EDITORIAL

How can we reduce racial/ethnic disparities in diabetes medication adherence?



"...we need to identify factors other than socioeconomic status that might explain the relationship between African-American or Hispanic-American race/ethnicity and nonadherence to diabetes medications."



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A substantial proportion of individuals with diabetes are nonadherent to their medication regimen [1,2]. Several studies have found a strong, independent association between suboptimal adherence to diabetes medications and poor glycemic control [1,3-5], as well as an increased risk of hospitalization and mortality [6]. Despite this evidence, few studies have identified what the barriers are to diabetes medication adherence that can be addressed in medication adherence promotion interventions [2,7], and even fewer studies, if any, have designed and tested such interventions. This places our knowledge of diabetes medication adherence far behind what we know about medication adherence in other chronic disease contexts (e.g., HIV [8], and hypertension). Already, other chronic disease literatures have accumulated decades worth of knowledge on general and population-specific barriers to medication adherence, as well as how to design and evaluate medication adherence promotion interventions across patient populations, including those populations at greatest risk of nonadherence and poor health [8].

Racial/ethnic minorities with diabetes are more likely than non-Hispanic Whites (NHWs) to be suboptimally adherent to their medications [1,3,4,9], and experience worse glycemic control [1,3-5,10,11] and more diabetes-related mortality [12]. Additionally, disparities in adherence might contribute to disparities in diabetes control [3,4,7]. In a representative study of adults with diabetes living in the USA, Heisler et al. found that one potentially modifiable factor for which there were racial disparities - medication adherence - was among the most significant independent predictors of glycemic control [4]. In another study involving individuals with diabetes from six metropolitan areas across the USA, Duru et al. found that missed doses of medication were more strongly associated with poor diabetes control among African-Americans (AAs) than among NHWs [7]. Finally, in a longitudinal cohort study of USAbased veterans with diabetes, Egede et al. found that racial/ethnic disparities in glycemic control were partially explained by differences in medication adherence [3]. Taken together, these studies suggest that

"...diabetes medication adherence promotion interventions that address patients' medication adherence-related information, motivation and behavioral skill deficits would not only improve medication adherence in general, but might also reduce racial/ethnic disparities in adherence."

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improving diabetes medication adherence among racial/ethnic minorities might reduce disparities in diabetes control. However, to do that, we must first identify why racial/ethnic minorities are less adherent to their diabetes medications than NHWs, and then design and evaluate interventions to address those reasons/barriers.

The cost of medications is a prominent barrier to medication adherence among individuals with diabetes [2], and particularly among lowincome, racial/ethnic minorities with diabetes [13]. Studies consistently report that racial/ethnic minorities with diabetes are more likely than NHWs to underuse medications for cost-related reasons [5,11,14], but there is conflicting evidence about whether this is actually due to differences in socioeconomic status (SES), with one study reporting that differences in SES drives this relationship [14], and two other studies reporting that the relationship persists regardless of differences in SES [5,11]. In one of these latter studies, AAs with diabetes were more likely than NHWs to report lower SES (i.e., lower incomes and less education), more cost-related nonadherence, and experience worse glycemic control [11]. However, after controlling for SES, AA race remained significantly associated with cost-related nonadherence [11]. Similarly, Mexican-Americans with diabetes were more likely than NHWs to report lower SES (i.e., lower incomes and being uninsured), more cost-related nonadherence, and experience worse glycemic control [5]. However, after controlling for SES, cost-related nonadherence remained significantly associated with poorly controlled diabetes [5]. Even if differences in SES are driving the relationship between racial/ethnic minority status and cost-related nonadherence, it is difficult to intervene upon one's income, education and insurance status. Since there is evidence suggesting changing one's SES might not improve one's medication adherence [5,11], we need to identify factors other than SES that might explain the relationship between AA or Hispanic-American race/ethnicity and nonadherence to diabetes medications.

One potential explanatory factor is health literacy – that is, one's ability to obtain, process, understand and apply health information to make appropriate health decisions. Low health literacy is common [101], and has been associated with less adherence to diabetes medications [9], worse glycemic control [15] and poor health in general [101]. Racial/ethnic minorities in the USA are disproportionately affected by low health literacy, with an estimated 41% of Hispanic-Americans and 24% of AAs, compared with 9% of NHWs, having below basic health literacy skills [101]. A handful of recent studies have found that patients' health literacy status explains racial differences in health outcomes, including one study that found that health literacy explains racial disparities in diabetes medication adherence [9]. In that study, 56% of AAs versus 18% of NHWs had a reading level lower than ninth grade (i.e., indicative of limited health literacy); both AA race and lower health literacy scores were associated with less adherence to diabetes medications; and health literacy, but not diabetes-specific or general numeracy (i.e., measures of quantitative literacy), explained the relationship between AA race and less adherence to diabetes medications [9]. While health literacy might explain racial differences in diabetes medication adherence [9], interventions cannot improve patients' health literacy skills, per se. Interventions can only accommodate patients with limited health literacy by using clear health communication strategies with all patients (e.g., using plain language [2,16], and verifying patients' understanding, among other strategies [16]).

One of the more promising, unexplored areas for promoting diabetes medication adherence and reducing disparities in adherence is to leverage health behavior change models. Health behavior change models have been used to understand, predict and promote medication adherence in other chronic disease contexts [8], but few, if any, have been applied to diabetes medication adherence, and none, to my knowledge, have been used to understand, predict or design interventions aimed at minimizing racial/ethnic disparities in adherence. One health behavior change model, the Information-Motivation-Behavioral Skills (IMB) model [8], may hold promise in achieving these aforementioned goals. At its most basic level, the IMB model asserts that to the extent that individuals are well-informed about how to take their diabetes medications (e.g., they have sufficient knowledge about correct utilization), are motivated to act (e.g., they maintain positive attitudes and have social normative support for taking their medications), and possess the behavioral skills required to act effectively (e.g., they can acquire, remember to take and self-administer medications), they will be more adherent to their medication regimen [8]. Likewise, to the extent that individuals are poorly informed, unmotivated to act and lack the behavioral skills required to act effectively, they will be less adherent to their medication regimen [8].

Based on the IMB model framework and studies published in the past 5 years, it appears that deficits in medication adherence-related information (i.e., knowledge), motivation (i.e., positive attitudes and social normative support) and behavioral skills (i.e., objective skills and self-efficacy) might explain why racial/ethnic minorities are less adherent to their diabetes medications than NHWs. For example, AAs with diabetes are more likely than NHWs to report both a lack of medication adherence-related knowledge (e.g., not knowing the number of doses to take or what each medication is for) [7] and negative attitudes and beliefs towards treatment (e.g., not liking to take medications or believing medications do more harm than good) [7,11]. In addition, receiving support from a physician, healthcare team [17] or a family member [18] has been associated with diabetes medication adherence cross-sectionally, and receiving support from a community healthcare worker has led to improvements in medication adherence among Hispanics with diabetes [19]. Finally, deficits in medication adherence-related behavioral skills (e.g., remembering doses, obtaining refills) are common [2,7], and appear to be more prevalent among AAs than NHWs [7], with AAs being more likely than NHWs to report forgetting or finding it hard to ask doctors about medication-related problems, or experiencing difficulty keeping track of what medications to take and when to take them [7]. It is therefore plausible that diabetes medication adherence promotion interventions that address patients' medication adherence-related information, motivation and behavioral skill deficits would not only improve medication adherence in general, but might also reduce racial/ethnic disparities in adherence.

In summary, there has been minimal research on what the barriers are to diabetes medication adherence [2,7], and even fewer intervention trials

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designed to overcome these barriers. However, studies repeatedly report that racial/ethnic minorities are less adherent to diabetes medications than NHWs [1,3,4,9], and that disparities in adherence explain disparities in diabetes control [3,4,7]. While racial/ethnic minorities are more likely than NHWs to report cost-related medication nonadherence, changing patients' SES is difficult to do, and doing so might not improve patients' medication adherence [5,11]. Moreover, racial/ethnic minorities have high rates of limited health literacy, which has been shown to explain disparities in diabetes medication adherence [9], and while health literacy status cannot be modified, it can be accommodated [16]. Finally, the IMB model of health behavior change [8] might be both a viable framework for understanding, predicting and promoting diabetes medication adherence across patient populations, and for reducing racial/ethnic disparities in adherence. Thus, efforts are needed to design and evaluate diabetes medication adherence promotion interventions that are health literacy appropriate, and can effectively enhance patients' medication adherence-related information, motivation and behavioral skills.

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