

EDITORIAL

A strategic approach to diabetes prevention: how much evidence is required before we act?



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“The diabetes epidemic is in full swing – we do not really have time to wait for decades before we act. The time to act is now.”

The global diabetes epidemic continues unabated with the number of people with diabetes predicted to increase from 366 million in 2011 to 552 million by 2030 [1]. In Australia, the burden of Type 2 diabetes is increasing and diabetes is expected to become the leading cause of disease burden by 2023 [2].

It is now just over a decade since the landmark US Diabetes Prevention Program (USDPP) and Finnish Diabetes Prevention Study both found that the risk of developing Type 2 diabetes could be reduced by 58% by lifestyle modification that focused on nutrition, physical activity and modest weight loss, and, more recently, that it could be sustained [3,4]. Cost-effectiveness analyses of different strategies for screening and prevention of Type 2 diabetes suggest that screening for Type 2 diabetes and impaired glucose tolerance, followed by interventions, is cost effective [5]. Furthermore, in the USDPP, lifestyle intervention was more cost effective than pharmacological intervention [6].

The potential to prevent or delay Type 2 diabetes in high-risk individuals by lifestyle intervention has been unequivocally established (proof of concept); however, most

landmark studies, conducted exclusively in primary care settings, used intensive, individualized interventions that would be difficult to roll out as population-wide programs [7].

The challenge is to translate this evidence into feasible and effective community-based programs that can be scaled up and rolled out more broadly in existing health and community systems [8,9]. In response to the challenge, a promising range of translational research studies have emerged over the past decade. In addition to the primary care setting, several studies have demonstrated the feasibility of screening and recruiting in workplaces and community settings, together with the effectiveness of group-based interventions [10–12].

Moving from scientific discovery to population-wide implementation requires a series of steps, each building upon the achievements of the previous step, from basic research to diffusion of interventions [13]. Over the last decade the USA, Finland and other parts of Europe have been leading the way in exploring policy efficiency, availability and distribution, as well as diffusion of diabetes interventions. In these countries, governments are showing



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leadership and working collaboratively with policy makers, researchers, private providers (health insurers and delivery agents) and practitioners to develop innovative and sustainable approaches to reach the people who can benefit the most from appropriate and effective interventions.

A major focus of recent translational research is how best to tailor or modify approaches so that they dovetail into existing infrastructure and services to enable the efficient recruitment of high-risk participants into effective lifestyle programs.

A recently published meta-analysis of 28 translation studies based on the USDPP, demonstrated that, 12 months after the intervention, there was an average weight loss of 4% from baseline [14]. Most importantly, the weight loss was similar irrespective of whether the intervention was delivered by a healthcare professional or lay educator (with appropriate training). A dose–response relationship revealed that for each additional lifestyle session attended there was an increase in weight loss of 0.26%.

Since research has clearly established a proof-of-concept for diabetes prevention, there should be a mandate to roll out programs. Diabetes prevention programs are progressively being ‘diffused’ into the healthcare system and have begun to be embedded in evidence-based policy and practice. However, they are still somewhat piecemeal and are under constant threat from other competing health issues and financial constraints.

A comprehensive Type 2 diabetes strategy should differentiate between three main target groups [15]: those with the condition (diagnosed, treated and managed); those at high-risk (identified, early intervention and secondary prevention); and those at low-risk (primary prevention). A strategy that both captures high-risk individuals (detection and early intervention/secondary prevention) and provides them with tailored, targeted and focused programs (group and individual) is required, and also a population-wide primary prevention strategy that targets the structural, environmental and economic determinants of nutrition and physical activity (i.e., improving dietary choices and increasing opportunities for everyone to be more physically active).

An overarching primary prevention strategy will reduce the proportion of people at a low risk moving to high risk, reduce the numbers at high risk from developing diabetes and concurrently assist those with diabetes in managing their

condition, thereby minimizing their complications and the burden on the healthcare system. Given the overwhelming evidence about what works in diabetes prevention there has never been a more important time than now for both primary care and public health systems to collaborate towards achieving a coordinated, integrative approach [13,16].

A strategic approach to diabetes prevention requires programs that result in similar efficiency in lifestyle changes while allowing management of a large number of participants. A strategic approach should take a systems perspective with the following components [17]:

- Overarching primary prevention strategy targeting physical activity and nutrition more broadly;
- Identification of individuals at high risk of developing Type 2 diabetes;
- Recruitment of individuals at high risk into quality lifestyle modification programs;
- Tailored lifestyle modification programs based on individual preferences to meet the diverse needs of high-risk populations;
- Ongoing low-cost support to maintain motivation and prevent relapse;
- Monitoring and evaluation;
- Feedback loops and continuous quality improvement.

Several countries are ‘scaling up’ diabetes prevention programs, but challenges remain [18]. Scaling up requires leadership, coordination and dedicated funding streams to build the capacity of a prevention system. There is a need for a competent workforce of lifestyle intervention providers, including both health service professionals and community-based organizations (government, non-government and private sector), able to work together to develop national action plans and policies for the expansion of diabetes prevention programs [13].

Political support for establishing a diabetes prevention strategy is critical. The US CDC is demonstrating how both public–private and community–clinic partnerships can result in successful diabetes prevention models [18,19]. (See ‘Not me’ campaign initiated by the Diabetes Prevention and Control Alliance [101]). In Australia, there are promising community-based government-funded diabetes prevention

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programs in Victoria [20] and parts of New South Wales [21].

There are tremendous opportunities to capitalize on electronic communication channels (e.g., internet, telephone, videos, webinars and smart phone applications) to reach large proportions of people with cost-effective evidence-based interventions. Telephone-based services show great promise [22]. However, we do need to ensure that we engage the hard to reach groups who are socio-economically disadvantaged and/or medically underserved.

There is no better case to address Type 2 diabetes than by prevention programs that target high-risk individuals complemented by a population health approach that targets the policy, structural and environmental factors that impact nutrition and physical activity. A prevention management strategy needs to find a way to translate the evidence into existing health and community systems. More coherent and relevant implementation research is needed – looking at how to work within existing systems and structures to facilitate recruitment of high-risk participants, and then referral pathways to appropriate and effective tailored lifestyle modification programs. However, when searching for definite answers we should learn by doing and putting into practice what is already known in a dynamic system-based approach.

The only way to reduce the personal and socioeconomic burden of diabetes and its associated complications is to prevent it. The scientific evidence supporting both primary and secondary prevention of diabetes by lifestyle intervention programs that are scaled up and rolled out into the community is compelling. The implementation of diabetes prevention programs requires an integrated, coordinated approach – one that applies equally in both developing and developed worlds [23]. Only through concerted efforts will we see significant reductions in the premature morbidity and mortality diabetes causes.

It could be argued that we already have enough evidence to act now. It is not a matter of gathering more evidence, although that is always a fruitful endeavor.

The urgent priority is for governments to show the same kind of leadership that they have shown to other important public health problems, such a smoking cessation, to ensure that countries develop a long-term strategic approach to Type 2 diabetes prevention. It has taken several decades for western countries to make a substantial impact on smoking rates. This has been achieved with a combination of public education, legislative, economic and environmental interventions, and long-term strategies that resulted in not smoking being the norm. Many of these initiatives were implemented with limited evidence of effectiveness at the time, but with hindsight have proven ‘as a total package’ to be efficacious. It could be argued that there is as much if not more evidence that diabetes can and should be prevented.

The diabetes epidemic is in full swing – we do not really have time to wait for decades before we act. The time to act is now. Governments, public health and the clinical sectors need to work in partnership with a common purpose to prevent Type 2 diabetes [19]. The cost of doing nothing will be substantial for both individuals and society in terms of reduced quality of life, reduced productivity and an escalation of healthcare costs [24].

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References

- Whiting DR, Guariguata L, Weil C, Shaw J. IDF Diabetes Atlas: global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Res. Clin. Pract.* 94(3), 311–321 (2011).
- Australia's Health 2010*. Australian Institute of Health and Welfare, Canberra, Australia (2010).
- Knowler WC, Fowler SE, Hamman RF *et al.* 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet* 374(9702), 1677–1686 (2009).
- Lindstrom J, Ilanne-Parikka P, Peltonen M *et al.* Sustained reduction in the incidence of Type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. *Lancet* 368(9548), 1673–1679 (2006).
- Gillies CL, Lambert PC, Abrams K *et al.* Different strategies for screening and prevention of Type 2 diabetes in adults: cost effectiveness analysis. *BMJ* 336(7654), 1180–1185 (2008).
- Herman WH, Brandle M, Zhang P *et al.* Costs associated with the primary prevention of Type 2 diabetes mellitus in the Diabetes Prevention Program. *Diabetes Care* 26(1), 36–47 (2003).

- 7 Gillies CL, Abrams KR, Lambert PC *et al.* Pharmacological and lifestyle interventions to prevent or delay Type 2 diabetes in people with impaired glucose tolerance: systematic review and meta-analysis. *BMJ* 334(7588), 299–308 (2007).
- 8 Milat AJ, King L, Bauman AE, Redman S. The concept of scalability: increasing the scale and potential adoption of health promotion interventions into policy and practice. *Health Promot. Int.* doi:10.1093/heapro/dar097 (2012) (Epub ahead of print).
- 9 Green LA, Seifert CM. Translation of research into practice: why we can't just do it. *J. Am. Board Fam. Pract.* 18(6), 541–545 (2005).
- 10 Makrilakis K, Liatis S, Grammatikou S, Perrea D, Katsilambros N. Implementation and effectiveness of the first community lifestyle intervention programme to prevent Type 2 diabetes in Greece. The DE-PLAN Study. *Diabetic Med.* 27, 459–465 (2010).
- 11 Saaristo T, Moilanen L, Korpi-Hyovalti E *et al.* Lifestyle intervention for prevention of Type 2 diabetes in primary healthcare. *Diabetes Care* 33(10), 2146–2151 (2010).
- 12 Ackermann RT, Finch EA, Brizendine E, Zhou H, Marrero DG. Translating the Diabetes Prevention Program into the community: the DEPLOY pilot study. *Am. J. Prevent. Med.* 35(4), 357–363 (2008).
- 13 Schwarz PEH, Albright AL. Prevention of Type 2 diabetes: the strategic approach for implementation. *Horm. Metab. Res.* 43(13), 907–910 (2011).
- 14 Ali MK, Echouffo-Tcheugui J, Williamson DF. How effective were lifestyle interventions in real-world settings that were modeled on the Diabetes Prevention Program? *Health Affairs* 31(1), 67–75 (2012).
- 15 Colagiuri R, Colagiuri S, Yach D, Pramming S. The answer to diabetes prevention: science, surgery, service delivery, or social policy? *Am. J. Public Health* 96(9), 1562–1569 (2006).
- 16 Green LW, Brancati FL, Albright A. Primary prevention of Type 2 diabetes: integrative public health and primary care opportunities, challenges and strategies. *Fam. Pract.* 29(Suppl. 1), i13–i23 (2012).
- 17 Schwarz PEH. Preventing Type 2 diabetes – how to proceed? *Br. J. Diabetes Vasc. Dis.* 11(4), 158–160 (2011).
- 18 Albright A, Williamson D. Community approaches to diabetes prevention. In: *Prevention of Type 2 Diabetes: from Science to Therapy*. Leroith D (Ed.). Springer, NY, USA, 203–219 (2012).
- 19 Bergman M, Buysschaert M, Schwarz PEH, Albright A, Venkat Narayan KM, Yach D. Diabetes prevention: global health policy and perspectives from the ground. *Diabetes Manage.* 2(4), 309–321 (2012).
- 20 Reddy P, Rankins D, Timoshanko A, Dunbar JA. Life! in Australia: translating prevention research into a large-scale intervention. *Br. J. Diabetes Vasc. Dis.* 11(4), 193–197 (2011).
- 21 Colagiuri S, Vita P, Cardona-Morrell M *et al.* The Sydney Diabetes Prevention Program: a community-based translational study. *BMC Public Health* 10(1), 328–335 (2010).
- 22 Goode AD, Reeves MM, Eakin EG. Telephone-delivered interventions for physical activity and dietary behavior change: an updated systematic review. *Am. J. Prevent. Med.* 42(1), 81–88 (2012).
- 23 Narayan K MV, Echouffo-Tcheugui JB, Mohan V, Ali MK. Global prevention and control of Type 2 diabetes will require paradigm shifts in policies within and among countries. *Health Affairs* 31(1), 84–92 (2012).
- 24 Herman WH. The economics of diabetes prevention. *Med. Clin. North Am.* 95(2), 373–384 (2011).

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- 101 Diabetes Prevention and Coalition Alliance. <http://notme.com/dpca/> (Accessed 2 October 2012)