Canadian Adult Obesity Clinical Practice GUIDELINES

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Prevention and Harm Reduction of Obesity (Clinical Prevention)

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Update History

Version 1, August 4, 2020. The Canadian Adult Obesity Clinical Practice Guidelines are a living document, with only the latest chapters posted at obesitycanada.ca/guidelines.

KEY MESSAGES FOR HEALTHCARE PROVIDERS

- Obesity is a heterogeneous disease that can develop via slow and steady weight gain over an extended period, or from rapid bursts of weight gain.
- Regular assessments of body weight are needed to catch early weight gain. Use the Edmonton Obesity Staging System to evaluate if the patient has obesity.
- Clinicians should initiate discussion around weight gain early and contemplate interventions that consider its complex causes, providing guidance beyond "eat less and move more."
- Many medications are associated with weight gain side effects that can contribute to long-term weight gain.
- Excess pregnancy weight gain and post-pregnancy weight retention are significantly reduced with behavioural interventions. Clinicians should counsel women attending prenatal care not to exceed pregnancy weight gain guidelines, and also give pregnant women the necessary counselling, as well as dietary, physical activity and psychological interventions within prenatal visits.
- Health benefits of smoking cessation outweigh the cardiovascular consequences associated with smoking cessation-related weight gain.
- Short-term behavioural interventions (generally six months or less) aimed at preventing weight gain in young adulthood, menopause, smoking cessation and breast cancer treatment have not yet been shown to be effective.
- Longer interventions will likely be needed to properly examine strategies for preventing weight gain for many of these high-risk groups and in the general population.

KEY MESSAGES FOR PEOPLE LIVING WITH OBESITY

- Preventing or delaying obesity is likely easier than long-term weight reduction.
- Causes of and risk factors for weight gain are wide ranging, extending beyond personal lifestyle choices such as food intake and exercise, and include factors that you may or may not be able to control.
- Obesity can develop with small gains in weight over a long period of time, or from rapid bursts of weight gain.
- Average weight gain in Canada is 0.5–1.0 kg per year.
- People are prone to greater weight gain during certain life stages, including adolescence, young adulthood and pregnancy.
- Raise your weight gain concerns with your primary care physician, even if you have experienced modest weight gain.
- Regular weighing by healthcare providers can help to identify patterns and factors contributing to weight gain early.

Introduction

In our modern environment, there are numerous factors that put adults at risk for weight gain and the development of obesity. From a public health standpoint, prevention of obesity and related health consequences should be a focus of healthcare systems. Preventing obesity can be targeted at the primary, secondary and tertiary care levels, and aimed anywhere from the individual to the population level. These factors are wide ranging and our understanding of them is growing at a rapid pace. Most research interventions and public health initiatives have focused on nutrition and physical activity. However, there are other modifiable factors, such as sleep, stress, use of medications that cause weight gain, gut dysbiosis secondary to antibiotic use,[1] other chronic conditions or smoking that may also influence weight regulation. Other factors that influence weight gain but are much less modifiable include age, genetics, epigenetics, income, physical environment, socio-political environment and adverse childhood events, including abuse and neglect.[2] These factors are not modifiable or less subject to individual control, but may also be potentially important influencers of weight management effectiveness. This chapter discusses the evidence supporting obesity prevention interventions at the primary, secondary and tertiary levels.

Primary prevention

The aim of primary prevention is to minimize weight gain and prevent obesity from developing in the first place. It has been suggested that primary prevention is the most cost-effective option for addressing obesity.[3] Due to the high prevalence of obesity, it can be argued that population-level interventions aimed at primary prevention may be more appropriate than interventions aimed at individual-level factors. Commonly proposed targets include unhealthy food/beverage taxation,[4] calories on menus,[5] healthy food programs and subsidy, limiting food and beverage advertisement, affordable physical activity options, increasing mixed land use and improving the walkability of the built environment[6] and addressing social determinants of health that negatively impact an individual's ability to dedicate time or resources to healthy living fundamentals.

Although it is clear that poor nutrition and a lack of adequate physical activity are important risk factors for the development of obesity, there may be other factors that play a significant role. This means that clinicians must consider the underlying root cause for weight gain, as opposed to only targeting the symptom of weight gain. For example, stress, shift work or insufficient sleep could be the underlying reason for increased dietary intake; depression and fatigue can lead to decreased physical activity. Further, depending on the situation, attenuating weight gain as opposed to preventing weight gain or achieving weight loss may be a more reasonable goal.

Currently, there are very few randomized control trials that examine primary prevention for obesity. Of those published, most examine short time periods that are associated with high risk for rapid weight gain. Very few published studies demonstrate the effectiveness of interventions at the population level. Most of the studies demonstrate effects on eating or physical activity behaviour, but it is unclear whether these results translate into clinically relevant differences in obesity.[7] Most of the evidence that suggests diet and physical activity play a role in preventing unhealthy weight gain and obesity comes from observational trials.[8–11] Observational trials do not provide strong evidence on which to base recommendations. Nevertheless, the lack of strong evidence supporting recommendations for obesity prevention should not necessarily preclude clinicians from incorporating these recommendations into practice. It is important to also consider that there are several challenges and barriers that are inherent to conducting prevention research in general.

1. **Science is designed to see changes, not a lack of changes:** In terms of standard scientific methods, studies are designed to see differences with an intervention, and there are less agreed-upon methods for determining the lack of a change (i.e., preventing obesity). Because of this, studies that examine weight gain prevention interventions use a high-risk control group (that gains large amounts of weight). In order to demonstrate an attenuation of the small 0.5 kg – 1 kg/year weight gains seen in the general population, a very large sample size would be needed, making the research less feasible.

2. **Obesity develops over a very long time:** A true primary prevention study would take a representative sample that includes low-risk individuals and provide an intervention to see if the rates of disease (i.e., obesity) are lower. However, because the average weight gain in Canadians is 0.5–1.0 kg per year,[12] a 170 cm tall individual with a BMI of 22.5 kg/m2 would increase their BMI by one unit every one and a half to three years, and take approximately 10 to 20 years to develop obesity. This highlights the long-term nature of obesity and how difficult it is to study with our current funding structure (with grants of less than half of that 10- to 20-year duration), as well as the expense involved in following individuals over long periods of time.

3. **Clinicians routinely counsel on prevention efforts for other health conditions despite little evidence:** Given the evidence-based medicine movement, it might be surprising to consider that clinicians and health policies routinely engage in prevention efforts for several health conditions for which there is also little to no evidence. For example, to our knowledge there are no randomized controlled trials that show that smoking prevention efforts in non-smokers result in a lower risk for lung cancer or heart disease. Further, anti-smoking campaigns and programs have shown reductions in smoking, but cannot causally link these campaigns or programs with changes in lung cancer[13,14] or heart disease.[14] The majority of evidence used to justify these programs are from observational studies showing a positive effect of smoking cessation on these health outcomes.[13,15] Nevertheless, we promote smoking abstinence campaigns and interventions aimed at smoking cessation for specific health benefits despite the lack of strong evidence from randomized controlled trials. In the same way, dietary, physical activity and other behavioural interventions have not been causally proven to be helpful for preventing weight gain and obesity. There is substantive observational evidence, as well as limited, short-term, randomized control trial studies, suggesting that behavioural interventions for the primary prevention

of obesity may warrant the same considerations that have been given to smoking and lung cancer.

Primary prevention randomized controlled trials that examine risk factors for weight gain are limited. Within the general population, there have been short studies of dietary interventions examining specific foods, such as yogurt,[16] whey protein supplementation[17] or polyunsaturated fatty acids[18], but with limited success. Short-term studies report that behavioural changes, such as self-weighing, frequent reminders or self-reflection, may be associated with significantly less weight gain or even weight loss over the holidays.[19,20] There are also several published reports on workplace interventions that have been successful in improving knowledge and behaviours but are less likely to report improvements in obesity or weight gain[21,22] unless they target weight loss in workers with overweight or obesity.[23,24] Primary prevention studies tend to be short in duration (less than six months) and are predominantly nutrition and physical activity interventions. This is problematic as primary prevention efforts will likely need to be far longer in order to demonstrate weight gains less than the typical 0.5–1.0 kg/year. There are a few, longer-term, randomized control trials, with most showing no differences in weight gain over time, unless a study was able to induce weight loss.[25–28]

Most prevention research examines weight gain in high-risk populations or during short periods associated with high risk for weight gain, such as pregnancy or postpartum weight retention,[29–31] smoking cessation,[32,33] certain cancer treatments,[34] patients using medications associated with weight gain,[35,36] menopause[37] and young adults.[38] Of these, limiting pregnancy and postnatal weight gain has received the most attention; behavioural intervention has been demonstrated to be effective. The limited pharmacological options for weight gain prevention have mainly been examined in populations who are more likely to have obesity, such as patients with diabetes or those taking anti-psychotic medications.

Pregnancy: Gestational weight gain and postpartum weight retention

Pregnancy is a period of rapid weight gain. Canadian recommendations suggest weight gained through pregnancy should be between 5 to 18 kg[39] depending on the woman's pre-pregnancy BMI category. In reality, half of Canadian women exceed gestational weight gain recommendations.[40] This is of concern, as greater gestational weight gain results in greater postpartum weight retention.[41] Studies demonstrate that many women retain 2–5 kg per pregnancy.[42] Thus, pregnancy and the postnatal period may be particularly important periods for targeted primary weight gain prevention.

Behavioural interventions to prevent excessive gestational weight gain have ranged in their intensiveness and delivery methods. Most use medical nutrition therapy and/or exercise interventions, ranging from in person to telephone or other electronic messaging systems.[42] Some interventions also incorporate behavioural change strategies to supplement the program. To date, it is unclear which aspects of the intervention or which combination are the most effective.

A Cochrane review of high-quality evidence published in 2015 by Muktabhant et al.[43] reported that nutrition and/or exercise randomized controlled trials are associated with a 20% reduction in risk for excessive gestational weight gain. In this review, the effectiveness of the interventions was not clearly demonstrated in women with overweight or obesity, which is concerning given the already higher risk for negative pregnancy outcomes for both the mother and baby in these populations.[42] The authors hypothesized there may be differences in physiology and/or other barriers that may require a more intensive intervention to prevent excessive gestational weight gain in women already affected by overweight or obesity. In one study by Yeo et al.,[31] the authors suggest that interventions delivered by prenatal care providers may be more successful that those delivered outside prenatal care, resulting in 3 kg less gestational weight gain. Though behavioural interventions are effective at reducing gestational weight gain, it is less clear whether these interventions are sufficient to improve maternal and fetal complications.[44] Nevertheless, prenatal behavioural interventions may present a unique opportunity for obesity prevention at a life stage when women are regularly engaged with their healthcare practitioner.[42]

Smoking cessation

Smoking cessation is associated with substantial cardiovascular benefits but is also associated with substantial weight gain. For example, Tian et al.[45] report that individuals who quit smoking gained 2.6 kg more than those who continued to smoke over six years. However, it is important to note that a recent meta-analysis suggests the mortality risk associated with the weight gain associated with smoking cessation is far less than the mortality rate[46] associated with continuing to smoke. Nevertheless, post-cessation weight gain is a significant concern,[32] and may negatively impact smoking cessation efforts, particularly in individuals of white ethnicity and those with existing weight concerns.[32,33] Thus, interventions that address post-cessation weight gain may be important for improving smoking cessation success.

Weight gain associated with smoking cessation is largely attributed to increased energy intake and reduced energy expenditure.[46] Several studies that tested a combination of smoking cessation and traditional calorie-restriction interventions (using meal replacement or low calorie diets) report mixed results on cessation and weight gain.[47] Further, there is a concern that strict caloric restriction may impede smoking cessation attempts.[46,48,49] Not all agree on this point as some suggest that combined weight and smoking cessation programs may in fact improve abstinence in the short term (< 3 months).[47] Unfortunately, there do not appear to be long-term benefits of behavioural interventions for weight gain prevention.[47] Similarly, it does not appear that exercise alone is associated with improved weight gain prevention.[50] That said, evidence from observational trials suggests that individuals who quit smoking are better able to manage their weight if they are physically active.[46,50] A recent study reports that post-cessation weight gain in young adults was not related to dietary and physical activity patterns,[45] suggesting that post-smoking weight management may be far more complicated than can be explained by behavioural habits alone. Nevertheless,

physical activity and improved dietary habits are likely to have beneficial health effects independent of changes in body weight.

A recent Cochrane review[51] suggests that there is short-term evidence to support the effectiveness of pharmacotherapies to attenuate post-cessation weight gain, but as with short-term behavioural interventions it is unclear whether these benefits extend past one year, or which, if any, pharmacotherapy is superior.[51,52] Thus, it appears that pharmacotherapy delays but does not prevent post-cessation weight gain.

In summary, individuals who attempt to quit smoking should be aware of the risk of weight gain. Nevertheless, the health benefits of smoking cessation generally exceed the consequences of some weight gain. However, there is insufficient evidence to strongly recommend any single type of intervention to prevent post-cessation weight gain. Adoption of healthy behavioural habits is recommended as an adjunct for smoking cessation programs.

Cancer treatment

Though weight loss is more common with cancer treatment, some patients gain weight, and weight gain is particularly more common with breast, colorectal, prostate and ovarian cancers.[33,53,54] Weight gain may be related to certain medications, chemotherapy and hormonal changes.[55] The vast majority of literature has focused on the efficacy of behavioural interventions for the prevention of weight gain for breast cancer patients, as most women experience weight gain during breast cancer treatment.[56] In fact, less than 10% of women who gain weight after receiving a breast cancer diagnosis return to their pre-diagnosis weight, even after six years.[34]

According to a recent review by Thomson and Reeves,[34] most studies do not demonstrate significant weight gain prevention, and none demonstrate longer-lasting weight effects after the cessation of the intervention. Though the evidence is limited, some studies suggest that outcomes may be better in post-menopausal women, and that initiating interventions while the patient is still undergoing chemotherapy may be key in preventing weight gain.[34] That said, the short-term negative outcomes of weight gain are less consistent than those seen with weight loss,[54,57–59] with increased mortality risk reported only when the weight gains exceed 10%.[54] Thus, care must be given to ensure that weight management efforts do not mask negative health outcomes that require intervention.

Medication use

Use of several classes of medications, such as anti-psychotics, anti-depressants, anti-hyperglycemics and corticosteroids, are associated with weight gain.[35,36] The amount of weight gain they are associated with varies; some can be a potentially large contributor to obesity. Thus, from a primary prevention standpoint, clinicians may wish to consider the weight-gaining side effects, if possible, when initiating medications. In general, there is insufficient evidence to suggest the routine prescription of adjunct medications for preventing weight gain, and it is likely inappropriate from a primary prevention perspective. However, for many of these medications, the magnitude of associated weight gain and the potential for cardiometabolic consequences may warrant consideration.

Anti-psychotics

Several anti-psychotic medications are well documented to be associated with weight gain and are associated with the highest levels of weight gain.[60] In the short term, anti-psychotics are associated with weight gains of approximately 3.2 kg, and long term with gains of 5.3 kg compared to placebo control.[35] Of these, olanzapine and clozapine are associated with the largest amounts of weight gain[36] with as much as 10 kg reported.[60] Anti-psychotics are thought to relate with weight gain through changes in appetite and altered metabolism.[61] Thus, initiating medications with less weight gain tendencies, such as haloperidol, lurasidone, ziprasidone, aripiprazole and amisulpiride,[62,63] may be preferred options, if clinically appropriate. It may also be important to consider if medications are needed for long-term management, and whether acutely; switching to a medication with a better weight-gain profile for maintenance therapy may be appropriate.[64] If the decision is made to switch medications, symptoms should be closely monitored to address side effects, such as rebound insomnia, and to ensure relapse does not occur.

To prevent the weight gain, pharmacological and behavioural interventions have been examined with variable success. Medical nutrition therapy, physical activity and cognitive behavioural strategies are associated with medium effect sizes for weight loss trials and large effect sizes for weight gain prevention trials.[65] However, even with intervention, many patients are still likely to gain weight. Weight gain is also associated with untreated mental illness, and not treating is not an option. Consequently, it may be more beneficial to initiate behavioural interventions early after initiating anti-psychotic use. Of the pharmacological choices, support exists for metformin as an adjunct therapy,[66] but this is likely to only be applicable to populations with already prevalent obesity. In general, there is no strong evidence to suggest the routine prescription of adjunct medications for preventing anti-psychotic-associated weight gain or for achieving weight reduction after weight gain.[65]

Anti-depressants

Antidepressants are associated with a more moderate amount of weight gain than anti-psychotics, with a recent review citing a 2–5 kg weight gain associated with tricyclic anti-depressants, monoamine oxidase inhibitors and selective serotonin reuptake inhibitors.[60] However, anti-depressants may have a higher global weight gain burden as there are more individuals with depression than schizophrenia.[36] Upon initiation of an anti-depressant, close monitoring of weight changes is needed as early changes in body weight are highly predictive of long-term changes.[67] Thus, clinicians should consider early intervention in preventing excessive gain if possible. Weight gain with anti-depressant use may be associated with

increased appetite but could also indicate changes in the underlying mood disorder.[60] In observational trials, dietary choices are associated with differences in weight gain,[68] but depression is often an exclusion criterion for weight management trials. It is thus unclear whether medical nutrition therapy or physical activity therapy are effective in preventing weight gain associated with anti-depressant use, particularly in populations without obesity. Again, weight gain is associated with untreated illness as well, and so whenever possible, engagement in healthy nutrition and eating behaviours, as well as weight monitoring, are important when initiating and continuing treatment of depression.

Diabetes medications

Most individuals with type 2 diabetes have obesity, and patients are recommended weight loss to improve risk factors. Some diabetes medications are paradoxically associated with improved insulin sensitivity and increased weight.[60] Thiazolidinediones, rosiglitazones, pioglitazones, sulfonylureas and meglitinides are associated with weight gains of 1–4 kg and insulin with higher associated weight gains of 5–6 kg.[60] The mechanisms responsible for weight gain vary between the medications, but include increases in appetite, increased lipid storage and fluid retention.[60] Patients who are prescribed sulfonylureas as a first-treatment strategy typically have greater weight gains[36] than with other medications. Metformin is the most commonly prescribed first-line treatment option and is associated with modest weight losses of 1.0–2.9 kg,[36] and may help prevent some of the weight gain associated with other type 2 diabetes medications such as insulin therapy.[69]

Menopause

The transition to menopause is associated with greater-than-normal fat gain, but with only normal rates of age-related weight gain.[37] Due to the hormone changes in menopause, there are losses in muscle mass that mask the accelerated gains in fat mass. Despite the beneficial effects of hormone replacement on body fat distribution, it should not be recommended as a treatment for abdominal obesity due to increases in cardiovascular risk.[37] Menopause is also associated with increases in sedentary time and physical inactivity, which further exacerbate cardiovascular risk.[70] Several large interventions have examined the impact of behavioural interventions on weight management, though most examined middle-aged women,[71] and not necessarily the menopausal transition women. Simkin-Silverman et al.[28] undertook one of the few studies to demonstrate that behavioural intervention is successful in preventing weight gain over five years in women transitioning to menopause. Similarly, Kuller et al.[72] reported success preventing weight gain over 54 months. In short, more research is needed to determine which components are most important in preventing menopausal related increases in adiposity.

Young adults

Early adulthood has been a life-phase associated with increased risk for weight gain, with one study reporting an average weight gain of 14 kg over 15 years of follow-up in young adulthood.[73] Onset of obesity is common in this age group and thus may represent an important life stage to target with weight gain prevention incentives. In particular, young adults attending post-secondary education are reported to have significant weight gain. A meta-nalysis suggests the weight gain in the first year of college to be less than 2 kg,[74] comparable to the average weight gain for the general population. Most of the literature in young adults that examines obesity prevention involves, in fact, weight loss or weight loss maintenance trials[75] or observational studies. These interventions use nutrition and physical activity approaches, behavioural change strategies, technology-based programs and educational programs. Interventions in this age group tend to be disappointing, with several reporting no effect of intervention[76–78] on weight gain prevention. Interventions that do demonstrate significant effects are typically weight loss studies,[38,79] and overall show modest results of less than 2 kg,[75] with very limited evidence that this is maintained long term.[75] This is in accordance with other clinical weight loss research that suggests that younger age is associated with worse weight outcomes.[80] Thus, younger adults may be a particularly high-risk group for weight gain and poor primary prevention intervention success.

Secondary prevention

Secondary prevention aims to reduce the impact of the disease that has already developed. This is accomplished by early detection and treating the disease as soon as possible in order to slow or stop its progression. Ultimately, the aim of secondary prevention is to return the patient to their original health and functional status to prevent long-term problems.

In terms of obesity, this can be thought of as regular screening and preventing further weight gain in individuals with uncomplicated mild obesity (i.e., Edmonton Obesity Staging System stage 0 or 1). Although obesity is strongly associated with morbidity and mortality, there is substantial variation in the health profiles observed between individuals with the same body mass index. Further, at the lower border of obesity, there are individuals who have not yet developed obesity-related comorbidities, such as hypertension, dyslipidemia, orthopedic problems or diabetes. It has been reported that up to 40% of the population may present with an elevated body mass index, yet can be described as "metabolically healthy" (depending on the definition used to define healthy),[81] or 20–25% with an Edmonton Obesity Staging System stage 0 or 1.[82] Unlike tertiary prevention wherein weight loss is clearly associated with health benefits for patients with prevalent obesity-related morbidity, it is unclear what, if any, benefits there may be for patients who present with metabolically healthy obesity[83] or Edmonton Obesity Staging System stage 0 or 1.[84] There is debate in the published literature as to whether people with metabolically healthy obesity have better long-term health outcomes and a lower mortality risk compared to individuals with obesity and obesity-related complications.[81,85] Individuals with metabolically healthy obesity tend to be more physically active, with less consistent evidence reported for dietary differences.[86] This may suggest that behavioural strategies may also play an important role in secondary prevention.

Importance of self-weighing

One of the key considerations for primary and secondary prevention is the concept of regular monitoring and early diagnosis. Obesity is surprisingly hard to recognize without objective assessments,[87] and may be harder to recognize as the average body mass index in the population is now within the overweight range.[88] Consequently, despite the attention given to obesity, health practitioners and the general population may be less likely to recognize the need or to pursue obesity prevention interventions.[88] This would suggest that regular assessments of obesity and weight gain need to be addressed early, preferably as a primary prevention method at primary care. However, to our knowledge there are no randomized controlled trials that examine regular self-weighing in a primary or secondary prevention context. In observational trials, such as the Pound of Prevention Trial and STOP Regain trial, individuals who engaged in self-weighing had less weight gain over time.[89,90] In the context of weight loss or weight loss maintenance, self-weighing is also associated with better weight outcomes.[91,92] However, in populations with severe obesity, regular weighing may be a source of stress and frustration that needs to be considered on an individual basis with the patient. Thus, the clinician should initiate respectful conversations around weight and weight gain before the development of obesity.

Tertiary prevention

Tertiary prevention aims to soften the impact of an ongoing illness or injury that has lasting effects. This is done by helping people manage long-term, often complex health problems and injuries (e.g., chronic diseases, permanent impairments) in order to improve as much as possible their ability to function, their quality of life and their life expectancy. For obesity, this would be synonymous with weight loss and long-term obesity management. This is where the majority of research lies and is the topic of the other guideline chapters.

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The summary of the Canadian Adult Obesity Clinical Practice Guideline is published in the *Canadian Medical Association Journal*, and contains information on the full methodology, management of authors' competing interests, a brief overview of all recommendations and other details. More detailed guideline chapters are published on the Obesity Canada website at www.obesitycanada.ca/guidelines.

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