

Emerging Technologies and Virtual Medicine in Obesity Management

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Update History

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

KEY MESSAGES FOR HEALTHCARE PROVIDERS

- The management of obesity through technological means has shown benefits in recent years. These include treatment and follow-up strategies delivered through portable devices (e.g., mobile phones), web-based platforms (e.g., websites) and wearable tracking devices (e.g., pedometers).
- Technology-based interventions provide cost-effective, time-efficient and flexible options for the management of patients with obesity, either on their own or as an adjunct to conventional (face-to-face) care.
- The weight loss benefits of technology-based interventions in the management of obesity have repeatedly been proven in the literature. However, there is insufficient data comparing these interventions to conventional (face-to-face) management. This prohibits us from forming firm conclusions about their comparative benefits in the management of patients living with obesity.

RECOMMENDATIONS

1. Implementation of management strategies can be delivered through web-based platforms (e.g., online education on medical nutrition therapy and physical activity) or mobile devices (e.g., daily weight reporting through a smartphone phone application) in the management of obesity (Level 2a, Grade B).^{1,2}
2. We suggest that healthcare providers incorporate individualized feedback and follow-up (e.g., personalized coaching or feedback via phone or email) into technology-based management strategies to improve weight loss outcomes (Level 4, Grade D).³
3. The use of wearable activity tracking technology should be used as part of a comprehensive strategy for weight loss (Level 1a, Grade A).⁴

KEY MESSAGES FOR PEOPLE LIVING WITH OBESITY

- Technology-based strategies can help you manage your health, both when used alone or when combined with conventional (face-to-face) obesity management approaches.
- There are multiple options for incorporating technology into your obesity management program, including through

your portable device (e.g., mobile phone), a web-based platform (e.g., website) and/or a wearable tracking device (e.g., pedometer).

- In many cases, you may find technology-based strategies more convenient and time efficient than face-to-face encounters with your healthcare provider. We suggest you discuss with your healthcare provider which options might work best for you.

Definitions

Conventional obesity management: Refers to face-to-face weight management programming that includes education regarding nutrition, exercise and/or a behavioural change component.

Usual obesity management: Refers to the lack of active or intentional weight management for patients living with obesity. This includes typical primary care, whereby there are no dedicated visits or education surrounding the management of obesity.

Introduction

Conventional obesity management programs have been shown to be effective in achieving short-term weight reductions in patients living with obesity.^{5,6} Many of the conventional obesity management programs have also been shown to be cost-, labour- and time-intensive.^{5,7} Attempts to reduce the frequency of encounters or interactions have shown negative results in terms of obesity management and other secondary parameters, such as cardiometabolic risk factors other than weight.⁸ The challenge in obesity management is to maintain or improve upon proven programs by maintaining the supportive aspects of conventional programming that include social and clinical support, accountability and personal feedback on a long-term basis.

Advances in technology, as well as use of technologies that have long been employed in medical care, present an opportunity to maintain the key components of conventional obesity management programming while reducing cost and provider time inputs, and improving convenience for patients, potentially resulting in improved adherence to treatment.^{3,4,6} Technology-based strategies may also overcome the barrier of inadequate training in effective psychological and behavioural counselling commonly cited by primary care providers.⁹ Additionally, it may present an opportunity to address concerns related to weight loss maintenance, as several studies have shown high rates of weight regain after initial successful short-term weight loss.¹⁰⁻¹²

The ubiquitous nature of technologies, specifically the widespread use of mobile phones, presents new opportunities for weight loss programming that can be used in an increasing subset of the patient population. Mobile phone use in Canada is now estimated

to include over 85% of the population.¹³ Access to the Internet for the use of web-based platforms is increasingly prevalent as well. New technologies are increasingly being presented for application in healthcare, although it is unclear how best to use these technologies in obesity management. Because the widespread application of technology for the purpose of remote patient care is relatively new in healthcare, more work needs to be done to determine the application of specific technologies for specific clinical purposes and within specific groups of patients.

The role of healthcare providers is to determine which aspects of proven conventional programs may potentially be substituted by technologies that offer convenience and cost effectiveness, as well as to determine the ways in which technology could be used to bridge care gaps due to a lack of availability of conventional programs. Finally, conventional programs could be supplemented by the use of technologies to provide cost-containment benefits or to improve outcomes in both initial weight loss and maintenance.

Efficacy of technology in the management of obesity

Current evidence has repeatedly shown that technology-based interventions for the management of obesity may lead to significant reductions in weight for patients with obesity, providing superior outcomes to usual care.^{1,14} The majority of studies on this topic involve follow-up ranging between six weeks to six months.^{1,4} Technology-based strategies include those delivered through web-based platforms, mobile devices or wearable tracking devices. Web-based platforms that have been studied include those that provide education about nutrition and physical activity, self-monitoring of goal behaviours and goal setting, among others. Strategies delivered through mobile devices include text message advice and smartphone applications to monitor food intake and weight. Wearable tracking devices, on the other hand, include pedometers and accelerometers.

It is important to note that, while the combination of technology-based management with conventional care augments weight management benefits, evidence regarding employing technological strategies as a substitute to conventional (face-to-face) programs remains inconclusive.^{4,14,15}

A meta-analysis of 23 randomized control trials examining web-based experimental versus non-web-based controls found that the utilization of technology led to improved weight loss outcomes (-0.68 kg, $p = 0.03$) over a period of three to 30 months.¹⁵ Secondary analyses revealed that the combination of web-based technology to conventional (face-to-face) care led to superior weight loss outcomes (-1.93 kg, 95% CI -2.71 to -1.15, $p < 0.001$) compared with web-based strategies without face-to-face care (-0.19 kg; 95% CI -0.87 to 0.49, $p = 0.59$), and that this difference was statistically significant ($p = 0.003$).¹⁵ Similarly, a second systematic review found that the incorporation of human contact or individualized feedback, through email or online discussion, into a web-based weight loss program led to improved outcomes.³ These findings suggest that incorporating individualized care, whether through face-to-face encounters or technological means, may provide improved weight loss and possibly improved obesity management.

A major downfall to many conventional programs is the high prevalence of weight regain over the long term following treatment.¹² Due to the limited evidence and short-term follow-up of available studies, it remains to be seen whether technology-based strategies are effective in preventing weight regain and aiding with weight loss maintenance.^{3,16}

Limitations and future directions

It is important to note that conventional programming, while having its limitations, has generally performed very well as a medical intervention. It is backed by strong evidence supporting its efficacy. Interventions that seek to replace this modality will need to be studied intensely and applied broadly in order to achieve results that could suggest replacing a widely accepted and rigorously proven intervention such as conventional obesity management programming.^{5,6}

Recommendations for the use of technology in obesity management are limited by a number of factors:

- A large proportion of studies on the topic do not implement any intervention for the control group, or use wait-list controls.^{1,14} This may falsely accentuate the positive effects of technology. Future studies should compare technological interventions to conventional (face-to-face) care in order to be able to form true conclusions about the potential superior benefits of technological interventions in obesity management.
- Technology studies often implement multiple interventions in the intervention group (e.g., mobile app in tandem with a web-based program) making it difficult to decipher which intervention in particular the effects of technology may be attributed to in the study.^{1,14} Future studies should investigate each intervention in isolation in order to be able to draw strong conclusions.
- The majority of studies on the topic have relatively short follow-up times ranging between six weeks to six months.^{1,4} It is

important that future studies allow for longer follow-up in order to be able to make conclusions surrounding weight regain and weight loss maintenance.

- Studies evaluating the use of technology-based management in obesity suffer from methodological flaws that limit their external validity. For one, a large proportion of studies on the topic include only patients living with obesity but exclude those with other comorbidities and chronic conditions, including diabetes and hypertension. This is detrimental to the generalizability of the findings, as obesity is strongly associated with such conditions. Additionally, many of the trials evaluating the efficacy of technology-based management for obesity have recruited disproportionately more women than men.³ More studies evaluating outcomes in men are needed to draw firm conclusions.
- A large proportion of studies investigating technology-based strategies for the management of obesity exclude patients that have recently engaged in obesity management programs or strength and endurance training.^{17–19} This inevitably preselects for patients who may be less informed about obesity as a chronic disease and in whom adherence to treatment and possible benefits may be undermined.

Summary

While the evidence supports the use of technology for obesity management, it does not support the replacement of conventional programming.^{1,14} There is insufficient evidence comparing technology-based treatments for obesity management to conventional (face-to-face) programs, as discussed above.^{4,14,15} Therefore, technology-based programming may be offered in addition to conventional (face-to-face) programming or in instances where conventional care is unavailable, not feasible or less preferred by the patient.

It is clear that technologies that employ a more personalized approach are superior to those that operate independent of user characteristics or feedback.^{3,15} Simply put, technology-based interventions still have to account for the personal nature that is inherent in the delivery of medical care in general.

More work will need to be done to determine which technologies are appropriate for application to obesity management and in which patient groups they will be most beneficial.

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