

What's Preventing Us from Preventing Type 2 Diabetes?

The Diabetes Prevention Program (DPP) clinical trial and its 10-year outcomes study (DPPOS), both sponsored by the National Institutes of Health (NIH), showed that certain interventions could prevent or substantially delay the onset of type 2 diabetes both safely and cost-effectively. Yet diabetes prevention is not widely practiced in the United States, and the disease's staggering human and financial costs continue to grow. It is therefore essential to identify the factors impeding the full realization of the DPP interventions' potential for preventing diabetes.

The DPP was a comparative effectiveness trial involving 3234 overweight or obese adults with impaired glucose tolerance (prediabetes). Forty-five percent of the participants belonged to racial or ethnic minority groups that have an increased risk of type 2 diabetes. Participants were assigned to receive one of three interventions: lifestyle intervention aimed at modest weight loss through diet and exercise, treatment with generic metformin, or a placebo control. DPP findings published in 2002 indicated that, relative to placebo, lifestyle intervention and metformin reduced the rate of conversion to diabetes by 58% and 31%, respectively, over 3 years. Subgroup analyses showed that lifestyle intervention was effective in both sexes, across all racial and ethnic groups, and in people with a genetic predisposition to diabetes. Lifestyle intervention worked best in participants 60 years of age or older, a group in which metformin did not provide a significant benefit. Metformin worked well among younger participants and was particularly effective in women with a history of gestational diabetes. Most DPP participants (88%) enrolled in the DPPOS, in which continued follow-up demonstrated that the 10-year risk reduction for type 2 diabetes was 31% for lifestyle intervention and 18% for metformin.

Beyond reducing diabetes risk, lifestyle intervention led to substantial health benefits and health care cost savings. Even though these interventions were initially delivered by highly trained professionals who conducted individual sessions, the net 10-year cost was quite modest; although metformin conferred fewer benefits and prevented fewer cases of diabetes, thanks to its lower cost it yielded net savings.

To translate clinical research into practice, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) established a program to adapt efficacious diabetes and obesity interventions, including the DPP's lifestyle intervention, to real-world settings. In one promising trial, lifestyle intervention delivered by YMCA fitness trainers in a group setting greatly reduced per-patient costs and validated one practical approach for reaching many of the estimated 79 million Americans with prediabetes.

Building on NIDDK research, which we sponsored, the Centers for Disease Control and Prevention (CDC) created the National Diabetes Prevention Program (NDPP) to assemble a sizable workforce well-trained in the methods pioneered through the DPP and YMCA–DPP studies. Quality assurance and credentialing provide payers with confidence that interventions are safe and effective, and the program is increasing the number of intervention sites and employing marketing strategies

that highlight program availability. Through cooperation with public and private partners, including the YMCA and UnitedHealth Group, group-based lifestyle intervention is now available at more than 100 CDC-recognized sites in 25 states.

Despite the strong evidence of benefit and the increasing capacity for delivering group-based lifestyle intervention, most payers do not cover services for preventing type 2 diabetes. The Affordable Care Act requires the Centers for Medicare and Medicaid Services (CMS) and private insurers to cover preventive medical services that receive a grade of B or better from the U.S. Preventive Services Task Force (USPSTF). Since the USPSTF has not issued a recommendation on diabetes-prevention services, lifestyle intervention is not covered. CMS recently began covering intensive behavioral therapy for obesity, which is a risk factor for diabetes. But this coverage has limited efficacy for diabetes prevention, since overweight, nonobese persons with prediabetes are not covered, and few primary care physicians who provide obesity counseling are trained in lifestyle intervention.

CMS lacks statutory authority to reimburse nontraditional care providers, such as lifestyle coaches. Private payers, on the other hand, have fewer constraints. Recognizing the health and financial benefits of lifestyle intervention for participants with prediabetes, UnitedHealth Group and Medica do cover these preventive services, and other private payers are considering doing the same. Recently, the YMCA received a CMS Health Care Innovation Award to pilot diabetes-prevention services for 10,000 Medicare beneficiaries with prediabetes in 17 communities. Such a program could be a model for more widespread intervention coverage. Unfortunately, the great majority of Americans with prediabetes remain undiagnosed or unaware of their condition, and few have access to an accredited lifestyle-intervention provider.

Given its efficacy, potential for cost savings, and excellent safety profile, metformin offers another approach to diabetes prevention, particularly in people less than 60 years of age and in women with a history of gestational diabetes. It is difficult, however, to know how often the drug is prescribed off-label for diabetes prevention. Lack of Food and Drug Administration (FDA) approval for this indication hampers education about its potential benefits: it is unlawful for industry to advertise drugs for unapproved indications, and professional societies and insurers are reluctant to recommend unapproved agents in guidelines and educational materials. Only holders of an original new drug application (NDA) may file for FDA approval of new indications. From a business perspective, a pharmaceutical company may have difficulty justifying the cost of a supplemental NDA if a medication is available in generic form.

One important and unavoidable consideration is that the deadly, debilitating, and costly complications of diabetes do not appear immediately after disease onset. Although the peak incidence of the disease occurs between 50 and 60 years of age, complications typically emerge a decade or more later (with enormous implications for Medicare). The duration and extent of hyperglycemia predict complications, and controlling diabetes becomes more difficult over time. Thus, it may take decades to fully realize the health and financial benefits of diabetes prevention. Even the

substantial benefits achieved through glycemic control in the NIH's landmark Diabetes Control and Complications Trial and the Epidemiology of Diabetes Interventions and Complications studies were not immediate: an average of 6.5 years of intensive blood-glucose management dramatically reduced early signs of microvascular complications of diabetes, but effects on clinical events such as myocardial infarction and kidney failure emerged over decades.

Such results demonstrate the importance of following patients to assess long-term outcomes in key clinical trials, particularly for chronic diseases such as diabetes. Since the effects of interventions on the most serious consequences of diabetes are not immediate, the health and financial benefits of preventing or delaying diabetes are expected to accrue slowly at first, then accelerate over time. Achieving modest cost savings with metformin within a decade and the near cost neutrality of even the original, individually administered lifestyle intervention over that same period are therefore remarkable. Under the Congressional Budget Office's standard scoring of policy proposals on the basis of their 10-year budgetary impact, diabetes prevention appears to be on the cusp of fiscal benefit, in addition to being of enormous health benefit. Given a longer-term perspective, however, the value of applying DPP results to diabetes prevention is clear cut.

Although research has provided tools for preventing or delaying type 2 diabetes, health policies limit their application. Industry needs incentives for obtaining FDA approval of new uses of generic drugs, or we must design alternative pathways for approval. Benefits and costs must be assessed over meaningful timelines for diseases that stretch across decades. Finally, instituting mechanisms for compensating NDPP-certified ancillary health care providers and integrating them into the broader public health infrastructure may cost-effectively stem the tide of diabetes and improve our nation's health.

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