



Lifestyle intervention for obesity: a call to transform the clinical care delivery system in Mexico

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Rolando Giovanni


Díaz-Zavala ¹

María del Carmen

Candia-Plata ²

Teresita de Jesús

Martínez-Contreras ¹

Julián Esparza-Romero ³

¹Nutrition Health Promotion Center, Department of Chemical and Biological Sciences, University of Sonora, Hermosillo, Sonora, Mexico;

²Department of Medicine and Health Sciences, University of Sonora, Hermosillo, Sonora, Mexico; ³Diabetes Research Unit, Department of Public Nutrition and Health, Research Center for Food and Development CIAD, Hermosillo, Sonora, Mexico

Abstract: Obesity and its comorbidities have become the most important public health problems for Latin America. In Mexico obesity has increased dramatically to the point where the government has declared it an epidemiological emergency. The most recent national data showed overweight and obesity affects 72.5% of adults, or around 56 million Mexicans. Most Mexican adults with obesity are undiagnosed. According to data derived from a national representative survey, only 20% of adults with BMI >30 kg/m² were diagnosed with obesity by a health provider. Likewise, only 8% of individuals with obesity had received treatment for obesity. Interventions offered in the Mexican health care delivery system generally consist of traditional consultations with recommendations on diet and exercise, visits are monthly to quarterly, and validated behavior change protocols are not used. Evidence from clinical trials has shown that weight loss with this type of treatment is generally less than 1 kg per year. In contrast, intensive lifestyle interventions – protocols focusing on achieving changes in diet, physical activity, and moderate weight loss using behavioral strategies with weekly or bi-weekly sessions for the first 3 to 6 months, and a maintenance phase with trained interventionists – as implemented in the Diabetes Prevention Program and the Look AHEAD studies achieved weight loss of 7–9% at one year. Additionally, translation studies of these interventions to the community and to real-world clinical practice have achieved weight loss of around 4%. Adaptations of intensive lifestyle interventions have been implemented in the United States, both in clinical practice and in the community, and this type of intervention represents a potential model to combat obesity in Mexico and other Latin American countries. It is essential that primary care providers in Mexico implement clinical practice guidelines based on the best evidence available as discussed here to effectively treat obesity. The authors make recommendations to improve the treatment of obesity in the clinical care delivery system in Mexico using intensive lifestyle interventions.

Keywords: nutrition, weight loss, primary care, underdiagnosis, health care providers, diabetes

Correspondence: Rolando Giovanni Díaz-Zavala
Nutrition Health Promotion Center, Department of Chemical and Biological Sciences, University of Sonora, Blvd. Luis Encinas y Rosales S/N, Hermosillo, Sonora 83000, México. C.P.
Email giovanni.diaz@unison.mx

Obesity and related non-communicable diseases have become the most important public health problems for Latin America. Since 1980, the average BMI in Latin American individuals increased by about 1 kg/m² per decade, which is twice as fast as the average global increase¹ In the case of Mexico, obesity has increased rapidly in recent years among Mexican adults. The prevalence of obesity in women aged 20 to 49 years was 9% in 1988, and quadrupled to 35% in 2012.² The most recent figures in 2016 show that 33.3% of Mexican adults are affected by obesity. Further, 72.5% of the adult population

are overweight or obese (approximately 56 million).³ It is well known that obesity increases the risk of developing chronic non-communicable diseases, such as type 2 diabetes, cancer and cardiovascular disease.⁴ These health problems are the main leading causes of death among adults in Mexico,⁵ and have a heavy toll on the Mexican economy.⁶

Obesity is under-diagnosed in Mexico

Despite the fact that obesity has been declared the “main modifiable risk factor in the country”,⁷ the latest published data on diagnosis from the Mexican health and nutrition survey showed that only 20% of adults suffering from obesity have been diagnosed by a health care provider.⁸ The under-diagnosis of obesity is well known, even in developed countries such as the United States.⁹ Factors associated with this problem include poor training of health personnel, lack of time for prevention activities, lack of financial incentives to treat obesity, weight stereotyping, and skepticism about the effectiveness of obesity treatment, among others.^{9,10} Block et al observed in a cross-sectional study among internal medicine residents from United States, that although nearly all of them were aware of the consequences of obesity, 61% were not familiar with the use of BMI for diagnosis, less than 50% felt qualified to treat obesity, and 31% reported obesity treatment was futile.¹¹ A cross-sectional study carried out in a hospital by our research group in northern Mexico in 2007, showed that 79% of health care providers did not know the range of BMI to diagnose obesity (80% primary care physicians, 69% medicine specialists, 55% undergraduate medicine interns and 96% nurses). Further, 78% of patients evaluated with a BMI >30 kg/m² did not consider themselves as having obesity (Díaz-Zavala et al unpublished data). In 2013, the Mexican Government began the implementation of a national strategy against overweight, obesity and diabetes, which includes actions for health promotion, disease prevention, health regulation, fiscal policy and medical care.¹² These efforts along with help from civic associations¹³ and recent recommendations by the National Academy of Medicine of Mexico^{14,15} have the potential to substantially improve obesity diagnosis in clinical care. However, to date there is no data available from national representative surveys to show a significant improvement in these figures.

Obesity is under-treated in Mexican adults and the treatments available are not effective

In relation to obesity management, national-level data revealed that only 8% of individuals with obesity had received treatment by a health care provider.⁸ However, there is some evidence that a significant proportion of adults may be trying to lose weight, including with strategies that have limited or no scientific support such as herbal products and dietary supplements.¹⁶ In addition to the low level of treatment, interventions offered in the Mexican clinical care delivery system usually consist of conventional appointments with recommendations on diet and exercise. Visits are not frequent (monthly or quarterly) and validated behavioral change protocols are not used, nor are they contemplated in clinical practice guidelines.^{17–19} Public primary care clinics generally do not have nutritionists, psychologists, or trained personnel in behavioral change; therefore, obesity management relies on medical and nursing personnel. Some primary care clinics and hospitals offer obesity management services by nutritionists or nutrition student interns; however, even with nutritionists, the treatment is given in a traditional fashion without using a behavioral change protocol and with sporadic visits.

Within this context, an important question is whether interventions to treat obesity offered in Mexico’s health sector are effective. Tsai and Wadden in 2009 published a systematic review of clinical trials in a primary care setting in the United States.²⁰ They identified four brief interventions implemented by primary care physicians with infrequent consultations (>1 month between consultations), similar to what most Mexicans receive. It was noted that participants in each of the four brief intervention groups had a weight loss of 0.1 kg,²¹ 0.9 kg,²² 1.4 kg,²³ and 2.3 kg²⁴ in one year. The researchers concluded that the evidence does not support low-to-moderate intensity counseling by physicians to achieve clinically significant weight loss.²⁰ Further, Wadden et al conducted a systematic review in 2014, identifying three studies on the effect of an intervention with quarterly or less frequent consultations by primary care physicians. They observed that participants in these low-intensity interventions had a weight loss of only 0.6 kg to 1.7 kg in 6 to 24 months.²⁵ In the same year Hartman-Boyce et al conducted a systematic review on the effectiveness of interventions with multiple components (diet, exercise, behavioral therapy), implemented by therapists who provided interventions in

clinical practice on a routine basis, on body weight. They found interventions implemented by primary care teams did not have a significant effect on body weight compared to a control group at 12 months (mean difference of 0.45 kg).²⁶ Lastly, a study conducted by our research team where patients with obesity in the control group received monthly conventional appointments by a nutrition student intern (with recommendations on a hypocaloric diet and physical activity) showed that participants increased their body weight by 0.4 kg in three months.²⁷ The studies previously mentioned, including the most recent review,²⁸ clearly demonstrate that low-intensity conventional treatment (consultations >1 month apart) to which most Mexicans have access, does not have a clinically significant effect on body weight.

Diabetes: a growing problem with poor control

In 2016, for the first time in history, the Mexican Government declared an epidemiological emergency for two non-infectious health problems: diabetes and obesity.²⁹ This was due to the high prevalence of both conditions and the almost 100,000 people who died from diabetes in 2015.²⁹ Diabetes doubled nationally from 7.3% in 2000 to 14.4% in 2006.³⁰ This figure could be higher now, but there is no recent comparative national information. Almost half of individuals that met the criteria for diabetes in 2006 did not know they had it. Meanwhile, 95% of those who did know, did not have metabolic control of it,³⁰ however this figure improved to 75% in 2012.² Only 15% of individuals with diagnosed diabetes reported checking their HbA1c in the previous year.² Both poor diagnosis and poor control of this condition precedes numerous complications, excessive costs, and deterioration in the quality of life.

It was expected that the declaration of an epidemiological emergency of obesity and diabetes in Mexico would improve their diagnosis and control through various strategies, including strengthening the actions of the National Strategy for the Prevention and Control of Overweight, Obesity and Diabetes.¹² However, the efforts initiated at governmental level, together with academics and institutions, to create a comprehensive evidence-based policy for obesity prevention called the “National Agreement for Healthy Nutrition”, was highly opposed by those who saw their interests affected (eg the sugar and food industries), which significantly limited their implementation.³¹ Such opposition even extended to harassing and

threatening some researchers and activists who led the effort.³² Some researchers have identified possible conflicts of interest in the advisory board of the Mexican Observatory on Noncommunicable Diseases, which plays a key role in directing policy efforts for obesity prevention and control in the National Strategy for Prevention and Control of Overweight, Obesity and Diabetes.³³ Recently, the health authorities of the new government have recognized this problem. They have also stated that health issues will be disconnected from private initiative and that public health policy will be above private interests.³⁴

Opportunities to improve obesity treatment in Mexico

Obesity and type 2 diabetes could be prevented and controlled more effectively with intensive lifestyle interventions. Such interventions focus on achieving changes in diet, physical activity and moderate weight loss (7–10%) using a protocol that includes behavioral strategies (stimulus control, self-monitoring, goal setting, social support, etc.), as well as nutrition and physical activity education, with weekly or bi-weekly sessions for the first 3 to 6 months of treatment, and then a maintenance phase monthly or more frequently.^{35–37} Since 2002, evaluations of the Diabetes Prevention Program (DPP)³⁸ have shown that it is possible to achieve moderate weight loss (7% at 1 year and about 4% at 4 years) with this type of program, and prevent 6 out of 10 cases of type 2 diabetes in individuals at risk. Subsequently, the Look AHEAD study, a multicenter randomized clinical trial, showed that individuals with obesity and type 2 diabetes who participated in an intensive lifestyle intervention (similar to DPP) had positive results in weight control in the short (1 year, –8.5% vs –0.6% control group), medium (4 years, –4.4% vs –0.7%) and long term (8 years, –4.7% vs –2.1%).³⁹ Concomitant to weight loss, participants in the intensive lifestyle intervention showed numerous health benefits, such as significant improvement in their cardiorespiratory condition, body composition, blood glucose and lipids, blood pressure, systemic inflammation levels, liver fat, sexual function and quality of life, as well as a reduction in sleep apnea, urinary incontinence and depression symptoms.⁴⁰ There was no effect on cardiovascular mortality, which was the primary outcome of the study,⁴¹ however, a secondary analysis including only the intensive lifestyle intervention participants who achieved a weight loss greater than 10% did show a significant effect.⁴² A description of the lifestyle protocols for the DPP, Look

AHEAD and the Mexican adaptation of the DPP for obesity programs are shown in [Table 1](#).

The mandatory question is, why, if there is evidence that traditional treatments are not effective for obesity and the prevention/control of diabetes, does this not translate into changes in clinical practice in Mexico? The lack of transfer of scientific evidence into clinical practice is not a problem confined to Mexico, but it is becoming more and more recognized.⁴⁵ There is a great amount of valuable information from controlled clinical trials (translational research phase 1); however, the dissemination of findings from clinical studies to real-world clinical practice (translational research phase 2) still represents a challenge.⁴⁵

In this context, it can be stated that there is sufficient evidence that the transfer of intensive lifestyle interventions such as the DPP protocol for obesity management and diabetes prevention in different scenarios (community centers, recreation centers, churches and health centers) under real-world conditions can achieve significant weight loss (4%).^{27,46} This evidence includes a systematic review and meta-analysis of 28 US-based studies⁴⁶ and a pilot study in Mexico.²⁷ Additionally, the DPP protocol has been shown to be cost-effective in people at high risk for diabetes,⁴⁷ and the implementation of the DPP in the community through the Young Men's Christian Association (non-governmental organization) in the United States has shown the program to be both effective and cost-effective.^{48,49} Given the evidence of effectiveness of the DPP, including in translation studies, the National Diabetes Prevention Program of the Centers for Disease Control and Prevention (CDC) was approved in 2010 by the Congress of United States as a frame of reference to prevent diabetes.⁵⁰ The CDC through the National Diabetes Prevention Program supports organizations in all 50 US States and the District of Columbia to provide intensive lifestyle interventions to prevent diabetes in high-risk populations.⁵¹ This program is provided in group mode by a trained lifestyle change facilitator using a protocol approved by the CDC that can be in person, online or mixed.^{49,52} Through the provision of funds for public health departments, the CDC promotes awareness about prediabetes, and the National Diabetes Prevention Program encourages screening, laboratory tests, and referrals to intensive lifestyle interventions.

Currently, intensive lifestyle interventions are considered the gold standard for the management of obesity in the United States.⁵³ The most recent report by the US Preventive Task Force in 2018 recommends clinicians to offer or refer adults with obesity to intensive,

multicomponent behavioral interventions, ie intensive lifestyle interventions.⁵⁴ Since 2011, the Centers for Medicare and Medicaid Services began reimbursing physicians who offer this type of program to their patients with obesity, based on the evidence found by the US Preventive Services Task Force.⁵⁵ In fact, the first results of this program are already emerging. Treviño et al in a retrospective analysis with 643 patients, found that participants who attended less than 4 sessions did not lose weight, those who attended 4 to 8 sessions had a reduction of 1.1 kg, and those who attended more than 8 sessions lost 3.7 kg. The majority of participants in the study were Hispanic, and clinics were located in low income areas, which may have negatively influenced results.⁵⁶ In the UK, another promising demonstration of effectiveness in treating obesity in routine primary care is the Counterweight Program.⁵⁷ This program was implemented in the UK by practice nurses who were trained and mentored by registered dietitians with specialist training in obesity management. The program includes nutrition education and behavioral strategies, consists of 6 consultations the first 3 months and then quarterly the rest of the year. The participants who completed the 12 months (43%) reduced their body weight by 3 kg, and the program has also been shown to be cost-effective.⁵⁸ The above evidence supports intensive lifestyle interventions as a potential model for combating obesity and diabetes in Mexico.

Remaining challenges for Mexico. What is the current state of knowledge and attitude of health care providers in Mexico?

In the authors' opinion, further research is needed to determine the knowledge and attitude of health care providers in Mexico, including in the public health care system. Important questions include: How many know how to diagnose obesity? How many believe obesity can be treated effectively? How many have the necessary skills to treat obesity (dietary and physical activity counseling, use of behavior change strategies)? How many refer their patients to receive treatment? How many have effective programs to which to refer their patients? How many health care providers would like to actively collaborate in the treatment of obesity? How many health care providers would be willing to receive training? The answers to these questions would help inform the implementation of effective interventions into routine practice. If we do not

Table 1 Description of the lifestyle protocols for the Diabetes Prevention Program (DPP), Action for Health in Diabetes (Look AHEAD) and Mexican adaptation of the DPP for obesity programs

Component	Diabetes Prevention Program ^{38,43}	Look AHEAD ^{39,44}	Diabetes Prevention Program adaptation in Mexico ^{27,71}
Intervention goals			
Weight loss	≥7%	≥10%	≥10%
Physical activity	150 min/week	≥175 min/week	150 min/week
Intervention characteristics			
Interventionists	Registered dietitians (mainly) and other health professionals with at least a master's degree in exercise physiology, behavioral psychology or health education. The interventionists were called "Lifestyle coaches" and had received previous training on the program (2 days, number of hours not specified).	Registered dietitians, behavioral psychologists and exercise specialists. They had received previous training (2 days, number of hours not specified).	Nutritionists (4 years study plus 6 to 12 months of practice in any of the following areas: clinical nutrition, research, community practice or food services) and nutrition interns. They had received previous training (25 hrs).
Implementation modality (visits)	Individual	Individual and group	Individual and group
Components of the visits	Individual implementation of the diabetes prevention program based on the "Lifestyle Balance"® manual. At each visit, the Lifestyle coach evaluates the individual body weight of participants and self-monitoring records (fat intake, body weight and physical activity). Participants identify personal barriers for weight loss and physical activity and develop an action plan or goals agreement for the next session.	Group sessions. Implementation of the diabetes prevention program "Lifestyle Balance"® adapted to patients with obesity and type 2 diabetes in groups of 10 to 20 people. Individual sessions. Lifestyle coach reviews progress and particular needs for the resolution of problems related to lifestyle. In the first week of the treatment the participant is asked to record their self-selection of food, in the second week the caloric restriction is added, and in the third week, the use of meal replacements is prescribed.	Group sessions. Implementation of the diabetes prevention program "Lifestyle Balance"® adapted to the Mexican population in groups of 10 to 50 people. Individual sessions. The nutritionist measures the body weight individually, prescribes the hypocaloric diet, recommends meal replacements (or smoothie with similar nutritional composition made at home). In addition, strategies to solve problems of adherence to the lifestyle are implemented. The topic seen in the group session is briefly reviewed in case that participant did not attend the group session.
Duration of visits	30 to 60 mins	Group session: 60 to 75 mins. Individual session: took place every third week of the month for 20 to 30 mins.	Group session: 90 mins Individual session: The first lasts 40 to 60 min and the subsequent visits 20 to 30 mins.

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Table 1 (Continued).

Component	Diabetes Prevention Program ^{38,43}	Look AHEAD ^{39,44}	Diabetes Prevention Program adaptation in Mexico ^{27,71}
Frequency of the visits	0 to 6 months: Approximately every 10 days ≥6 months: At least once every two months	0 to 6 months: weekly 7 to 12 months: At least 3 visits per month 2 to 4 years: monthly	0 to 3½ months: weekly 3½ to 6 months: biweekly 6 to 12 months: monthly
Nutritional intervention: -Type of diet -Distribution of macronutrients - Use of meal replacement	- Hypocaloric (1,200 to 2,000 kcal) - 25% fat - No	- Hypocaloric (1,200 to 1800 kcal) - <30% fat - Yes	- Hypocaloric (1,200 to 1,800 kcal) - 25% fat, 55% carbohydrates, 20% protein - Yes (optional)
Supervised exercise sessions	Yes	Yes	No
Support strategies to achieve or maintain weight loss or physical activity (“toolbox”)^a	Yes	Yes	No

(Continued)

Table 1 (Continued).

Component	Diabetes Prevention Program ^{38,43}	Look AHEAD ^{39,44}	Diabetes Prevention Program adaptation in Mexico ^{27,71}
<p>Description of sessions</p> <p>0 to 6 months. For this phase, the “Lifestyle Balance”[®] manual consisted of 16 sessions is implemented in the first 24 weeks:</p> <p>Session 1. Welcome to the Lifestyle Balance Program[®] Session 2. Be a Fat Detective Session 3. Three Ways to Eat Less Fat Session 4. Healthy Eating Session 5. Move Those Muscles Session 6. Being Active: A Way of Life Session 7. Tip the Calorie Balance Session 8. Take Charge of What’s Around You Session 9. Problem Solving Session 10. The Four Keys to Healthy Eating Out Session 11. Talk Back to Negative Thoughts Session 12. The Slippery Slope of Lifestyle Change Session 13. Jump Start Your Activity Plan Session 14. Make Social Cues Work for You Session 15. You Can Manage Stress Session 16. Ways to Stay Motivated</p> <p>For the rest of the intervention (≥6 months) 6 additional sessions were included, which are available in: https://www.diabetesprevention.pitt.edu/index.php/group-lifestyle-balance-materials/</p>	<p>0 to 6 months. The “Lifestyle Balance”[®] manual adapted for people with obesity and type 2 diabetes, included approximately 19 sessions for this phase, which is implemented in the first 24 weeks with a frequency of 3 sessions per month:</p> <p>Session 1: Welcome to the LookAHEAD Lifestyle Program Session 2: Getting Started Tipping the Calorie Balance Session 3 (Supplement): Be careful to read the label. Session 3: Ways to Eat Fewer Calories Session 4: Move Those Muscles Session 5: How Are You Doing? Session 8: Being Active: A Way of Life Session 9: How Are You Doing? Session 10: Healthy Eating Session 11: More About Healthy Eating Session 12: Four Keys to Healthy Eating Out Session 13: How Are You Doing? Session 14: Talk Back to Negative Thoughts Session 15: The Slippery Slope of Lifestyle Change Session 16: Emotions and You Session 17: How Are You Doing? Session 18 (Supplement): Happy Thanksgiving! Session 18: Handling Holidays - Vacations - Special Events Session 19: Jump Start Your Activity Plan: Muscle Training</p> <p>For the rest of the intervention (≥6 months) there were 25 additional sessions, which are available in: https://www.lookaheadtrial.org/publicResources/interventionMaterial.cfm?docCollectionGUID=4a761cfb-dad6-4168-a286-40de81919df2</p>	<p>0 to 6 months. The “Lifestyle Balance”[®] manual adapted for the treatment of excess weight in Mexico, included 19 sessions for this phase, which is implemented weekly during the first 14 sessions and every two weeks during the last 5 sessions:</p> <p>Session 1. Welcome to the Lifestyle Balance Program[®] Session 2. Be a Fat and Calorie Detective Session 2.1 Reading a Nutrition Label Session 2.2 Cooking Demonstration and Food Weighing^b Session 3. Move Those Muscles Session 4. Food Groups and Portion Sizes^b Session 5. Healthy Eating and Calorie Balance Tilting Session 6. Take Control of What Is Around You Session 7. How to Design Your Own Menu (Mexican System for Food Equivalents)^b Session 8. Problem Solving Session 9. Four Key Points to Eating Out Healthily and The Slippery Slope to Lifestyle Change Session 10. Make Social Cues Work For You and Activity Plan Kickoff Session 11. You Can Manage Stress Session 12. How to Feel Motivated Session 13. Obesity Risks^b Session 14. Diabetes Prevention^b Session 15.1 Heart Health and Cholesterol^b Session 15.2 Heart Health and Hypertension^b Session 16. Relationship Between Obesity and Cancer^b</p> <p>For the months 6 to 12 there were 6 additional sessions that, like the first sessions, are available from the authors of this study.</p>	

Notes: ^aSupport strategies to achieve or maintain weight loss or physical activity (“toolbox”). These include special advice for the solution of problems, tools for the control of food portions (utensils and meal replacement), gym memberships, among others. In the Look AHEAD study participants who did not achieve a 5% reduction in the first 6 months had the option of using orlistat to support weight loss. ^bAdditional session to the original program.

make real efforts to answer these questions, especially in the primary care setting, it will be difficult to achieve substantial progress in the areas of obesity treatment and diabetes prevention in México.

Change the paradigm of the traditional consultation

If we consider the intensive lifestyle interventions offered in the Diabetes Prevention Program (DPP) and the Look AHEAD studies as an exemplar, offering these programs requires a change of mentality and a restructuring of the traditional treatment model, as well as important changes to public policies in Mexico. First, health personnel must be made aware that there are effective evidence-based programs for obesity management and diabetes prevention, and that they could have access to these types of programs to which to refer their patients. They may also need to receive more nutrition education,^{59,60} training in behavioral change strategies,⁶¹ physical activity counseling, and intensive lifestyle intervention programs. A cross-sectional study conducted in the US showed that only 14% of resident physicians believe they are adequately trained to provide nutritional counseling.⁶² Another aspect would be contemplating changes to the curriculum of schools of medicine and nursing to avoid the need to correct these problems through continuing medical education. A survey involving more than 100 accredited US medical schools revealed students received less than 20 hrs of nutrition education during their professional training, only 1 in 4 schools had a nutrition course, and only 27% of schools received the minimum nutrition education (25 hrs) as proposed by the Academy of Sciences.⁶³

While clinicians are in some way part of the obesity problem and its poor combat, they also have the potential to be key contributors to the solution. Therefore, they should consider that traditional clinical tools for obesity management are not sufficient. Due to the epidemiological burden of obesity in Mexico, it is necessary to supplement traditional clinical strategies with evidence-based programs that have shown good results.

It is necessary to have access to a multidisciplinary approach and other potential strategies for the management of obesity

It will be important to examine the possibility of incorporating other key health professionals trained in the

implementation of the protocols used in the DPP and Look AHEAD study, such as nutritionists, behavioral psychologists and experts in physical activity.^{40,43} Some studies suggest nutritionists obtain better results in weight control of patients with and without diabetes compared to other health care providers.^{64,65} However, in public primary care clinics in Mexico there are few nutritionists employed in comparison to nurses or doctors (there are 10,000 doctors for every 3 nutritionists).¹⁴ However, it may be that the type of intervention to be implemented is more important than who implements it. For example, when nutrition interns used the DPP protocol for management of obesity in the primary care setting, participants lost 4.7 kg in three months vs an increase of 0.4 kg if provided with monthly traditional consultations. Sixty-two per cent of the DPP group participants had more than 5% decrease in body weight vs zero per cent in the traditional consultation group.²⁷ The same phenomenon was observed when Delahanty and colleagues evaluated the translation of the Look AHEAD study into a primary care clinic in the United States. When nutritionists implemented this high-intensive lifestyle intervention (similar to the DPP protocol), patients lost 6.7 kg compared to 2.1 kg when using traditional consultations, which were also given by nutritionists.⁶⁶ In fact, there is evidence that even secular lifestyle-change educators could have positive results in weight control if they apply the DPP protocol.⁴⁶

Another area of great potential is the application of remote technology for obesity management. For example, a study conducted in the primary care setting, showed that an adaptation of the DPP protocol by means of a DVD during the first 3 months of treatment, followed by a maintenance phase with biweekly messages via e-mail and the use of a website, had positive results up to 15 months (-4.5 kg vs -2.4 control group).⁶⁷ Meanwhile, Appel and colleagues had similar findings (-4.6 kg vs -0.8 kg control group) after 2 years of intervention in primary care, but using phone calls instead of a DVD in the intensive phase of the intervention (12 phone calls weekly and then monthly), as well as the support of a website.⁶⁸ Finally, referral to commercial programs could be another opportunity. Ahern et al recently found that primary care referral to a commercial intensive lifestyle intervention program (Weight Watchers) for 52 or 12 weeks resulted in significant improvement in weight loss at 12 months (6.76 kg and 4.75 kg, respectively) vs a brief self-help intervention (3.26 kg).⁶⁹ A more detailed description of these intervention studies can be found in [Table 2](#).

Table 2 Description of relevant studies of weight loss by means of an intensive lifestyle intervention

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean \pm SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention mode/ Health care provider	Effect on body weight ^a
Efficacy trials of the Diabetes Prevention Program (DPP) and the Action for Health in Diabetes (Look AHEAD) studies							
DPP/United States^{38,43}	Randomized clinical trial of 2.8 years/27 centers involving research centers, universities and health care (hospitals)	3,234	50.6 \pm 10.7 years/ (67.7)	White (54.7), African American (19.9), Hispanic (15.7), American Indian (5.3), Asian (4.4)	<ul style="list-style-type: none"> Intensive Lifestyle Intervention^b: Weekly sessions for 24 weeks (approximately every 10 days) in the first 6 months and at least 1 session every two months for the rest of the study. Metformin Placebo 	Individual (face-to-face)/ Registered dietitians, health providers with at least a master's degree training in exercise physiology, behavioral psychology, or health education	<p>2.8 years:</p> <ul style="list-style-type: none"> Intensive Lifestyle Intervention^b: -5.60 kg Metformin: -2.10 kg Placebo: -0.10 kg
Look AHEAD/ United States^{39,44}	Randomized clinical trial of 11.5 years/ 16 centers involving research centers, universities and health care (hospitals)	5,145	58.7 \pm 6.8 years/ (59.5)	African American (15.6), American Indian/ Alaskan Native (5.0), Asian/ Pacific Islander (0.9), Hispanic/ Latino (13.2), Non-Hispanic white (63.1), Others/ multiple (1.9)	<ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol for patients with obesity and Type 2 Diabetes: Weekly sessions (3 group and 1 single) during the first 6 months. From month 7 to 12 visits were three per month and for the rest of the intervention were monthly. Diabetes support and education: Three educational group sessions per year with topics on nutrition/ diet, physical activity and social support. 	Individual and group (face-to-face)/Registered dietitians, psychologists and exercise specialists.	<p>1/4/8 years:</p> <ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol for patients with obesity and Type 2 Diabetes: -8.5/-4.4/-4.7% Diabetes support and education: -0.6/-0.7/-2.1%

(Continued)

Table 2 (Continued).

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean ±SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention model/ Health care provider	Effect on body weight ^a
Translations of the DPP and Look AHEAD programs							
Ackermann, et al/ United States ^{48,49}	Pilot cluster-randomized trial with duration of 12 to 14 months/ Six centers of non-governmental organizations (Young Men's Christian Association)	92	≈58.3 years/ (55.4)	Hispanic (3.26), African American (12.0), White (81.5), Other (5.43)	<ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol: Weekly sessions (approximately every 7 or 9 days) during the first 16 to 20 weeks. For the rest of the intervention, the sessions were monthly. Brief counseling for weight loss: Short counseling (2–5 mins) at 0, 6 and 12 months on the importance of weight loss and physical activity for the prevention of diabetes, also had access to the same information materials included in the intensive lifestyle intervention. 	Group (face-to-face)/ Site coaches trained in behavioral strategies	1 year: <ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol: -6.0% Brief counseling for weight loss: -1.8%
Armenta-Guirado, et al/ Mexico ²⁷	Three month randomized clinical pilot study/ One primary care clinic	42	≈37.4 years/ (80.9)	Mexicans (100)	<ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol for the treatment of obesity: Weekly group and individual sessions during 3 months of the intervention. Traditional treatment: Monthly sessions of individual nutritional advice. 	Individual and group (face-to-face)/Nutrition interns	3 months: <ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol for the treatment of obesity: -4.70 kg Traditional treatment: +0.40 kg

(Continued)

Table 2 (Continued).

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean \pm SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention model/ Health care provider	Effect on body weight ^a
Delahanty, et al/ United States ⁶⁶	Six month randomized clinical study/ One primary care clinic	57	\approx 61.5 years/ (40.4)	African American (14.0), Asian (7.02), Hispanic/Latino (3.51), White (73.7)	<ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol for patients with obesity and Type 2 Diabetes (Look AHEAD): Weekly sessions (approximately every 9 days) for 6 months. Nutritional therapy: Individual counseling sessions by a registered dietitian on strategies for weight loss and physical activity according to clinical practice guidelines for type 2 diabetes. 	Individual and group (face-to-face)/Dietitians who had completed their professional practice and were inexperienced in lifestyle intervention	6 months: <ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol for patients with obesity and Type 2 Diabetes (Look AHEAD): -6.70 kg Nutritional therapy: -2.10 kg

(Continued)

Table 2 (Continued).

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean ±SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention mode/ Health care provider	Effect on body weight ^a
Intensive Lifestyle Programs Implemented in Other Formats (Online, Phone, DVD)							
Appel, et al/ United States⁶⁸	2 year randomized clinical study/ Six primary care clinics	415	54.0± 10.2 years/ (63.6)	Asian (1.0), Black (41.0), White (56.1), Hispanic (2.2), Other (1.9)	<ul style="list-style-type: none"> Lifestyle intervention for weight loss with electronic advice (phone calls, internet and email): Weekly sessions for the first three months (12 calls) and a monthly call for the rest of the intervention. Lifestyle intervention for weight loss with face-to-face advice: Weekly sessions (9 group sessions and 3 individual sessions) during the first 3 months, 3 sessions from 3 to 6 months (1 group, 2 individual) and for the rest of the intervention were monthly (1 group, 1 individual). Control Group: Brief lifestyle counseling only at the beginning without any component of the interventions. 	Individual and group (face-to-face and electronic media resources)/Health coaches with primary care providers support	<p>2 years:</p> <ul style="list-style-type: none"> Lifestyle intervention for weight loss with electronic advice (phone calls, internet and email): -4.6 kg Lifestyle intervention for weight loss with face-to-face advice: -5.1 kg Control Group: -0.80 kg

(Continued)

Table 2 (Continued).

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean ±SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention model/ Health care provider	Effect on body weight ^a
Ma, et al/United States ⁶⁷	15 month Randomized clinical trial/ One primary care center	241	52.9 ±10.6 years/ (46.5)	Non-Hispanic White (78.0), Asian/Pacific Islander (17.0), Latino/Hispanic (4.1)	<ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol: Weekly face-to-face sessions during the first 3 months. For 3 to 12 months, the sessions were every 2 to 4 weeks according to particular needs of participants. In addition, electronic messages were sent to encourage adherence to the intervention. Intensive Lifestyle Intervention^b adapted from DPP protocol on DVD: Recorded sessions on DVD that were taught on a weekly basis during the first 3 months. In addition, a group briefing at baseline and constant advice of a registered dietitian electronically during this phase. For the rest of the intervention, the interventionist sent motivational messages to encourage adherence to the intervention. Standard treatment: Traditional medical care without additional counseling for weight loss. 	Individual and group (face-to-face or home DVD, in addition to electronic tools)/ Registered dietitians and fitness instructor	<p>3/6/15 months:</p> <ul style="list-style-type: none"> Intensive Lifestyle Intervention^b adapted from DPP protocol: -5.4/-6.6/-6.3 kg Intensive Lifestyle Intervention^b adapted from DPP protocol on DVD: -4.5/-4.3/-4.5 kg Standard treatment: -0.7/-0.7/-2.4 kg

(Continued)

Table 2 (Continued).

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean ±SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention mode/ Health care provider	Effect on body weight ^a
Primary Care Referral to Commercial Intensive Lifestyle Programs							
Ahern, et al/ England ^{69,70}	24 month Randomized clinical trial/ 23 primary care practices	1,269	≈53 years/ (67.7)	Asian or Asian British (2.76), Black or black British (1.81), Mixed or multiple ethnic group (1.18), White or white British (89.5), omitted or not reported by participants (3.39), Other (1.18)	<ul style="list-style-type: none"> Referral to 12 weeks commercial Weight Watchers program designed for weight loss: Access to commercial behavioral change system resources, social support, food (healthy food choices by points system) and exercise, through personalized advice and group support meetings. Referral to 52 weeks commercial Weight Watchers program designed for weight loss: Access to commercial behavioral change system resources, social support, food (healthy food choices by points system) and exercise, through personalized advice and group support meetings. 	Individual and group (face-to-face and online)/Health coach	<p>3/12/24 months: Referral to 12 weeks commercial Weight Watchers program designed for weight loss: -4.84/-4.75/-3.00 kg</p> <ul style="list-style-type: none"> Referral to 52 weeks commercial Weight Watchers program designed for weight loss: -4.62/-6.76/-4.29 kg Brief intervention: -2.04/-3.26/-2.30 kg

(Continued)

Table 2 (Continued).

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean \pm SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention mode/ Health care provider	Effect on body weight ^a
Retrospective or Prospective Evaluations of Intensive Lifestyle Programs Implemented in Real-World Clinical Practice							
Treviño, et al/ United States⁵⁶	Retrospective cohort study/ Six health care clinics	643	54 (45–64) ^c years/ (71.1)	Hispanic (70.1), Non-Hispanic white (8.1), African American (3.7), Other (13.0)	<ul style="list-style-type: none"> Intensive Behavioral Therapy for Obesity: Weekly sessions during the first month, biweekly for 2 to 6 months and monthly for the next 6 months. The sessions included the evaluation of patients with obesity, nutritional counseling and educational sessions with behavioral strategies for achieving weight loss and maintenance that involves changes in diet and physical activity. 	Individual (face-to-face)/ Health educator	Number of sessions attended:^d <ul style="list-style-type: none"> <4 sessions: 0 kg 4 to 8 sessions: -1.1 kg >8 sessions: -3.7 kg
Counter-weight Project/United Kingdom⁵⁷	Two-year prospective cohort study/65 General Practices	1,906	49.4 \pm 13.5 years/ (77.0)	Data not available	<ul style="list-style-type: none"> Lifestyle intervention designed for weight loss in general practice: Biweekly sessions approximately during the first 3 months (6 or more). For the following months the frequency of visits was chosen by the participant, but were requested to attend at least 9 out of 12 in the first year of intervention. The sessions are based on the healthy reduction of body weight through changes in diet and physical activity supported by behavioral strategies 	Individual and group (face-to-face)/Nurses trained and mentored by nutritionists with experience in the management of obesity	3/6/12 months: Lifestyle intervention designed for weight loss in general practice: -3.34/-4.24/-2.96 kg

(Continued)

Table 2 (Continued).

Study/Country	Design and study duration/ Participating clinics	n	Age (Mean ±SD)/Sex F (%)	Race or ethnic group (%)	Description of the intervention and control groups	Intervention mode/ Health care provider	Effect on body weight ^a
Systematic reviews of Intensive Lifestyle Programs in Real-World Settings							
Ali, et al (Systematic review of the DPP) ⁴⁶	Systematic review of studies with a duration of 3 to 12 months. Included 28 studies with different designs	2,916	55.1 years/ (69.9)	Non-Hispanic white (70.9)	<ul style="list-style-type: none"> Intensive Lifestyle Intervention^b: DPP curriculum 	Individual and group (face-to-face or electronic intervention)/Registered dietitians, nurses, exercise specialists, exercise science students, health promoters, among others	1 year: Intensive Lifestyle Intervention ^b : DPP curriculum ^c : -3.99%

Notes: ^aIntention to treat analysis. ^bIntensive Lifestyle Intervention. Protocol that includes educational lifestyle change sessions with healthy eating topics, physical activity and behavioral strategies to achieve weight loss. ^cMedian (IQR), IQR, interquartile range (first quartile–third quartile). ^dCompleters analysis. ^eIntention to treat or completers analysis.

Need for research in México and multiple efforts at different levels to combat obesity

It is important to note that much of the work discussed in this review was conducted in the US and other developed countries. Studies evaluating the translation of obesity treatments into clinical settings in Mexico and Latin American countries are urgently needed. Our research group will soon have results of the translation of the DPP in five clinics in the northwest of the country⁷¹ as well as results of the implementation of the online DPP protocol (Clinical Trials Register: NCT03629301). Another fundamental key to improving obesity management in Mexico, will be to develop evidence-based clinical practice guidelines with the collaboration of international experts. If developed countries have considered intensive lifestyle interventions, as defined here, as the gold standard for the management of obesity, it is necessary to discuss whether these interventions should also be the standard for Mexico. Considering the significant problems of obesity and diabetes in Mexico, we should aim to have a program like the US National Diabetes Prevention Program; however, it is unknown if such interventions would have the same impact on our population in terms of weight loss and diabetes prevention.

It is clear that clinical interventions will not solve the obesity problem by themselves, but neither can environmental strategies (regulation, etc.) achieve the calorie deficit needed to treat patients with existing obesity.⁶¹ We will certainly require multiple efforts at multiple levels –socio-ecological approaches– to fight obesity and related comorbidities. In this sense, policies outside of the clinical sector have shown positive results in the fight against obesity in México, such as the excise tax on sugar sweetened beverages,⁷² among other promising proposals.^{73,74}

Recommendations to improve the lifestyle treatment of obesity in the clinical care delivery system in Mexico

The National Academy of Medicine of Mexico has recently published a position paper which includes recommendations at multiple levels to improve the prevention and management of obesity.⁷³ In Table 3 we give general recommendations to improve the lifestyle treatment of obesity in the clinical care delivery system in Mexico.

Table 3 General recommendations to improve the treatment of obesity in the clinical care delivery system in Mexico

	Recommendations
1.	Update the Mexican clinical practice guidelines with the collaboration of national experts in obesity management, government health authorities and international experts. It is recommended that the Diabetes Prevention Program (DPP) protocol be used as the program to promote lifestyle change considering the availability of materials for its application and the evidence of efficacy and effectiveness on body weight of adults with obesity.
2.	These guidelines should define the role of each health care provider. They should also clearly describe dietary management, physical activity, behavioral strategies, frequency of consultations (with broad flexibility according to needs: face-to-face, online, telephone, group, individual), and follow-up visits, pharmacotherapy and bariatric surgery. Important topics should also be included, such as stigmatization and obesity, how to initiate a conversation about weight, weight regain, among others.
3.	The primary care setting should have, as far as possible, interdisciplinary teams (including nutritionists or psychologists skilled in behavioral change) and the basic infrastructure for the diagnosis and treatment of obesity.
4.	Train primary health care providers in these clinical practice guidelines, establish mechanisms of evaluation and feedback to achieve their implementation. Also establish mechanisms to reward and recognize trained providers, as well as clinics with positive results.
5.	Conduct a pilot study of this project in a municipality or state, evaluate the results and make appropriate adjustments if needed. Once there are positive results, disseminate it on a larger scale and evaluate the effectiveness of the program.

The health authorities of the new government have a unique opportunity to take advantage of the efforts of many researchers and the Mexican society to fight against obesity and chronic degenerative diseases. Only time will tell if this opportunity was achieved or if it was another story of failed good intentions.

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Disclosure

RGDZ and TJMC are nutritionists and provide training courses on intensive lifestyle change programs to health care providers, where the University of Sonora receives payment for these courses. The authors do not receive any direct payment for it, but they have benefited with part of these funds for research purposes. Additionally, the Nutritional Health Promotion Center provides the protocol of the Diabetes Prevention Program to the community at a cost recovery fee. The authors report no other conflicts of interest in this work.

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