Observations and Recommendations for Community-Based Diabetes Screenings

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Purpose

Community-based diabetes screening is common, but its impact on health outcomes is unclear. Screening protocols may not be standardized nor reflect current clinical practice. A community and clinical team examined the quality and consistency of community-based screening to diagnose hyperglycemic states, and it developed a bilingual screening tool to allow screeners to present accurate, actionable results to participants.

Methods

The team interviewed providers and community members, analyzed forms and educational materials utilized by screeners, and observed local diabetes screening events. Researchers compared glucose parameters used by screeners to published guidelines and observed fingerstick techniques and protocols for education, referral, and follow-up. Screening was divided into 3 phases: participant assessment before testing, obtainment of a sample, and interpretation of and counsel about results.

Results

There was a general lack of consistency in diabetes screening practices at the 12 screenings attended and among the 11 screeners interviewed. Assessment rarely included evaluation of diabetes risk factors or recent caloric intake. Obtaining a sample through fingersticks often included practices known to cause discomfort and decrease accuracy of glucose measurements. Criteria used to categorize results as "normal" or "abnormal"

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rarely followed published guidelines for laboratory-measured glucose values and varied significantly between screeners. No organization mentioned prediabetes in screenings. Postscreening consultation protocols varied widely.

Conclusions

Inconsistencies and inaccuracies in screening practices may limit the quality and relevance of community-based diabetes screenings. The impact of local screenings may be enhanced by using a tool that includes concrete steps and precise guidelines.

Diabetes and its precursor, prediabetes, are epidemic and disproportionately affect minority populations.[1-3] Diabetes can be prevented or delayed in people with prediabetes, and the complications of diabetes can be controlled, but only if individuals with these conditions are diagnosed and referred for appropriate interventions.[4-8] Unfortunately, 40% of adults with diabetes in the United States are undiagnosed, and it is likely the majority of those with prediabetes are also undiagnosed, given the paucity of screening for this recently recognized condition.[1] Wider-spread diagnosis of hyperglycemic states will likely entail screening of individuals outside medical settings. However, doubts exist regarding the accuracy and benefits of community-based glucose screenings[4,9-14] leading to appropriate diagnoses and treatments.[10-14] Specific concerns include the accuracy of glucose meters, the use of glucose meters for purposes other than self-management, and the fact that published guidelines for interpreting glucose values are designed for laboratory-measured venous blood samples.

Yet, community screenings are prevalent, for anecdotal reasons that include the honoring of community organizations' requests, outreach and marketing by health care organizations, and efforts to improve health, particularly among populations with barriers to care such as lack of access, trust, and convenience. Additionally, these screening events can help educate community members about diabetes-related concepts and serve as a bridge to appropriate clinical care. Thus, the question arises whether there is a better way to conduct screenings, both to improve the likelihood they will indeed benefit those screened and to incorporate screening for prediabetes.

Members of the East Harlem Diabetes Center of Excellence (the coalition), a team of community and academic partners dedicated to improving the health of individuals with or at risk for diabetes, chose to examine the diabetes screening process in more detail. East Harlem is the epicenter of type 2 diabetes in New York City. The majority of its 110 000 residents are Latino or black (90%), and it has the highest diabetes mortality in New York City.[15] The coalition partners evaluated local screenings for prediabetes and diabetes, the parameters and protocols used in managing elevated glucose readings, and consistency in procedures among the myriad groups screening for diabetes in this one relatively small neighborhood.

Methods

The investigation began by conducting one-on-one, open-ended interviews with health providers offering, and community members receiving, glucose testing. The team identified individuals through their networks and at community-based screening events. Questions focused on the components of screening events: fingerstick techniques, glucose parameters, the manner in which results are presented, protocols for abnormal results and follow-up, and recommendations to improve screening.

Next, coalition members attended community-based diabetes screening events, including health fairs and community festivals, sponsored by 1 of the 5 health care organizations or other local organizations in East Harlem. The members performed glucose screenings, were screened themselves, and observed testing techniques and participant protocols. At each event, they collected screening forms and educational materials to later examine for content, literacy, and user-friendliness and to assess the parameters used to classify blood glucose levels as "normal," "prediabetes," or "diabetes."

The screening process was divided into phases to analyze the various components independently and to understand how each phase contributes to the accuracy and relevance of community-based diabetes screening:

Phase 1: Participant assessment—assessment of whether screeners ascertained recent caloric intake and diabetes risk factors before performing a blood glucose reading.

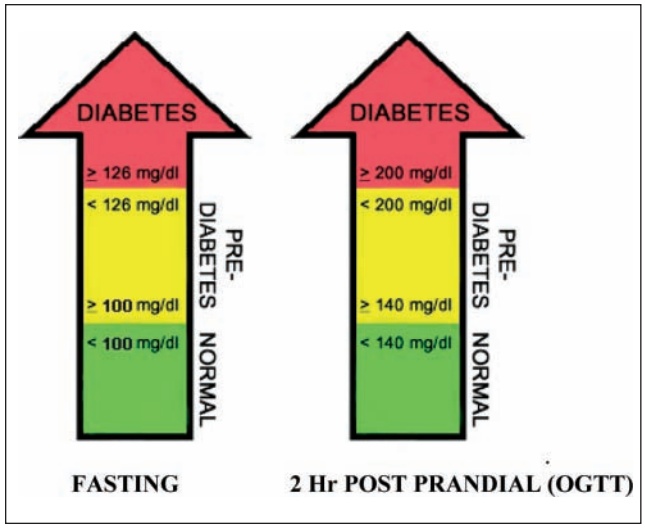

Figure 1. Published guidelines for assessing glucose. OGTT, oral glucose tolerance test.

Phase 2: Fingerstick technique—observation of whether practices were used that are known to affect the accuracy of blood glucose readings (eg, not allowing the isopropyl alcohol prep to dry before a fingerstick,[16] sampling the first drop of blood expressed,[17] and using blood glucose meters designed for self-management) and level of patient comfort (eg, anatomic location of stick site).

Phase 3: Interpretation and counseling—assessment of whether organizations were screening for diabetes and prediabetes; whether glucose parameters for "normal," "prediabetes," and "diabetes" were consistent with those in published guidelines (Figure 1); presentation of results to participants; the level of privacy; handling of abnormal results; and referral for follow-up care.

Results

Between June and August 2007, coalition members interviewed nurses (n, 5), physicians (n, 4), and outreach workers (n, 2) involved in diabetes care, education, and screening in East Harlem. They also attended 12 local diabetes screening events and interviewed 22 community members being screened for diabetes. Overall, there was tremendous variation in how screenings were conducted and significant departures from recommended screening protocols in this one community.

Observations at screening events demonstrated deficiencies and opportunities for improvement in 3 phases.

Phase 1: Participant Assessment

Participant risk factor assessment differed widely among events. Risk factors for diabetes were rarely discussed with participants before checking the blood glucose. Instead, registration focused on obtaining participant consent and demographic information and on providing participants with literature on general disease prevention and available services at local health care centers. Timing of last meal was consistently assessed at only 1 out of 12 events before the blood glucose reading was checked. When this assessment was made, there was no means to communicate the information to screeners performing the blood letting to provide a context within which to interpret blood glucose levels. Screeners stated that this information was not available, because of time constraints and concerns over patient flow and crowding. At most events, participants crowded around individuals having their blood glucose checked, thereby limiting confidentiality and increasing the potential for exposure to blood products.

Phase 2: Fingerstick Technique

Techniques used to perform fingersticks varied widely. Most were performed on the medial aspect of the fingertip, the portion of the finger most sensitive to pain. The lateral border of the finger, the site least likely to provide adequate blood, was the second-most common area chosen. Screeners rarely employed the preferred method to maximize comfort and blood expressed, approaching the zone between these areas at a 45° angle. Moreover, screeners commonly used the first drop of blood expressed and occasionally did not allow isopropyl alcohol preps to dry before sampling. When blood was difficult to express, screeners rarely used accepted and pain-free techniques to express blood, such as keeping the arm below the level of the heart and warming fingers before performing a second fingerstick.

Phase 3: Interpretation and Counseling

The events differed widely in the diagnostic guidelines used for diabetes screening, inclusion of prediabetes in the screening criteria, and protocols for presenting blood glucose results. Specifically, 2 out of 6 organizations accurately performed fasting, and 2 out of 6 accurately performed postprandial glucose tests, but none correctly screened for both fasting and postprandial,

when published guidelines (Figure 1) for laboratory-measured venous glucose values are used as a gold standard for screening.

Even more striking was the overall variation in glucose parameters used in this one community to screen for diabetes. No organization mentioned prediabetes in its screenings. Two organizations gave 1 level for "abnormal" glucose results, which ranged from 100 to 110 mg/dL. The 4 organizations that specified upper limits of "normal" in different states ranged from a maximum normal glucose at fasting from 100 to 125 mg/dL and, postprandially, from 140 to 200 mg/dL. Actual time from last meal was not indicated by organizations measuring postprandial glucose levels.

Only 1 organization had a panic value set for urgent care referral on its screening form (450 mg/dL). The remaining organizations did not have a set panic value on their screening forms but anecdotally advised some participants with blood glucose meter readings of "high" (indicating > 500 mg/dL) to immediately go to the nearest emergency room.

Postscreening consultation protocols also varied widely. Results ranged from simple statements of "normal" or "not normal" to lengthy discussions regarding glycemic control and lifestyle choices. Some results were presented by trained clinicians at tables situated away from crowds to maintain privacy and confidentiality. When participant volume started to rise, it was common for results to be presented across crowded tables or by other members of the screening team, including medical students, outreach workers, and volunteers. Several participants stated that they left without a complete understanding of their results or with unanswered questions. In addition, when participant volume was high, individuals who had blood glucose values within the "normal" range were often dismissed without consultation, which some thought was a lost opportunity for prevention and patient education.

Implications and Relevance

In a relatively small community with a long-standing coalition focused on diabetes, there were many discrepancies in diabetes screening practices. Variation in screening practices could be seen broadly in the general order and organization of events, as well as narrowly in their screening practices. Information that could contextualize glucose readings, such as time of last meal, was either not elicited or not given to the clinicians who provided posttest counseling. Fingerstick techniques that maximize accuracy and comfort were often not evident. There was no formal mention of prediabetes at any event.

There was tremendous inconsistency in labeling of glucose results as "normal" and "abnormal." There was also inconsistency in the suggestions (or lack thereof) for follow-up testing. Thus, 2 people could be simultaneously screened at events only blocks apart with identical plasma glucose values and be provided with completely different interpretations and suggestions by a variety of clinicians and nonclinicians. Such discrepancies may place participants at increased risk of receiving information that is inaccurate, inconsistent, and inadequately linked to a supportive health care network.

Community diabetes screening events often rely on glucose meters that are not designed for screening purposes but for self-management of diabetes. Current Food and Drug Administration regulations allow commercial glucose meters to be marketed if they are accurate within 20% of the laboratory-measured venous blood value.[18] This regulation introduces a degree of inaccuracy into the screening process and precludes diagnosis when used in the community setting. Published guidelines (Figure 1) used to classify blood glucose values as either "normal," "prediabetes," or "diabetes" are designed for laboratory-measured venous blood samples.[19] Samples can be drawn at fasting, as well as after an oral glucose tolerance test with a 75-g glucose load. Often, oral glucose tolerance tests are conducted in clinical settings, and only glucose samples collected following this protocol should be interpreted using this scale.

In 2010, the American Diabetes Association endorsed laboratory A1C assays for screening and diagnosing diabetes.[19,20] A1C testing negates concerns regarding recent caloric intake. However, costs and speed of analysis may be prohibitive for community screeners.[19,21-23] Whereas the accuracy of point-of-care A1C machines has improved, these advances are not sufficient to endorse use for diagnostic purposes.[19] Additionally, point-of-care A1C machines are expensive ($1000 to $3000 at $7 to $8 per test), require regular maintenance, and may thus be appropriate only for high-volume physician offices.[23-25] Thus, until point-of-care A1C testing becomes more accurate and cost-effective, it remains impractical for community screeners, especially in resource-scarce communities, to offer it.

Several points along the path of screening could be reconfigured so that those who are screened are more

likely to gain tangible benefits. First, activity at the registration desk could dictate the overall organization of the screening, thereby influencing team efficiency as well as participant privacy and safety. Registration personnel trained in understanding diabetes risk factors could transform the registration procedure into an opportunity for patient education. Registration could also prevent crowding at blood glucose testing tables and facilitate the collection of information to provide a context for the interpretation of glucose findings (eg, time from last meal).

Screeners could be properly trained in blood-letting technique to decrease participant discomfort and increase blood-glucose accuracy. Prediabetes could be included so that communities recognize this condition and people are not falsely labeled as having diabetes or blood glucose readings within the normal range. Trained clinicians could provide accurate results consistent with published guidelines to all participants, offer clear and consistent counseling about minimizing risk of progressing to prediabetes or diabetes, and follow actionable protocols for handling abnormal test results and how these should be followed up.

To further the screening process, organizations conducting community-based diabetes screenings could partner with a local health center, which could provide opportunities for venous phlebotomy at screening events as well as access to certified laboratory testing. Additionally, it could help connect community members with clinical providers, should they require follow-up for abnormal results.

To rectify inconsistencies and meet the needs of screeners and community members, the coalition developed a tool (Figure 2) containing guidelines for testing and interpreting laboratory results. The tool contains multiple sections to guide the participant through the screening process and to connect members of the screening team to one another. It lists risk factors for diabetes, which screeners can review with participants before the test. The tool also illustrates how venous blood samples measured in a laboratory should be interpreted, to encourage community members to have appropriate screening performed in a clinical setting. The tool provides educational information on diabetes and prediabetes, which participants can read while waiting for their test or after the screening event. Finally, via a local map, the screening tool directs participants to all 5 health care institutions in East Harlem.

To encourage follow-up from screening events and to provide continuity to community members, the same tool can be used in a clinical setting. Clinicians at health care centers can review the results directly on the tool, whether from laboratory-measured venous blood samples or oral glucose tolerance tests. It can also serve as an educational aid to assist clinicians in teaching their patients about diabetes.

A team of coalition members collaborated to write the tool; revise it on the basis of feedback from local groups; and share it with all hospitals, health centers, and organizations identified that conduct glucose screenings in East Harlem. All agreed to use this tool so that there would be consistency in the neighborhood. There is space on the tool for each organization to place its logo and contact information, to minimize perceptions that the tool is for marketing purposes for one group and to garner institutional support for its use. The tool was written at a fourth-grade reading level, in both English and Spanish, and was piloted at multiple locations throughout East Harlem, where it received support from screeners and community members. The tool may increase efficiency of outreach events, provide valuable information to patients in a clinical setting, and further diabetes awareness throughout the community. Community-academic partners who collaborate to identify and meet needs for community-based health screenings may find success as they combine clinical and local expertise to maximize accuracy and, ultimately, the ability to take action.[26]

Conclusions

There is significant inconsistency in practices used in community-based diabetes screenings. Variation occurred in participant assessment, fingerstick technique, and results counseling, as well as through inappropriate use of glucose meters for screening and glucose parameters designed for laboratory-measured venous blood, thereby limiting the ability of outreach events to provide educational information and actionable results to participants. A tool that includes guidelines for interpretation of glucose levels measured in a clinical setting may reduce inconsistencies, better educate community members about diabetes, and maximize the impact of local screening events.

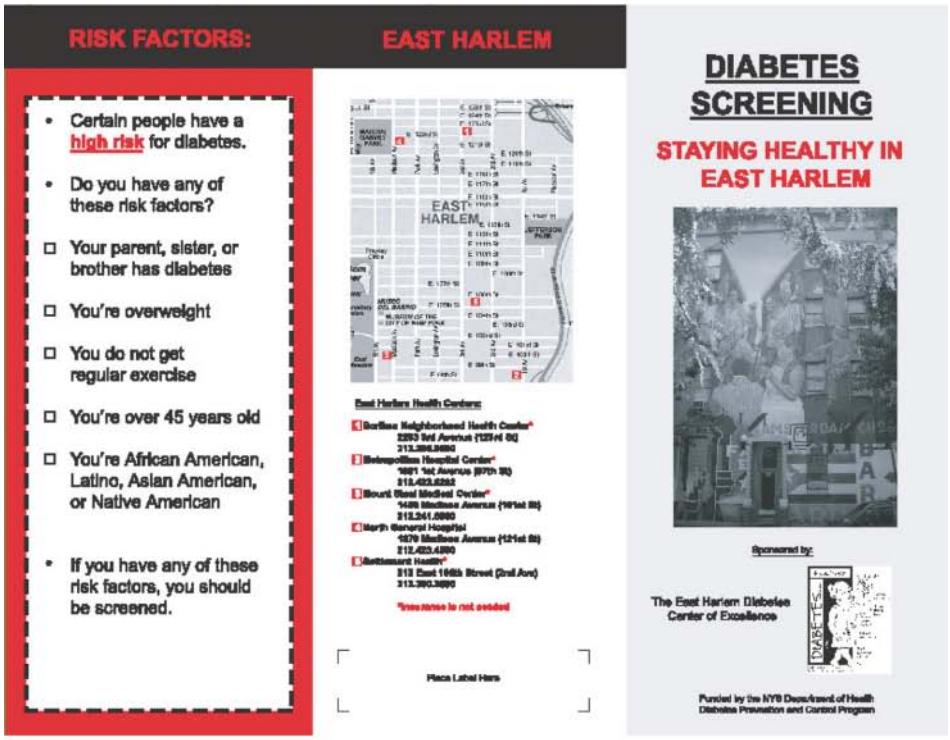

Figure 2. Community diabetes screening tool.

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