean ancestry (liberal definition) had a higher PREDIMED score than did persons reporting no Mediterranean ancestry. However, when Mediterranean ancestry was defined strictly, there was a significant association with PREDIMED score (P=.03), though the number of purely

Mediterranean participants was small. Individuals older than 61 years had higher, but not significant, scores than did those 61 years or younger. Similar to the findings in the PREDIMED cohort, there was a significant reduction in score associated with less education (P=.01) and increasing body mass index (calculated as the weight in kilograms divided by the height in meters squared) (P<.001).

For the Vascular Neurology cohort (Figure 3), women and men had similar PREDIMED scores. Persons with purely, partly, or no Mediterranean ancestry (liberally defined) had similar PREDIMED scores. When Mediterranean ancestry was defined strictly, there was again no association with PREDIMED score. There was a significant association of higher PREDIMED scores with increasing education (P<.001). In contrast to the Center for Brain Health cohort, there appeared to be an association between age and PREDIMED score, with patients below the median age scoring higher than those older. There was no association between PREDIMED score and body mass index.

FIGURE 2. Box and whisker plot of PREvención con DIeta MEDiterránea scores of the Center for Brain Health cohort by (A) sex, (B) liberal Mediterranean ancestry, (C) strict Mediterranean ancestry, (D) years of education, (E) age, and (F) body mass index (BMI).
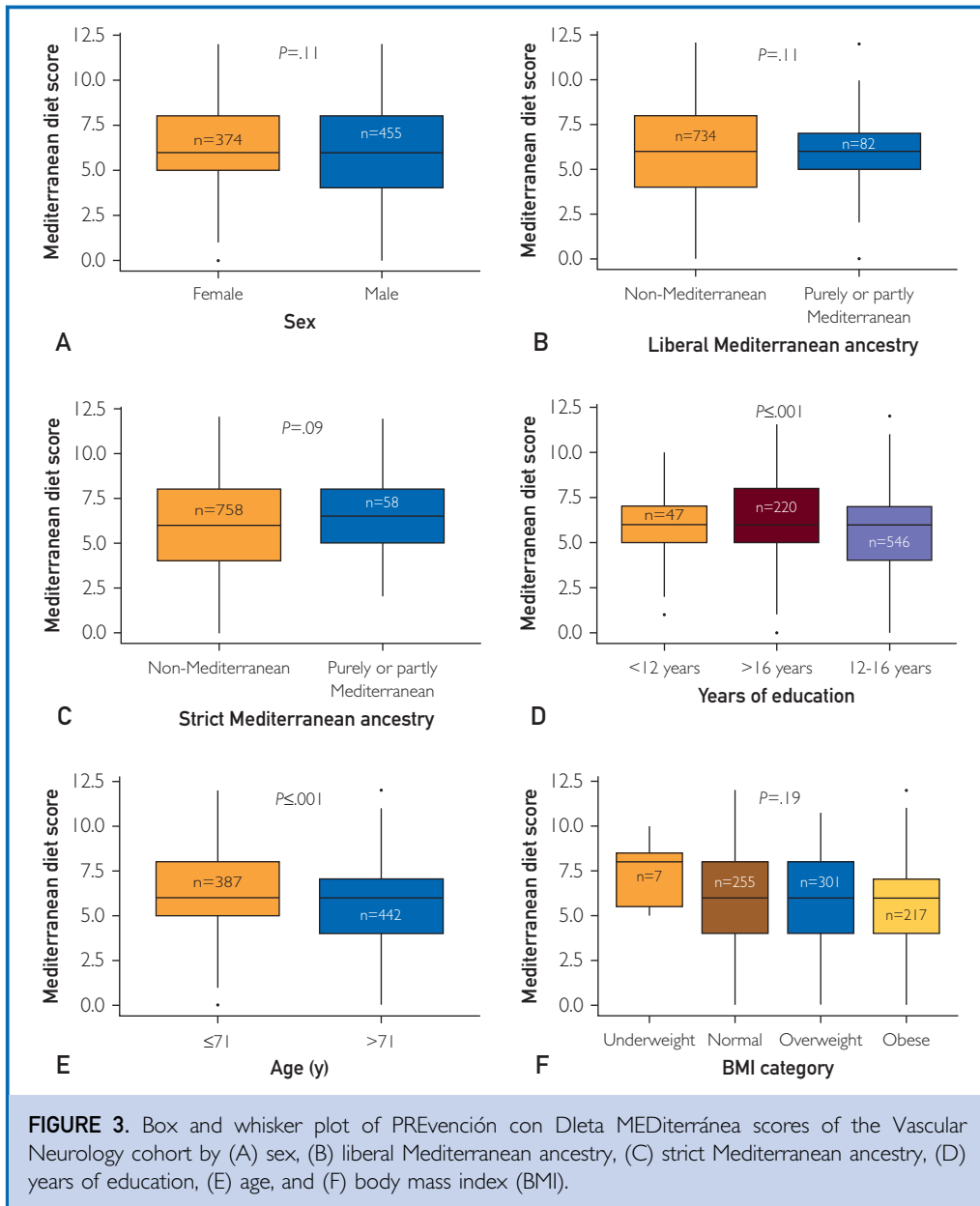
Adherence to the Mediterranean Diet

Table 2 summarizes the itemized data for adherence to the Mediterranean diet between men and women. In the Brain Health cohort, women were significantly more likely to receive a point for using olive oil as a main culinary fat (item 1), for eating 2+ servings of vegetables daily (item 3), for not eating red meat daily (item 5), for not drinking sweet or carbonated beverages daily (item 7), and for preferentially consuming white meat (item 13). No significant differences between men and women were observed for other PREDIMED items. All patients more often lost rather than received a point for item 2 (tablespoons of olive oil per day), item 4 (fruit units per day), item 8 (wine glasses per week), item 9 (servings of legumes per week), item 10 (servings of fish or shellfish per week), and item 14 (servings of sofrito sauce per week).

In the Vascular Neurology cohort, women were significantly more likely to receive a point for eating 2+ vegetables per day (item 3), for eating 3+ servings of fruit daily (item 4), for not eating red meat daily (item 5),

FIGURE 3. Box and whisker plot of PREvención con DIeta MEDiterránea scores of the Vascular Neurology cohort by (A) sex, (B) liberal Mediterranean ancestry, (C) strict Mediterranean ancestry, (D) years of education, (E) age, and (F) body mass index (BMI).

and for preferring white meat (item 13). No significant sex differences in the distribution of points for any of the other PREDIMED items were observed. All patients more often lost rather than received a point for item 2 (tablespoons of olive oil per day), item 4 (fruit units per day), item 8 (wine glasses per week), item 9 (servings of legumes per week), item 10 (servings of fish or shellfish per week), item 12 (servings of nuts per week), and item 14 (servings of sofrito sauce per week).

Figure 4 provides the comparison of participants in the original Spanish PREDIMED cohort and in the Brain Health and Vascular Neurology cohorts of this study, showing a significant difference in mean score between the 3 studies ($P<.001$, adjusted for age and sex). The mean PREDIMED score for the original PREDIMED cohort was 8.6; for the Brain Health cohort, it was 7.4; and for the Vascular Neurology cohort, it was 5.9.

In supplementary analyses, we used multivariable models to assess the independent

TABLE 2. PREDIMED Diet Items Answered in the Affirmative by US Neurology Clinical Practice Cohort and Sex[a,b]

PREDIMED diet item	Brain Health cohort (N=373)			Vascular Neurology cohort (N=829)		
	Women (n=260)	Men (n=113)	P value	Women (n=374)	Men (n=455)	P value
1. Olive oil as a main source of culinary fat	194 (75)	52 (46)	<.001	193 (52)	237 (52)	.95
2. 4+ tablespoons of olive oil daily	45 (17)	14 (12)	.30	29 (8)	37 (8)	.94
3. 2+ servings vegetables daily	185 (71)	62 (55)	.003	196 (52)	197 (43)	.01
4. 3+ servings fruit daily	121 (47)	41 (36)	.09	136 (36)	126 (28)	.009
5. <1 serving red meat or meat products daily	208 (80)	69 (61)	<.001	241 (64)	251 (55)	.008
6. <1 serving butter, margarine, or cream daily	198 (76)	83 (73)	.67	226 (60)	285 (63)	.56
7. <1 sweet or carbonated beverages daily	219 (84)	79 (70)	.002	285 (76)	318 (70)	.05
8. 7+ glasses wine weekly	55 (21)	14 (12)	.06	15 (4)	26 (6)	.33
9. 3+ servings legumes weekly	112 (43)	43 (38)	.43	99 (26)	144 (32)	.12
10. 3+ servings fish or shellfish weekly	82 (32)	27 (24)	.17	78 (21)	100 (22)	.76
11. <3 commercial sweets weekly	179 (69)	67 (59)	.09	241 (64)	299 (66)	.76
12. 3+ servings nuts weekly	164 (63)	71 (63)	>.99	123 (33)	177 (39)	.09
13. Prefer white meat	220 (85)	77 (68)	<.001	276 (74)	289 (64)	.002
14. 2+ servings sofrito weekly	64 (25)	26 (23)	.93	134 (36)	160 (35)	.90

[a]PREDIMED = PREvención con DIeta MEDiterránea.

[b]Data are presented as counts and frequencies, which indicate number (percentage) of patients who received a point for the PREDIMED item, where the total sum of points possibly ranges from 0 to 14 (1 point per item) and scores of ≥10 indicate strong adherence to the Mediterranean diet.
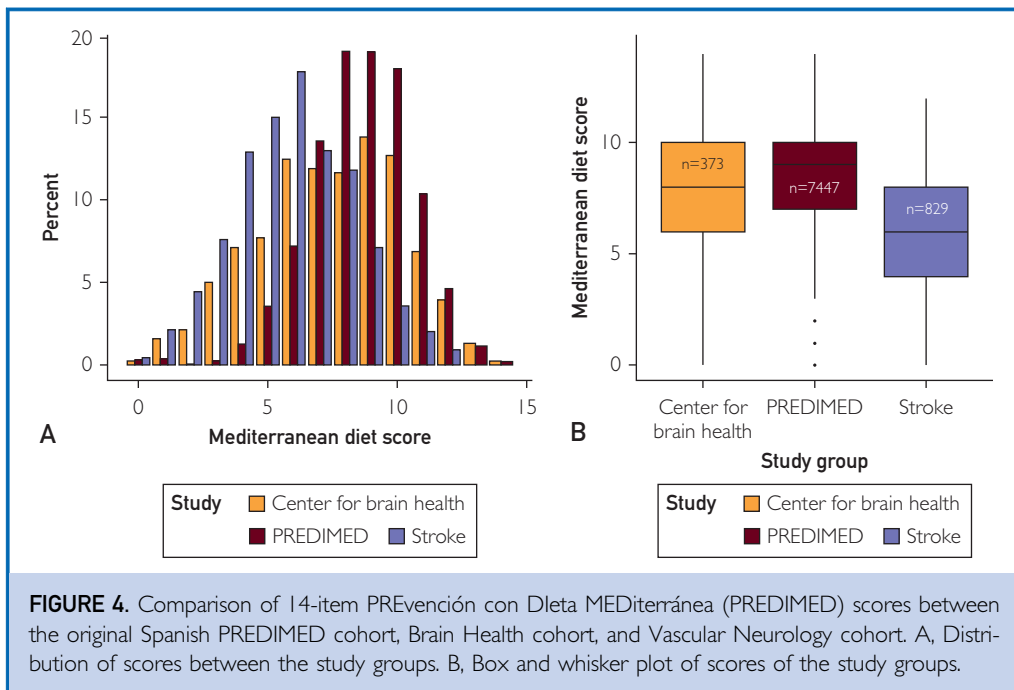
contribution of our identified demographic factors to differences in overall PREDIMED score. In addition, because the PREDIMED cohort is loaded with cardiovascular risk factors, we further investigated whether additional variables available in our cohorts (alcohol use, smoking history, diabetes, dyslipidemia, and hypertension) were associated with PREDIMED score. Similar to the PREDIMED cohort and consistent with our unadjusted findings, increasing body mass index was associated with a reduced score (P<.001, adjusted for age and sex). The results for sex were similar to univariable results, with male sex being associated with a reduced score (P<.001) and individuals reporting a "purely" Mediterranean ancestry having significantly higher PREDIMED scores (P=.01). In addition, individuals with a diagnosis of hypertension had significantly lower PREDIMED scores (P=.003), but the absolute difference was small (an average of 0.8 reduced score).

DISCUSSION

This article describes our experience with routinely ascertaining self-reported adherence to the Mediterranean diet in a Midwest US neurology clinical practice that included patients at risk for stroke or dementia by using an electronic version of PREDIMED built into our EMR.

The electronic version of the flow sheet provides clinical decision support (autoscoring and auto-interpretation), writes to the progress note, and electronically captures data that can be analyzed for quality improvement and practice-based research. The overall scores and per-item responses are reviewed with patients as an initial step toward improving adherence to the Mediterranean diet. Patients with weakly adherent Mediterranean diet scores (<10) are routinely referred to a registered dietitian employed by the Department of Neurology for the assessment of nutritional status, education on the Mediterranean diet, and development of a personalized plan (overlaying nutritional guidelines for any comorbid conditions).

Intake of nutritious foods may be associated with level of education and socioeconomic status. Our highly educated upper middle class population generally has the means to play an active role in their health care. However, our findings may not generalize to other populations with lower levels of education and lower socioeconomic status. Nevertheless, these demographic characteristics make this population an interesting one to study, as we may be able to identify and understand factors aside from level of education and socioeconomic status that could influence health behaviors, motivation, and adherence

FIGURE 4. Comparison of 14-item PREvención con DIeta MEDiterránea (PREDIMED) scores between the original Spanish PREDIMED cohort, Brain Health cohort, and Vascular Neurology cohort. A, Distribution of scores between the study groups. B, Box and whisker plot of scores of the study groups.

to a diet that may influence disease risk and health status. In fact, we found that certain factors were associated with poorer PREDIMED scores and may suggest a subset of people who may preferentially benefit from dietary interventions. This has clinical relevance for identifying individuals who may be particularly amenable to dietary interventions.

In our Center for Brain Health and Vascular Neurology cohorts, 26.6% (93/373) and 6.7% (55/829) patients, respectively, were strongly adherent to the Mediterranean diet, despite its neuroprotection benefits. Factors that associated significantly included sex, education, and possibly Mediterranean ancestry. Quantity of olive oil used daily, fruit units per day, glasses of wine per week, servings of legumes per week, servings of fish or shellfish per week, and servings of sofrito sauce per week were weaker items in both cohorts. These findings are interesting in comparison to those found in the PREDIMED cohort. Despite including patients with cardiovascular risk factors and higher levels of overweight and obesity (which are inversely correlated with the PREDIMED score), the Spanish patients had significantly higher PREDIMED scores, which suggests that in Mediterranean regions, even those predisposed to

heart disease have better adherence to the Mediterranean diet than our 2 cohorts of US patients. The opportunity to improve outcomes via dietary intervention was also evident in our Brain Health cohort, in that a readiness questionnaire indicated that most patients were willing or very willing to modify their diet.

The Vascular Neurology cohort provides an interesting contrast to the Brain Health cohort, as most of these individuals have already experienced a serious adverse health event (stroke or transient ischemic attack). One might expect these patients to be more motivated to follow a brain and heart healthy diet, or even to have already begun modifying their diet, after their index event. However, readiness was not assessed for those patients.

Our study has weaknesses. We did not validate the PREDIMED questionnaire against a Food Frequency Questionnaire in our population. However, this has been done in Spanish patient populations.[22] It is possible that in the United States, the PREDIMED questionnaire is a less valid measure of adherence to the Mediterranean diet than in Europe. In addition, one of the pitfalls of nutrition research, particularly retrospectively collected nutrition research, is that it is susceptible to misclassification. In this case participants may overreport

their intake because of knowledge of the benefit of adherence to a Mediterranean diet. However, this is most likely nondifferential, resulting in a dilution of any apparent differences, and is a limitation of any retrospective self-reported assessment. And although meals eaten out should be considered by respondents in their answers to questions, some may not be aware of the types of oils their foods were cooked with when eating out. This could result in misclassification of their response to items 1 and 2 on the questionnaire if the respondent ate many meals out. Again, this misclassification is probably nondifferential and unlikely to induce any spurious findings.

We cannot generalize our findings to the general US population (unselected for risk of dementia or risk of stroke) to determine whether adherence to the Mediterranean diet is stronger in the United States than observed in our neurology clinical practice, though we may be able to generalize the results to similar populations within the United States. However, our goal here was to evaluate the ability to use this screener in populations with vascular disease or at risk for dementia within the scope of a quality improvement and practice-based research initiative in neurology using the EMR.[28] We have a loyal patient population with high follow-up rates and intend to follow these patients to determine whether our interventions are positively affecting their diet adherence and health outcomes.

We believe that our study makes a strong case that it is feasible to evaluate adherence to the Mediterranean diet in a clinical practice setting, that the integration of these assessments within the EMR is pragmatic with low missing value rates, and that there is a huge unmet opportunity to improve neurological health through dietary interventions. Not only the PREDIMED questionnaire provided the clinician and the patient with information about the strength of the adherence to the Mediterranean diet overall, but the review of individual item responses ("missed points") also provided immediate feedback to patients about how they could elect to achieve weekly a score of 10 or more. The PREDIMED questionnaire also served as a pragmatic guide in deciding which patients to refer to a dietitian for Mediterranean diet instruction, a service not paid for by many payers, and hence identifying for which patients we could perhaps forego the cost (ie, those with high scores).

With federal funding support, we are sharing our SCDS toolkits for Brain Health and Vascular Neurology (as well as for 9 other neurological disorders) with other neurology clinical practices that are also sharing de-identified electronically captured data (in support of a Neurology Practice-Based Research Network). We aim to improve quality by comparing outcomes.[19] We hypothesize that increasing awareness of adherence to the Mediterranean diet in US neurology clinical practices may ultimately reduce the burden of dementia and stroke in the health systems and communities we serve.

CONCLUSION

Adherence to the Mediterranean diet can be routinely measured and captured in the EMR and analyzed for quality improvement and practice-based research. Our patients in a Midwestern US community were weakly adherent to the Mediterranean diet. This suggests potential for a major opportunity for nutrition intervention and education in US neurology clinical practices.

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