

New USPSTF Recommendations for Screening for Prediabetes and Type 2 Diabetes

An Opportunity to Create National Momentum

Edward W. Gregg, PhD; Tannaz Moin, MD, MBA, MSHS

Screening for type 2 diabetes has been advocated under an assumption that an early start with preventive care will reduce risk of the multiple complications following the onset of diabetes. However, the mixed evidence for this assertion has kept diabetes screening under debate for decades and lessened its role in the public health response to diabetes.

In this issue of *JAMA*, the US Preventive Services Task Force (USPSTF) presents its Recommendation Statement¹ and an updated Evidence Review² on screening for prediabetes and type 2 diabetes. The task force recommends that



Related articles [pages 704, 736, and 744](#) and [JAMA Patient Page page 778](#)



Related article at jamainternalmedicine.com

adults aged 35 to 70 years who have overweight or obesity be screened for prediabetes and type 2 diabetes and that clinicians “offer or refer patients with prediabetes to effective prevention interventions” (B recommendation).

The recommendation is relatively unchanged since the 2015 USPSTF statement,³ except for the lowering of the age threshold for screening from 40 to 35 years and the addition of metformin among diabetes prevention interventions.²

Also in this issue of *JAMA*, the study by Wang and colleagues⁴ demonstrates a new high in US total age-standardized diabetes prevalence of 14% in 2015-2018 and no consistent improvements in glycemic control and risk factor management for 10 years. Along with other evidence of potential stagnation of diabetes care and outcomes,⁵ these findings provide important context to the new USPSTF recommendation and warrant a closer look at where the biggest missed opportunities lie and what could be gained with the new screening guidelines.

The USPSTF report assessed evidence of benefit and harms of 3 interventions: population screening, early risk factor management for individuals with diagnosed diabetes, and preventive interventions for those with diagnosed prediabetes. Seeming to contradict the overall recommendation, the review concludes that there is little direct evidence that screening improves health outcomes for people with diagnosed diabetes. This conclusion relies heavily on the ADDITION study, which found no benefit of diabetes screening or detection-driven intensive risk factor management on long-term outcomes.^{6,7} However, the potential effects of screening, detection, and intervention for diabetes and prediabetes simultaneously, as now recommended, has not been tested in randomized trials. Thus, the rationale to screen depends on the benefits of the interventions that follow diag-

nosis, including the long-term attention to risk factor management and the opportunity to prevent diabetes in the large population at risk.

The benefits of intervention after diabetes diagnosis still rely largely on the UK Prospective Diabetes Study Group, which almost 25 years ago showed that glycemic and blood pressure control in patients with recently diagnosed diabetes reduced risk of microvascular and macrovascular complications and, with 10 years of additional follow-up, reduced risk of myocardial infarction as well as all-cause and diabetes mortality.⁸ These benefits were achieved without the advantage of newer medications that have since been added to diabetes treatment guidelines (because those medications have been shown to simultaneously address metabolic, glycemic, and cardiovascular risk).⁹ The benefits of intervention among persons diagnosed with prediabetes relied on 23 studies from 8 countries, collectively showing a relative risk (RR) reduction in diabetes incidence associated with multicomponent prevention programs (RR, 0.78 [95% CI, 0.69-0.88]). Although this magnitude of association was less than the risk reduction reported in the 2015 report (RR, 0.53 [95% CI, 0.39-0.72]),³ it reflects an important expansion of the literature beyond the proof-of-concept diabetes prevention trials, such as the US Diabetes Prevention Program. The updated evidence review² includes an increased number of studies, including more investigations conducted in community settings with diverse populations and longer follow-up. This, along with the scale-ups of programs seen in the US and UK, established the viability of individual-based interventions as an important approach against the diabetes epidemic.^{10,11}

The USPSTF screening recommendations apply to a large proportion of the adult population. More than 40% of the adult population will be eligible for the screening, among whom an estimated one-third most likely will meet USPSTF criteria for a prevention program.^{12,13} In theory, strong implementation across the full chain of recommended actions could contribute to significant health benefits, ranging from a reduced incidence of diabetes to a reduction in diabetes-related complications. However, surveillance data point to 3 major areas of concern that must be addressed to transform the health of the population.

First, the report by Wang et al⁴ suggests that diabetes care has stagnated.³ Among adults with diagnosed diabetes, the overall levels of glycemic control had not improved between 2007 and 2018, less than half (48.2%) met blood pressure targets, and only 21.2% achieved the combined goal

targets for hemoglobin A_{1c}, blood pressure, and lipids. Moreover, only 10.9% of Mexican American adults, 12.5% of non-Hispanic Black adults, and 7.4% of younger adults (ages 18-44 years) met the combined goal targets. Even before COVID-19 presented a new challenge as a common cause of severe morbidity with particularly severe outcomes in the population with diabetes, there was growing evidence that the long-term improvements in diabetes-related complications have slowed in these groups.¹⁴ Given increasing life expectancy after diagnosis and potentially increasing multimorbidity, challenges of screening may now be less important compared with the challenges and benefits of successfully providing long-term glycemic control and sustaining cardiovascular risk factor management among populations with diabetes who live decades after diagnosis.

Second, young adults appear to be the group with the most to lose by current levels of diabetes care delivery and the most to gain by attention to the new recommendation. This group has had the greatest relative increase in diabetes prevalence, the lowest receipt of preventive services and risk factor control, and an apparent increase in rates of diabetes-related complications.^{4,5,14} Although the shift in screening age to 35 years will likely have only a small influence on the numbers of persons identified with undiagnosed diabetes, an estimated 24.3% of young adults (ages 18 to 44 years) have prediabetes.¹³ In 2018, according to state-based data reported by the Behavioral Risk Factor Surveillance System, only 44% in this age group reported being tested in the past 3 years, and they also were less likely to be referred for, and to undertake, prevention services.^{15,16} Young adults with diabetes are also disproportionately affected by adverse social factors, including insecurities involving food, housing, and medication. Thus, addressing barriers to glycemic and cardiovascular risk factor control among young adults with newly diagnosed diabetes, who by default of their younger age carry the highest lifetime risk of diabetes and diabetes-related complications, makes this group the most likely to benefit from early intervention.

Third, the delivery of effective preventive interventions for people with prediabetes represents an ongoing missed opportunity. In the 2016-2017 National Health Interview Survey of 50 912 adults, only 5% diagnosed with prediabetes reported referral to a diabetes prevention program or weight loss program; of these, 40% reported participation.¹⁵ Scale-up of

multicomponent lifestyle interventions under way, which now include more than 550 000 individuals across 1961 programs over 9 years in the US and more than 400 000 over 5 years in the UK, have shown encouraging program attendance and weight loss when referral occurs and programs are available.^{10,11} However, the US enrollment represents less than 1% of the eligible US population, as availability, reimbursement, and engagement present challenges to long-term success.^{10,13}

Overcoming a gap so large calls for new ideas, new science, and perhaps new frameworks. The concept of prediabetes has often been met with skepticism because the USPSTF and American Diabetes Association-adopted definition of prediabetes (fasting plasma glucose level >100 mg/dL [5.55 mmol/L] or hemoglobin A_{1c} concentration >5.7%) captures a large heterogeneous risk group; it extends beyond the risk definitions used in the most influential randomized clinical trials, which required an abnormal oral glucose tolerance test result to be eligible.² Although multicomponent lifestyle interventions are beneficial for glycemic control and cardiovascular risk factor control across the full spectrum of risk,¹⁷ they are most cost-effective among groups with the highest levels and glycemic risk.¹⁸ Metformin has been shown to be cost-saving and most effective for prediabetes among patients who are younger, have higher levels of obesity, and have a history of gestational diabetes, but this medication remains rarely prescribed for this indication.^{18,19} Thus, development of a broader framework for diabetes prevention that matches risk tiers to diverse evidence-based interventions to serve individuals at varying levels of risk and that provides more personalized prevention or metformin may enhance engagement and uptake. Such a framework may ultimately complement the population-based policies needed to change population-level risk.

The USPSTF recommendations to act early and identify and prevent diabetes may have their greatest value if they can reach young and vulnerable adults through a more diverse range of effective options for prevention. For individuals identified with recently diagnosed diabetes, addressing barriers and expediting access to risk factor management is the clearest route to prevent complications. However, the greatest transformation in diabetes-related outcomes can be achieved if the problem is viewed from a longer-term perspective, whereby success is measured throughout the process and not at the beginning or the end.

ARTICLE INFORMATION

Author Affiliations: Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, London, United Kingdom (Gregg); Divisions of Endocrinology, Diabetes & Metabolism and General Internal Medicine & Health Services Research, David Geffen School of Medicine, University of California, Los Angeles (Moin); Health Services Research and Development Service Center for the Study of Healthcare Innovation, Implementation and Policy, VA Greater Los Angeles Healthcare System, Los Angeles, California (Moin).

Corresponding Author: Edward W. Gregg, PhD, School of Public Health, Imperial College London, London W2 1PG, United Kingdom (e.gregg@imperial.ac.uk).

Conflict of Interest Disclosures: Dr Moin reported receiving support from the National Institutes of Health/National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) (R01DK124503, R01DK127733, and R18DK122372), NIDDK/Centers for Disease Control and Prevention (U18DP006535), and the US Department of Veterans Affairs (QUE20-028 and CSP2002). No other disclosures were reported.

Funding/Support: This work is supported by a Royal Society Wolfson Fellowship (Dr Gregg).

Role of the Funder/Sponsor: The Royal Society had no role in the preparation, review, or approval of the manuscript and decision to submit the manuscript for publication.

REFERENCES

1. US Preventive Services Task Force. Screening for prediabetes and type 2 diabetes: US Preventive Services Task Force recommendation statement. *JAMA*. Published August 24, 2021. doi:10.1001/jama.2021.12531
2. Jonas DE, Crotty K, Yun JDY, et al. Screening for prediabetes and type 2 diabetes: updated evidence report and systematic review for the US Preventive

- Services Task Force. *JAMA*. Published August 24, 2021. doi:10.1001/jama.2021.10403
3. Siu AL; US Preventive Services Task Force. Screening for abnormal blood glucose and type 2 diabetes mellitus: US Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2015;163(11):861-868. doi:10.7326/M15-2345
 4. Wang L, Li X, Wang Z, et al. Trends in prevalence of diabetes and control of risk factors in diabetes among US adults, 1999-2018. *JAMA*. Published online June 25, 2021. doi:10.1001/jama.2021.9883
 5. Fang M, Wang D, Coresh J, Selvin E. Trends in diabetes treatment and control in US adults, 1999-2018. *N Engl J Med*. 2021;384(23):2219-2228. doi:10.1056/NEJMsa2032271
 6. Simmons RK, Echouffo-Tcheugui JB, Sharp SJ, et al. Screening for type 2 diabetes and population mortality over 10 years (ADDITION-Cambridge): a cluster-randomised controlled trial. *Lancet*. 2012; 380(9855):1741-1748. doi:10.1016/S0140-6736(12)61422-6
 7. Griffin SJ, Rutten GEHM, Khunti K, et al. Long-term effects of intensive multifactorial therapy in individuals with screen-detected type 2 diabetes in primary care: 10-year follow-up of the ADDITION-Europe cluster-randomised trial. *Lancet Diabetes Endocrinol*. 2019;7(12):925-937. doi:10.1016/S2213-8587(19)30349-3
 8. Holman RR, Paul SK, Bethel MA, Neil HA, Matthews DR. 10-Year follow-up of intensive glucose control in type 2 diabetes. *N Engl J Med*. 2008;359(15):1577-1589. doi:10.1056/NEJMoa0806470
 9. American Diabetes Association. Pharmacologic approaches to glycemic treatment: standards of medical care in diabetes—2021. *Diabetes Care*. 2021;44(suppl 1):S111-S124. doi:10.2337/dc21-S009
 10. Ely EK, Gruss SM, Luman ET, et al. A national effort to prevent type 2 diabetes: participant-level evaluation of CDC's National Diabetes Prevention Program. *Diabetes Care*. 2017;40(10):1331-1341. doi:10.2337/dc16-2099
 11. Valabhji J, Barron E, Bradley D, et al. Early outcomes from the English National Health Service Diabetes Prevention Programme. *Diabetes Care*. 2020;43(1):152-160. doi:10.2337/dc19-1425
 12. Estimates of the total resident population and resident population age 18 years and older for the United States, states, and Puerto Rico: July 1, 2019. US Bureau of Census. Published 2021. Accessed July 27, 2021. <https://www.census.gov/data/tables/time-series/demo/popest/2010s-national-detail.html>
 13. National Diabetes Statistics Report, 2020: estimates of diabetes and its burden in the United States. Centers for Disease Control and Prevention. Published 2020. Accessed July 30, 2021. <https://www.cdc.gov/diabetes/data/statistics-report/index.html>
 14. Gregg EW, Hora I, Benoit SR. Resurgence in diabetes-related complications. *JAMA*. 2019;321(19):1867-1868. doi:10.1001/jama.2019.3471
 15. Ali MK, McKeever Bullard K, Imperatore G, et al. Reach and use of diabetes prevention services in the United States, 2016-2017. *JAMA Netw Open*. 2019;2(5):e193160. doi:10.1001/jamanetworkopen.2019.3160
 16. National Diabetes Surveillance System. Centers for Disease Control and Prevention. Reviewed June 15, 2021. Accessed August 2, 2021. <https://www.cdc.gov/diabetes/data/index.html>
 17. Zhang X, Devlin HM, Smith B, et al. Effect of lifestyle interventions on cardiovascular risk factors among adults without impaired glucose tolerance or diabetes: a systematic review and meta-analysis. *PLoS One*. 2017;12(5):e0176436. doi:10.1371/journal.pone.0176436
 18. Zhou X, Siegel KR, Ng BP, et al. Cost-effectiveness of diabetes prevention interventions targeting high-risk individuals and whole populations: a systematic review. *Diabetes Care*. 2020;43(7):1593-1616. doi:10.2337/dci20-0018
 19. Moin T, Li J, Duru OK, et al. Metformin prescription for insured adults with prediabetes from 2010 to 2012: a retrospective cohort study. *Ann Intern Med*. 2015;162(8):542-548. doi:10.7326/M14-1773