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ELEMENTS OF AN EFFECTIVE DPP PROGRAM IN AT-
RISK ADULTS WITH PREDIABETES

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DEDICATION

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ABSTRACT

ELEMENTS OF AN EFFECTIVE DPP PROGRAM IN AT- RISK ADULTS WITH PREDIABETES A DESCRIPTIVE STUDY

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One major health concern for the United States is prediabetes. Therefore, it is pertinent for providers to be knowledgeable of an effective diabetes prevention program (DPP) to prevent the onset of diabetes. The objective of this article is to identify effective DPP's which reduce the development of type 2 diabetes in at risk adults, in the primary care setting. A systematic literature review was conducted from 2011 to 2016 which revealed the key components of an effective DPP. The key components include the use of a trained lifestyle coach, length and number of session, method of delivery, follow-up sessions, cost, and patient perceptions. Utilizing the key components of a DPP, providers can effectively identify a DPP that's individualized to each patient.

Elements of an Effective DPP Program in At-

Risk Adults with Prediabetes

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Introduction

Prediabetes is one of the biggest health concerns in the United States. The CDC's 2014 National Diabetes Statistics Report shows the number of individuals with prediabetes rose from 79 million in 2010 to 86 million in 2012.¹ Most of these individuals will progress to type 2 diabetes mellitus (T2DM) within 5 years.¹ According to statistics, T2DM is a costly and deadly disease.¹ The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) defines prediabetes as hemoglobin A1C between 5.7 and 6.4% or fasting plasma glucose 100-125 mg/dl, and BMI greater than 24 kg/m².²

For nurse practitioners (NPs), the increase of a prediabetes and diabetes diagnoses creates a huge burden. Therefore, NPs in the primary care setting need to be thoroughly educated on diagnostic criteria for prediabetes, diabetes, and early interventions aimed at decreasing the incidence of prediabetes progressing to diabetes. Healthcare providers can increase life expectancy, decrease complications, and lower the cost of health care related to type 2 diabetes by preventing or delaying the onset for all patients who meet the pre-diabetes criteria. Diabetes Prevention Programs (DPPs) are a key initiative in reducing the development of diabetes in a patient diagnosed with prediabetes. As providers, NPs should be familiar with local DPPs available, price ranges of these programs and how to implement a DPP in their practice.

The effectiveness of lifestyle interventions in reducing the incidence of T2DM by 29-58% has been demonstrated by several large randomized control trial studies of DPPs conducted in the U.S., China, Finland, and India.^{3,4,5,6} In participants greater than 60 years the reduction was 71%.³ Following major landmark studies, numerous other studies have been conducted to translate DPPs into primary care and community settings and several reviews assessed these DPPs effectiveness.^{8,9,10,11,12,13,14} A key identified outcome is moderate weight loss of 5-7%

through healthy dietary changes and increased moderate intensity physical exercise to minimum 150 minutes per week.^{7,15} Participants of these programs experienced a return to normal blood glucose and improved diabetes and heart disease risk factors including blood glucose levels, weight, blood pressure, and lipid levels.¹⁵

The objective of this article is to identify effective DPPS which reduce the development of type 2 diabetes in at risk adults, in the primary care setting. A systematic search for literature published on DPPs between January 2011-January 2016 was done. Both qualitative and quantitative reviews were included. Literature reviewed revealed the effectiveness of DPPs and helped identify the key elements to an effective DPP.

Patients eligible for enrollment into DPP programs needed to be overweight (Body Mass Index (BMI) ≥ 24 ; ≥ 22 if Asian) and have met the criteria for a diagnosis of prediabetes having a blood test result in the prediabetes range within the past year: HgA1C of 5.7–6.4% or FPG: 100–125 mg/dL, or two-hour plasma glucose (after a 75gm glucose load): 140–199 mg/dL or be previously diagnosed with gestational diabetes and no previous diagnosis of diabetes.¹⁶

Elements of an Effective DPP

The goal of the DPP program is to empower patients with prediabetes to take charge of their health and well-being with the main outcome of moderate weight loss.¹⁶ To successfully implement a DPP certain components must be in place. Review of the evidence-based literature provides substantial insight on DPPs with translational interventions. Several modifiable elements emerged from the literature associated with successful DPPs. The key elements are: use of a trained lifestyle coach, length of the program and number of sessions, method of delivery (in person, individual or group, telephone, email, internet, mobile app, DVD), follow-up sessions after the main period of the program, cost, and patient perceptions.^{8,9,10,12,13,14,15,17}

Studies conducted using variations of the landmark DPPs have different degrees of success in reaching the outcomes. Some reviews concluded that programs with less intensive curriculum are not as effective considering long-term outcomes but yield similar results in the short term outcome of weight loss.^{10,15,22} Participants of programs with fewer sessions and a 12 month final review²⁰ achieved similar weight reduction to participants from programs structured like the U.S. DPP (16 weekly in person sessions, monthly follow-up up to a year)^{8,9,10,14,15,23,24}. The length of DPPs reviewed varied from 8 weeks to 6 years with 12 months being the most common and effective.^{3,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23} Programs which include a maintenance phase significantly reduce the development of T2DM.^{8,12,15,18}

In the literature reviewed the DPPs were delivered through various methods. The majority of the studies used programs which utilized a face-to-face individualized, group, or combined approach.^{6,7,8,9} These approaches were shown to be the most effective.^{10,12,15} Methods that also showed varying degrees of success included telephone based, mobile phone app, self-administered design, or commercial weight loss program such as Weight Watchers.^{17,19,21,27}

Implementing a DPP involves significant expense for both the provider and for the participant, which is a barrier to implementation. The medical costs over 3 years reported by the original US DPP was \$3519/participant.²² Looking at cost effectiveness, the intervention incorporating the commercialized Weight Watchers program stands out.¹⁷ This program has annual cost of \$515.40 for full access and online only access cost of \$227.00 compared to the annual cost of the National Diabetes Education Program using a sliding scale ranging from \$0 - \$427.00 based on income.^{17,18} Both studies had significant results in preventing the onset of diabetes.^{17,18}

Two studies looked at patient's perceptions regarding their risk and how open patients

would be to DPPs.^{35,37} One found the key factors that encouraged engagement were high motivation and social and external supports.³⁵ The other found that most patients overestimated the risk of developing diabetes and were not familiar with evidence-based treatment options for prediabetes, but were open to lifestyle interventions.³⁷

Conclusion

A patient is more likely to adhere to a program that fits with his/her lifestyle and financial capability. As nurse practitioners (NPs) not only is it desirable to enroll these patients in DPPs, but also to implement a DPP in practice. The National Guideline Clearinghouse published a guideline for preventing T2DM through DPPS¹⁵ and the Centers for Disease Control (CDC) developed a guide to implementing a DPP which includes guidelines for screening, prediabetes assessment tool, and sample patient flow process that can be used.¹⁶ Primary health care providers can implement a DPP in their practice or refer patients to a (CDC) recognized program available in the area.

CEU Questions

1. What are key elements of an effective DPP program?
 - a) trained lifestyle coach, method of delivery, follow-up sessions, cost, and patient perceptions.
 - b) trained lifestyle coach, length of program/number of sessions, method of delivery, and patient perceptions
 - c) trained lifestyle coach, length of program/number of sessions, method of delivery, follow-up sessions, cost, and patient perceptions

2. What patient data meets the requirements for a diagnosis of prediabetes?
 - a) HGA1C between 5.7-6.4% or FPG 100-125 mg/dl, and BMI > than 24 kg/m²

b) HGA1C between 6-6.4% or FPG >125 mg/dl, and BMI > than 24 kg/m²

c) HGA1C between 5.7-6.4% or FPG 100-125 mg/dl, and BMI > than 29 kg/m²

3. Why is it important as a provider to know information about DPPs?

a) To decrease the number of patients that progress from prediabetes to diabetes

b) Increase the life expectancy of these patients

c) Lessen complications

d) Lower healthcare cost

e) All the above

4. Where can I find information as a provider on how to implement a DPP in my practice?

a) CDC website

b) American Diabetes Association

c) local Health Department

5. Can you as a provider prevent a patient with prediabetes from developing into diabetes?

a) True

b) False

References

1. National Diabetes Statistics Report, 2014. (2015, May 15). Centers for Disease Control (CDC). Retrieved from <http://www.cdc.gov/diabetes/data/statistics/2014StatisticsReport.html>
2. Diagnosis of Diabetes and Prediabetes | NIDDK. (n.d.). Retrieved November 02, 2016, from <https://www.niddk.nih.gov/health-information/diabetes/diagnosis-diabetes-prediabetes>
3. Knowler WC, Barrett-Connor E, Fowler SE, Herman RF, Lachin JM, Walker EA, et al. Diabetes Prevention program Research group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England journal of medicine*. 2002;346(6):393-403
4. Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *The New England journal of medicine*. 2001;344(18):1343-50
5. Pan XR, Li GW, Hu YH, Wang JX, An ZX, et al. Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance. The Da Qing IGT and diabetes study. *Diabetes care*. 1997;20(4):537-44
6. Ramachandran A, Snehalatha C, Mary S, Mukesh B, Bhaskar AD, Vijay V, et al. The Indian Diabetes Prevention programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-10). *Diabetologia*. 2006;49(2):289-97
7. Albright AL, & Gregg EW (2013). Preventing Type 2 Diabetes in Communities Across

- the U.S.: The National Diabetes Prevention Program. *American Journal of Preventive Medicine*, 44(4, Supplement 4), S346–S351. <http://doi.org/10.1016/j.amepre.2012.12.009>
8. Aziz Z, Absetz P, Oldroyd J, Pronk NP, & Oldenburg B (2015). A systematic review of real-world diabetes prevention programs: learnings from the last 15 years. *Implementation Science*, 10, 1–17. <http://doi.org/10.1186/s13012-015-0354-6>
 9. Katula JA, Vitolins MZ, Morgan TM, Lawlor MS, Blackwell CS, Isom SP, & Goff DJ (2013). The Healthy Living Partnerships to Prevent Diabetes study: 2-year outcomes of a randomized controlled trial. *American Journal of Preventive Medicine*, 44(4 Suppl 4), S324-S332. doi:10.1016/j.amepre.2012.12.015
 10. Dunkley AJ, Bodicoat DH, Greaves CJ, Russell C, Yates T, Davies MJ, & Khunti K. (2014). Diabetes Prevention in the Real World: Effectiveness of Pragmatic Lifestyle Interventions for the Prevention of Type 2 Diabetes and of the Impact of Adherence to Guideline Recommendations: A Systematic Review and Meta-analysis. *Diabetes Care*, 37(4), 922-933. doi:10.2337/dc13-2195
 11. Samuel-Hodge CD, Johnson CM, Braxton DF, & Lackey M. (2014). Effectiveness of Diabetes Prevention Program translations among African Americans. *Obesity Reviews*, 15, 107-124. doi:10.1111/obr.12211
 12. Neamah HH, Kuhlmann AK, & Tabak RG. (2016). Effectiveness of Program Modification Strategies of the Diabetes Prevention Program: A Systematic Review. *The Diabetes Educator*, 42(2), 153-165. doi:10.1177/0145721716630386
 13. Aguiar EJ, Morgan PJ, Collins CE, Plotnikoff RC, & Callister R. (2014). Efficacy of interventions that include diet, aerobic and resistance training components for type 2 diabetes prevention: a systematic review with meta-analysis. *The International Journal*

Of Behavioral Nutrition And Physical Activity, 112. doi:10.1186/1479-5868-11-2

14. Davies MJ, Gray LJ, Troughton J, Gray A, Tuomilehto J, Farooqi A, Yates T. (2016). A community based primary prevention program for type 2 diabetes integrating identification and lifestyle intervention for prevention: The Let's Prevent Diabetes cluster randomized controlled trial. *Preventive Medicine*, 84, 48-56.
doi:10.1016/j.ypmed.2015.12.012
15. Pronk NP, & Remington PL. (2015). Combined Diet and Physical Activity Promotion Programs for Prevention of Diabetes: Community Preventive Services Task Force Recommendation Statement. *Annals of Internal Medicine*, 163(6), 465. doi:10.7326/m15-1029
16. Prevent Diabetes STAT Toolkit - cdc.gov. (n.d.). Retrieved January 26, 2017, from https://www.bing.com/cr?IG=CF7E7BE266FD49C384D920F768FB1C47&CID=1D6531F794CD657611FA3BE195FC6492&rd=1&h=xVvX-TJZ8RtgmOhQ8WSY3xVHryDj6zc6gGkb0jc35kU&v=1&r=https%3a%2f%2fwww.cdc.gov%2fdiabetes%2fprevention%2fpdf%2fSTAT_toolkit.pdf&p=DevEx,5108.1
17. Marrero DG, Palmer KNB, Phillips EO, Miller-Kovach K, Foster GD, & Saha CK. (2016). Comparison of Commercial and Self-Initiated Weight Loss Programs in People With Prediabetes: A Randomized Control Trial. *American Journal of Public Health*, 106(5), 949–956. <http://doi.org/10.2105/AJPH.2015.303035>
18. Katula JA, Blackwell CS, Rosenberger EL, & Goff Jr DC. (2012). Translating Diabetes Prevention Programs: Implications for Dissemination and Policy. *NCMJ*, 72(5), 405-408.
19. Kanaya AM, Santoyo-Olsson J, Gregorich S, Grossman M, Moore T, & Stewart AL. (2012). The Live Well, Be Well Study: A Community-Based, Translational Lifestyle

Program to Lower Diabetes Risk Factors in Ethnic Minority and Lower-Socioeconomic Status Adults. *American Journal of Public Health*, 102(8), 1551–1558.

<https://doi.org/10.2105/AJPH.2011.300456>

20. Vita P, Cardona-Morrell M, Bauman A, Singh MF, Moore M, Pennock R, Colagiuri S. (2016). Type 2 diabetes prevention in the community: 12-Month outcomes from the Sydney Diabetes Prevention Program. *Diabetes Research and Clinical Practice*, 112, 13–19. <http://doi.org/10.1016/j.diabres.2015.11.010>
21. Michaelides A, Raby C, Wood M, Farr K, & Toro-Ramos T. (2016). Weight loss efficacy of a novel mobile Diabetes Prevention Program delivery platform with human coaching. *BMJ Open Diabetes Research & Care*, 4(1), e000264. doi:10.1136/bmjdr-2016-000264
22. Lawlor MS, Blackwell CS, Isom SP, Katula JA, Vitolins MZ, Morgan TM, & Goff DJ. (2013). Cost of a group translation of the Diabetes Prevention Program: Healthy Living Partnerships to Prevent Diabetes. *American Journal of Preventive Medicine*, 44(4 Suppl 4), S381-S389. doi:10.1016/j.amepre.2012.12.016
23. Vojta D, Koehler TB, Longjohn M, Lever JA, & Caputo NF. (2013). Diabetes prevention at the national level: A Coordinated National Model for Diabetes Prevention. Linking Health Systems to an Evidence-Based Community Program. *American Journal of Preventive Medicine*, 44(Supplement 4), S301-S306. doi:10.1016/j.amepre.2012.12.018
24. Gong Q, Gregg EW, Wang J, An Y, Zhang P, Yang W, Bennett PH. (2011). Long-term effects of a randomized trial of a 6-year lifestyle intervention in impaired glucose tolerance on diabetes-related microvascular complications: the China Da Qing Diabetes Prevention Outcome Study. *Diabetologia*, 54(2), 300–307.

<https://doi.org/10.1007/s00125-010-1948-9>

25. Brokaw SM, Carpenedo D, Campbell P, Butcher MK, Furshong G, Helgerson SD, & Harwell TS. (2015). Effectiveness of an Adapted Diabetes Prevention Program Lifestyle Intervention in Older and Younger Adults. *Journal of the American Geriatrics Society*, 63(6), 1067–1074. <http://doi.org/10.1111/jgs.13428>
26. Cené CW, Haymore LB, Ellis D, Whitaker S, Henderson S, Lin F, & Corbie-Smith G. (2013). Implementation of the Power to Prevent Diabetes prevention educational curriculum into rural African American communities: A feasibility study. *The Diabetes Educator*, 39(6), 776-785. doi:10.1177/0145721713507114
27. Aguiar EJ, Morgan PJ, Collins CE, Plotnikoff RC, Young MD, & Callister R. (2016). Efficacy of the Type 2 Diabetes Prevention Using LifeStyle Education Program RCT. *American Journal of Preventive Medicine*, 50(3), 353–364. <http://doi.org/10.1016/j.amepre.2015.08.020>
28. Miller CK, Weinhold KR, Marrero DG, Nagaraja HN, & Focht BC. (2015). A translational worksite diabetes prevention trial improves psychosocial status, dietary intake, and step counts among employees with prediabetes: A randomized controlled trial. *Preventive Medicine Reports*, 2, 118–126. <http://doi.org/10.1016/j.pmedr.2015.02.003>
29. Whittemore R, Rosenberg A, Gilmore L, Withey M, & Breault A. (2014). Implementation of a Diabetes Prevention Program in Public Housing Communities. *Public Health Nursing*, 31(4), 317–326. <https://doi.org/10.1111/phn.12093>
30. American Diabetes Association. (2015, June 22). *The Cost of Diabetes: American Diabetes Association®*. Retrieved from <http://www.diabetes.org/advocacy/news->

[events/cost-of-diabetes.html](#)

31. Combined diet and physical activity promotion programs for prevention of diabetes: Community Preventive Services Task Force recommendation statement. | National Guideline Clearinghouse. (n.d.). Retrieved October 17, 2016, from <https://guideline.gov/summaries/summary/49591>
32. Diabetes Complications - Mayo Clinic. (2014, July 31). Retrieved from <http://www.mayoclinic.org/diseases-conditions/diabetes/basics/complications/con-20033091>
33. Flood D, Mux S, Martinez B, García P, Douglas K, Goldberg V, & Rohloff P. (2016). Implementation and Outcomes of a Comprehensive Type 2 Diabetes Program in Rural Guatemala. *Plos ONE*, *11*(9), 1-14. doi:10.1371/journal.pone.0161152
34. Herman WH. (2015). The cost-effectiveness of diabetes prevention: results from the Diabetes Prevention Program and the Diabetes Prevention Program Outcomes Study. *Clin Diabetes Endocrinol*, *1*(1). doi:10.1186/s40842-015-0009-1
35. Kullgren JT, Knaus M, Jenkins KR, & Heisler M. (2016). Mixed methods study of engagement in behaviors to prevent type 2 diabetes among employees with pre-diabetes. *BMJ Open Diabetes Research & Care*, *4*(1), e000212.
36. Melnyk BM, & Fineout-Overholt E. (2015). *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed.). Philadelphia: Wolters Kluwer Health.
37. O'Brien MJ, Moran MR, Tang JW, Vargas MC, Talen M, Zimmermann LJ, & Kandula NR. (2016). Patient perceptions about prediabetes and preferences for diabetes prevention. *The Diabetes Educator*, *42*(6), 667-677. doi:10.1177/0145721716666678
38. World Health Organization. (2016, June). Diabetes. Retrieved from

<http://www.who.int/mediacentre/factsheets/fs312/en/>