Risk and Protective Factors for Cost-Related Nonadherence Among Middle East and North African (MENA) Adults

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Objective: Cost-related nonadherence to health maintenance behaviors is common in the general population, yet we know little about these behaviors in Middle East and North African (MENA) Americans. We examined cost-related nonadherence (CRN) in the MENA community in SE Michigan to determine demographic predictors, and risk and protective factors.

Design, Setting, and Participants: We used data from a cross-sectional convenience sample of MENA adults (N=398) conducted May-September 2019 to identify relevant demographic predictors, as well as the association between individual health, social, and clinical factors and the likelihood of reporting CRN.

Methods and Measures: CRN was defined by whether respondents reported any of the following: that they took less medicine, skipped doses, or delayed getting a prescription filled. Other factors included patient/provider communication and racial concordance, mental health distress, food insecurity and insurance status. We used multivariable logistic regression models to determine association of these health and social factors with CRN.

Results: Those with highest incomes were least likely to report CRN. Participants with private insurance and with no coverage were more likely to report CRN compared with those with Medicaid coverage. Risk factors for CRN included food insecurity and mental health distress, though strong patient/provider communication was protective of CRN.

Discussion: The risk factors for CRN in the MENA community align with risk factors in the general population. As provider communication is protective of CRN, interventions focused on improving patient/provider communication may serve as a way to protect against financially motivated medication nonadherence. *Ethn Dis.* 2022;32(1):11-20; doi:10.18865/ed.32.1.11

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Introduction

Millions of Americans struggle financially with the costs associated with their health care and nearly 30% of US adults skip taking prescribed medication because of cost.[1] This adaptation of treatment is known as cost-related nonadherence (CRN).[2] Across national studies, rates of CRN among adults range from 6.8% to 19.8%.[3,4] CRN is associated with adverse health consequences including more severe disease progression, increased utilization of acute care services, and hospitalization.[5] Demographic, health, and socio-economic characteristics at the individual level have been associated with high rates of CRN, younger age,[6] female sex,[2] depressive symptoms,[7] worse health and food insecurity,[8] lack of health insurance,[6] and financial difficulties.[9] Those with high-dedcutible private health insurance may also be at an increased risk for CRN.[10]

We know little about factors that can protect against CRN in diverse populations. Some studies have shown that good patient/provider communication[5] and trust[11] can help protect against CRN, and patient/provider concordance on race may serve to improve that communication.[12]

Known risk factors and potential moderators of CRN have primarily come from large, national data sets and medical claims. There is a paucity of literature examining CRN in ethnic minority populations, though a few studies have shown high levels of CRN among Black and Latinx populations compared

with the majority White population.[13] Differences in CRN among ethnic minorities compared with Whites may relate to lower SES or higher rates of chronic disease, both of which have roots in structural and historical racism[14]; it is important to control for these factors in examinations with racial/ethnic groups to determine if there are other contributing factors influencing outcomes.

Those with ancestry in any of the 22 Middle East and North African (MENA) countries are a growing ethnic minority population in the United States overall and specifically in Michigan.[15] MENA individuals are considered White in the US census and in national health surveys and there are no official indicators provided for MENA origin beyond the write-in option.[16] As a result, there are no national-level data on CRN among the MENA population. One of the largest populations and most concentrated population of MENA people in the United States is in Southeast (SE) Michigan in the metro-Detroit area.[15] However, this population differs from the national MENA population in that more report low incomes and the region comprises a larger number of recent immigrants and refugees whose access to insurance may differ from other MENA populations.[17] Additionally, data from Michigan show high rates of discrimination and numerous health care disparities in the MENA community, including lower rates of health care coverage, higher rates of no health care provider and no health care access due to cost, and worse self-rated health compared with statewide metrics for the general population.[15,17] Prevalence of CRN in the MENA population is currently unknown, though data from other ethnic minority groups with similar socio-economic circumstances indicate that CRN may be prevalent in the MENA community.

The purpose of this study was to examine CRN in a cross-sectional MENA sample in SE Michigan by demographic characteristics and potential risk and protective factors.

Residence in or near an ethnic enclave may provide the MENA community in SE Michigan possible health and economic buffers against poor health outcomes, as is the case in other ethnic enclaves.[18] For many in this community, a strong sense of social cohesion along with a high value placed on personal relationships may increase the importance of relationships, trust, and good communication between patients and providers,[19] which has been found to protect against general nonadherence[5] and may therefore be protective against CRN. It may also be important to patients that their providers share their MENA identity and have a similar view around discrimination and other unfair treatment, so we examined these as possible predictors of CRN. The importance of racial concordance and shared identity-based experiences between patients and providers has been found to be protective for medication adherence in some instances for ethnic minorities,[12] though the results are mixed.[20]

The extent to which risk and protective factors for CRN differ for the MENA population compared with the general population in Michigan is unknown. Further understanding of CRN among MENA individuals can inform cultural compatible interventions. The purpose of this study was to examine CRN in a cross-sectional MENA sample in SE Michigan by demographic characteristics and potential risk and protective factors.

Methods

Study Design, Data Sources, and Study Population

Data came from a cross-sectional convenience sample survey exploring health-related knowledge, attitudes, and behavior of MENA adults living in SE Michigan. Between May and September 2019, a survey, available in English and Arabic, was distributed in 12 community settings (eg, grocery stores, local eateries, clinics, mosques, churches, and community events) across three counties. Recruitment was completed through posters, fliers and in-person outreach. Participants were given the option of completing the survey with a pen and paper or online, with assistance if needed from trained, bilingual

interviewers. They were given a $25 incentive. The sample included adults 18 years of age and older and self-identifying as either Arab or Chaldean, the two largest MENA ethnic groups in SE Michigan.[15] We excluded surveys from analysis due to total missingness of data on the dependent variables, leaving 398 respondents out of the full sample of 450 with fully completed surveys for analysis. The study was approved by the Institutional Review Board (IRB) at the University of Michigan.

Measures

Cost-related Nonadherence (CRN)

Our primary outcome of interest was CRN, which was measured with three items (α=.78)[8]. Participants were asked whether they engaged in any of the following behaviors over the last 12 months because of cost: 1) took less medicine; 2) skipped doses; or 3) delayed getting a prescription filled (yes/no). A positive response to any of the three items was an indication of CRN,[8] which was treated as a dichotomous variable in logistic regression models.

Protective Factors

Patient/Provider Communication

We measured patient/provider communication with seven items adapted from the National Cancer Institute's Health Information National Trends Survey (α =.95). Participants were asked how often, over the past 12 months, their primary care physician: a) gave them a chance to ask questions; b) attended to their feelings; c) involved them in decisions about their health care; d) made sure they understood everything; e) explained everything; f) spent enough time with them; and g) helped them deal with feelings of uncertainty (4 point Likert Scale, 0-never to 3-always). A mean score of the items was used to account for skipped items (2.33, SD=.74, range 0-3), with higher scores indicating better communication.

Patient/Provider Racial Concordance

To assess patient/provider race concordance, respondents were asked the following question: "is your primary care physician of MENA descent?" (yes/no).

Treated Unfairly

We measured whether respondents felt they were often treated unfairly with a single item from the Whitehall Study: "I often have the feeling that I am being treated unfairly" [21] (6-point Likert scale, 0-strongly disagree to 5-strongly agree), with a higher score indicating a greater sense of unfair treatment. This variable was used as a possible predictor and dichotomized into high (≥3) and low (<3) for the regression analysis.

Usual Source of Care

The survey had one item to capture a usual source of care. The question asked respondents what their normal place of care was.[22] This was characterized into a binary item of a usual source of care (clinic, doctor's office, outpatient) and no usual source of care (emergency department, some other place).

Demographic, Social, and Clinical Predictors

We also collected information on possible individual social determinants of CRN, including demographic, care-seeking, and health information such as type of insurance coverage, income, and standard measures of self-rated health.

Food Insecurity

Food insecurity was measured with the sum of two questions from the US Census Bureau's American Housing Survey. Respondents were asked the frequency (3-point scale, 0-never, 1-sometimes, or 2-often) of the following statements: "I worried whether our food would run out before I got money to buy more," and "The food I bought just didn't last and I didn't have money to get more." Total summed scores for these two items were used in the logistic regression models as an independent variable predicting CRN, (range 0-4) with a higher score indicating more food insecurity.

Mental Health Distress

To measure depressive symptoms and anxiety, we used the four-item PHQ-4 scale (α=.94).[23] Items were summed (range 0-12), with a higher score indicating worse mental health, in line with the original PHQ-4 scale measurement recommendations.[23]

Statistics

We used estimates from the Arab American Institute to determine the MENA population and country-of-origin sub-groups in Michigan for weighting.[24] Data were then weighted using post-stratification raking

based on mother's and father's country of origin to better match, and therefore be more representative of the MENA population distribution in SE Michigan. Weighted data were used for demographic percentages, prevalence of predictor variables and prevalence of CRN. For all other analysis, unweighted data were used. Descriptive and bivariate statistics were used to examine differences between participants who did and did not report CRN. To determine demographic factors associated with CRN, we used a multivariable logistic regression model with the following independent variables: sex, age, immigration status, income, health insurance type, and chronic disease status. These demographic factors were included in this analysis based on significance in bivariate analysis and previous literature. Finally, we computed multivariable logistic regression models with other health and social variables. We completed three multiple variable logistic regression models of health and economic factors predicting CRN, one each for self-rated health, mental health distress, and food insecurity. The models were adjusted for sex, age, income, health insurance type, and chronic disease status. Statistical significance was set at .05 and all analyses were conducted with R version 3.6.2 (R Foundation for Statistical Computing, Vienna, Austria).

Results

Table 1 shows the demographic characteristics of the full sample (N= 398), stratified by those who do (n=109) and do not (n=289) engage in any CRN. The weighted mean age of the sample was 35.7 (SD=17.5), 66% were foreign-born, 72% identified as Muslim, and 82% as Arab. The majority of the sample (67%) had completed at least an associate degree or some college, and more than half (60%) reported an annual income <$35,000. Bivariate analysis included t-tests and chi-square tests and significant differences in CRN report were observed by health insurance type (P<.01), with a higher percentage of those with no insurance coverage reporting CRN in the past year. Differences were also seen by level of food insecurity (P<.001), with those with higher levels of food insecurity reporting CRN, and by higher levels of those reporting worse patient/provider communication and having no usual source of care also reporting CRN in the past year. Differences based on sex, age, immigration status, religion (Muslim or Christian), origin (Arab or Chaldean), income, employment, and chronic disease status were non-significant.

More than 27% of respondents reported engaging in any indicators of CRN (took less medicine, skipped doses, or delayed getting a prescription filled over the past year due to cost). About 12% (n=50) of the respondents selected only one CRN indicator, while 6.6% (n=26) selected two and 10% (n=40) selected all three CRN indicators (data not shown).

Table 2 shows demographic correlates of CRN, based on univariate analysis. Those with the highest income were less likely to report CRN compared with participants with the lowest income (OR: .31; 95% CI (.12, .73); p<.01). Participants with private insurance coverage (OR: 2.07; 95% CI (1.03, 4.19); p<.05), and no insurance coverage (OR: 5.03; 95% CI (2.41, 10.71); p<.001) were more likely than those with Medicaid coverage to report CRN. Sex, age, immigration status, and having a chronic disease were not significantly associated with CRN.

Table 3 includes multiple variable logistic regression models of health and economic factors predicting CRN: self-rated health, mental health distress and food insecurity. Individuals with mental health distress (OR: 1.13; 95% CI (1.05, 1.22); p<.01) and those who reported food insecurity (OR: 1.34; 95% CI (1.09, 1.65); p<.01) were more likely to report CRN.

Multiple variable logistic regression models of health care and social factors predicting CRN, one each for patient/provider racial concordance, unfair treatment, patient/provider communication and having a usual source of care, adjusted for sex, age, income, chronic disease status, and health insurance type are shown in Table 4. Respondents who reported better patient-provider communication were less likely to engage in CRN (OR: .56; 95% CI (.35, .79); P<.01) The other three variables were not associated with CRN.

Sensitivity analyses were conducted and showed a similar level of sensitivity among the statistically significant predictors and the three CRN items that comprise the total index score, with the excep-

Table 1. Participant characteristics by those who engage and do not engage in cost-related non-adherence (CRN)

	Unweighted, N=398	Weighted % (mean)	Cost-related non-adherence				P[a]
			No, n= 289		Yes, n=109		
			Unweighted n	Weighted % (mean)	Unweighted n	Weighted % (mean)	
Age, years	387	35.67 (17.5)	280	36.06 (17.92)	107	34.75 (16.62)	.21
Sex (N Female)	247	64.21	177	(62.23)	70	(69.44)	.56
Marital status (Married)	210	55.33	157	(56.99)	53	(50.93)	.32
Immigration Status							.98
US-born	131	34.01	95	(33.92)	36	(34.26)	--
Foreign-born	261	65.99	189	(66.08)	72	(65.74)	--
Origin							.39
Arab	266	82.23	189	(81.11)	77	(85.19)	--
Chaldean	102	17.77	77	(18.88)	25	(14.82)	--
Religion							.40
Muslim	246	72.33	176	(70.38)	70	(76.85)	--
Christian	140	25.89	107	(27.88)	33	(21.30)	--
Employment Status							.19
Employed	202	49.36	151	(50.70)	51	(45.37)	--
Unemployed	68	18.06	48	(17.48)	20	(18.52)	--
Other, eg, retired, student	125	32.56	89	(31.81)	36	(34.27)	--
Income level							.10
$0-14,999	103	26.65	72	(25.18)	31	(30.56)	--
$15,000-34,999	125	33.50	87	(31.82)	38	(37.04)	--
$35,000-74,999	90	23.60	63	(23.43)	27	(24.07)	--
$75,000-200,000+	69	16.24	57	(19.58)	12	(8.33)	--
Education level							.95
Less than high school	53	13.20	37	(13.64)	16	(12.04)	--
Completed high school	78	20.05	54	(19.23)	24	(22.22)	--
Associate degree or some college	97	24.62	70	(23.78)	27	(25.93)	--
Completed college	122	31.47	92	(32.52)	30	(29.63)	--
Graduate or professional degree	44	10.66	33	(10.84)	11	(10.19)	--
Health Insurance							.0018[d]
Private insurance	115	31.73	84	(32.52)	31	(29.63)	--
Medicaid	137	38.85	107	(43.36)	30	(31.48)	--
Medicare	53	14.21	41	(15.39)	12	(12.04)	--
Some other source	10	3.05	6	(2.45)	4	(4.63)	--
No coverage	47	11.17	21	(6.29)	26	(22.22)	--
Chronic disease, yes	151	37.56	107	(35.66)	44	(38.89)	.47
Mental health distress[b]	358	2.72 (.19)	256	2.20 (.20)	102	3.88 (.38)	.000[e]
Food Insecurity[b]	394	.82 (.07)	286	.66 (.07)	108	1.21 (.16)	.0005[e]
Patient/provider communication[b]	336	2.33 (.74)	249	2.43 (.67)	87	2.03 (.84)	.02[c]
Unfair treatment[b]	383	1.72 (.09)	275	1.61 (.11)	108	1.99 (.17)	.21
Self-rated good health, n	338	84.77	250	(86.71)	88	(79.63)	.24
Patient/provider racial concordance, n, yes	284	73.10	203	(72.03)	81	(75.93)	.58
Usual source of care, n, yes	354	88.83	266	(91.26)	88	(83.33)	.017[c]

a. P-values for chi-square tests for unweighted categorical variables and t-tests for unweighted binary variables.
b. Data shown as weighted mean (SD).
c. P<.05
d. P<.01
e. P<.001

Table 2. Multivariate demographic predictors of cost-related non-adherence, n=334

	Cost-related non-adherence	
Demographic factors[b]	**OR[a]**	**95% CI**
Sex		
Female	1.22	(.72, 2.08)
Male	Reference	
Age	.99	(.96, 1.00)
Immigration status		
US-born	.96	(.52, 1.81)
Foreign-born	Reference	
Income range		
<34,999	Reference	
35,000-74,999	.92	(.48, 1.74)
75,000-200,000+	.31[c]	(.12, .73)
Health insurance type		
Medicaid	Reference	
Private insurance	2.07[c]	(1.03, 4.19)
Medicare	1.37	(.60, 3.02)
No coverage	5.03[d]	(2.41, 10.71)
Chronic disease status		
No chronic diseases	Reference	
One or more chronic diseases	1.32	(.76, 2.30)

a. Odds ratios from a single logistic regression model.
b. Model covariates: Sex, age, immigration status, income, health insurance type, and chronic disease status.
c. P<.05
d. P<.001

tion of insurance status-none and patient/provider communication, which were sensitive to two of the three predictors (data not shown, available upon request). These results are generally consistent with previous studies with this measure,[8] although further exploration of CRN among MENA Americans could help parse out these effects.

Discussion

In one of the first studies on CRN in a MENA population, we report demographic characteristics as well as potential risk and protective correlates of CRN in a cross-sectional sample in SE Michigan. MENA individuals have reported low access to health care due to cost.[17] The results indicate that CRN may be high in this population and that there are shared characteristics associated with CRN among both our study population and the larger US population.[6] In this study, CRN was 27.4%, compared with the estimated national CRN rate of 19.8% using the same measure of CRN.[4]

We found, after adjustment for income, those with private insurance and those with no insurance coverage were more likely to report CRN compared with those with Medicaid coverage. Those with no insurance coverage may struggle to pay for medications as out-of-pocket costs.[1] For some types of medications, such as insulin, these costs can be substantial.[25] Compared with the cost-sharing benefits Medicaid recipients receive, those with private insurance may have plans with less complete drug coverage than Medicaid offers, tiered drug coverage, or have higher deductibles and variable co-pays depending on the plan,[10] all of which contribute to the cost burden of medications for these individuals. This is consistent with prior studies among non-MENA populations.[3,26] These findings, paired with higher prevalence of diabetes and other chronic diseases in the Arab American population compared with the White population in Michigan,[27] demonstrate the need to further explore CRN in the MENA population, particularly considering the burden of specific chronic diseases.

In terms of social, economic, and health factors, having a usual source of care, patient/provider racial concordance, and reporting being treated unfairly were not asso-

Table 3. Multiple variable logistic regression models of health and economic factors predicting cost-related non-adherence

Cost-related non-adherence		
Models[a]	**OR**	**(95% CI)**
Self-rated health,(high/low), low=reference, n=333	.74	(.33, 1.70)
Mental health distress, n=304	1.13[b]	(1.05, 1.22)
Food insecurity, n=333	1.34[b]	(1.09, 1.65)

a. Model covariates: Sex, age, immigration status, income, health insurance type, and chronic disease status.
b. P<.01

Table 4. Multiple variable logistic regression models of health care and social factors predicting cost-related non-adherence

Cost-related non-adherence		
Models	**OR**	**(95% CI)**
Provider/patient racial, concordance (yes/no), no=reference, n=330	1.40	(.77, 2.63)
Unfair treatment, low=reference, n=315	1.26	(1.00, 1.40)
Provider/patient communication, n=287	.56[b]	(.35, .79)
Usual source of care (yes/no), no=reference, n=329	.90	(.39, 2.21)

a. Model covariates: Sex, age, immigration status, income, health insurance type, and chronic disease status.
b. P<.01

ciated with CRN. However, strong patient/provider communication was significantly associated with a lower likelihood of reporting CRN. For this community, having patient-centered communication with a provider may be a significant protection against CRN, and it may be more important than having a usual health care provider and one with a shared racial/ethnic identity. This may be especially true in an ethnic community where providers may be more likely to share a racial/ethnic identity with their patients and where patients may not have difficulty in finding these providers compared with outside the ethnic community.

While both mental health distress and food insecurity were significantly associated with higher likelihood of reporting CRN, strong patient/provider communication was found to be protective against CRN. Past research in the MENA community indicates the significance of collectivism and social networks and support[19] within the community, all of which may be reflected in this measure of communication. While this matches other findings indicating the importance of patient/provider communication and trust in protecting against CRN among other groups,[28] it has not been explored in this population. It is likely that better communication helps to facilitate shared decision-making for MENA adults and their providers in line with the values and social structure in the community. Effective communication between patients and providers may also encourage patients to raise these sensitive issues with their providers, who may in turn be able to link them to supportive services.

In this study, cost-related nonadherence (CRN) was 27.4%, compared with the estimated national CRN rate of 19.8% using the same measure of CRN.[4]

Food insecurity has not been systematically measured among the MENA population in Michigan. The 2013 and 2016 Arab and Chaldean Behavioral and Risk Factor Survey examined food access and consumption, but not food security.[15,17] Other national studies of food insecurity and CRN have found higher likelihood of an association among older participants,[8] those with lower incomes and those who report a chronic disease.[29] The effect of food insecurity on CRN was significant in our study population, even while controlling for age, income level, and chronic disease status, indicating the unique importance of food insecurity in considering this outcome for MENA adults. As food insecurity is likely an indicator of financial hardship in this population, health care service providers can screen for it as a risk factor for CRN. Providers can also encourage patients to utilize food assistance, which may help those who are choosing between purchasing food and medications, as well as those who require specialized diets or whose outcomes would improve with better nutrition.[29] Structural level interventions may be particularly effective in addressing food insecurity in the MENA community, as food insecurity can often be categorized as a structural level factor. For example, the state of Michigan could make permanent the additional assistance provided to families whose children qualify for free and

reduced lunch during the 2020-2021 school year (Pandemic Electronic Benefits Transfer, P-EBT).[30]

Of the health indicators we assessed, mental distress was significantly associated with CRN, which is consistent with other national studies. The direction of causality however merits attention. Mental health could be both the cause and consequence of CRN. With regard to the former, mental health symptoms are an important predictor of CRN,[31] and those with adverse mental health outcomes may be particularly susceptible to CRN.[32] Poor mental health is associated with comorbidities and treatment of mental health symptoms can be costly, which may explain, in part, the association with CRN.[7] However, in this analysis, we controlled for chronic disease status, insurance type, and income, indicating that on its own, poor mental health had a strong relationship with CRN in our sample. This finding mirrors those from other studies of CRN and poor mental health,[33] including among other ethnic minority populations.[34] Symptoms of poor mental health, particularly depression, can themselves cause nonadherence.[33] Within the MENA community, this finding is of particular concern as there are higher rates of poor mental health for MENA individuals compared with the majority White population in Michigan.[35]

Study Limitations

There are limitations to this study. We used a community convenience sample that limits generalizability. Our sample was somewhat skewed toward younger participants and those with lower incomes than the Michigan MENA and national populations. The weighted mean sample age was 34.9 years, which is younger than both the MENA population in Michigan and nationally reported in other studies.[15,17] We did not assess whether there was prescription drug coverage in health plans, which may have provided additional information about the higher odds of reporting CRN among those with private insurance compared to Medicare. Our data also did not allow us to explore the possible influence of family size or health status of family members on CRN behaviors. Additionally, because we did not measure CRN in a sample of those with chronic disease, those who reported no CRN may also be those who do not have any chronic diseases, though we did control for this in our models. To our knowledge, the measures of CRN we used have not been validated among MENA adults. Future research is needed to test the generalizability of our results to a larger and more representative sample of MENA adults including those with Iranian or Turkish heritage.

Even with these limitations, our results have important implications for both practice and future research with the MENA population. Our study shows that MENA individuals with no insurance coverage and private insurance were more likely to report CRN. The results of this study also indicate that mental health distress and food insecurity are also risk factors for CRN in this population. These findings can help providers identify and offer support to those who may be at an elevated risk for medication nonadherence related to cost. Finally, our results emphasize that strong patient/provider communication may serve as an intervention target to decrease CRN among MENA adults. Ensuring a sense of trust and good communication through strong connections between patients and their providers in the MENA community will help facilitate necessary conversations about cost and help improve both adherence and health outcomes.

Conclusion

This study provides a more thorough understanding of CRN among the MENA population in SE Michigan and has implications for interventions and practice. Risk factors for CRN in the community are similar to those that have been established through large, national studies of the general population. These included food insecurity and poor mental health outcomes. Improved screening for these predictors may help providers identify patients at-risk for CRN. Strong communication between patients and providers was found to be a protective factor against CRN. Improving patient/provider communication through interventions with both patients and providers may offer a way to protect against CRN in the MENA community.

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Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Green, Resnicow, Tariq, Syed, Alhawli, Patel; Acquisition of data: Green, Resnicow, Tariq, Syed, Patel; Data analysis and interpretation: Green, Resnicow, Tariq, Patel; Manuscript draft: Green, Resnicow, Tariq, Alhawli, Patel; Statistical expertise: Green, Resnicow, Patel; Acquisition of funding: Resnicow; Administrative: Syed, Alhawli; Supervision: Resnicow, Patel

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