



Contents lists available at ScienceDirect

Obesity Research & Clinical Practice

journal homepage: www.elsevier.com/locate/orcp



Economic evaluation of a multi-disciplinary community-based intervention programme for New Zealand children and adolescents with obesity

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ARTICLE INFO

Article history:

Received 9 October 2017
Received in revised form 25 March 2018
Accepted 27 April 2018

Keywords:

Paediatric
Obesity
Adolescent
Lifestyle intervention
Economic evaluation

ABSTRACT

Objective: To determine whether Whānau Pakari, a home-based, 12-month multi-disciplinary child obesity intervention programme was cost-effective when compared with the prior conventional hospital-based model of care.

Methods: Whānau Pakari trial participants were recruited January 2012–August 2014, and randomised to either a high-intensity intervention (weekly sessions for 12 months with home-based assessments and advice, n=100) or low-intensity control (home-based assessments and advice only, n=99). Trial participants were aged 5–16 years, resided in Taranaki, Aotearoa/New Zealand (NZ), with a body mass index (BMI) \geq 98th centile or BMI $>$ 91st centile with weight-related comorbidities. Conventional group participants (receiving paediatrician assessment with dietitian input and physical activity/nutrition support, n=44) were aged 4–15 years, and resided in the same or another NZ centre. The change in BMI standard deviation score (SDS) at 12 months from baseline and programme intervention costs, both at the participant level, were used for the economic evaluation. A limited health funder perspective with costs in 2016 NZ\$ was taken.

Results: The per child 12-month Whānau Pakari programme costs were significantly lower than in the conventional group. In the low-intensity group, costs were NZ\$939 (95% CI: 872, 1007) (US\$648) lower than the conventional group. In the high-intensity intervention group, costs were NZ\$155 (95% CI: 89, 219) (US\$107) lower than in the conventional group. BMI SDS reductions were similar in the three groups. **Conclusions:** A home-based, multi-disciplinary child obesity intervention had lower programme costs per child, greater reach, with similar BMI SDS outcomes at 12 months when compared with the previous hospital-based conventional model.

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Introduction

The costs of obesity are not sustainable. A past meta-analysis has shown that the associations of overweight and obesity with higher all-cause mortality persist across Asia, Australia, Europe, North America, and Aotearoa/New Zealand (henceforth referred to

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<https://doi.org/10.1016/j.orcp.2018.04.001>

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as New Zealand (NZ)) [1]. Overweight and obesity were estimated to incur annual costs of NZ\$720 to 850 million in health care and lost productivity for NZ in 2006 [2]. Recent NZ studies have established a high prevalence of weight-related comorbidities, suboptimal eating behaviours, low physical activity, and potential psychological difficulties in children and adolescents with obesity [3–6]. Effective, early, comprehensive assessments and interventions are therefore imperative. The World Health Organization recommends family-based, multicomponent lifestyle weight management services for children and young people with obesity [7]. Lifestyle interventions comprising of multicomponent sessions involving the parent and child, with 26 or more hours of intervention contact are likely to be of greatest benefit in terms of weight management [8]. However, multi-disciplinary intervention programmes are often costly and complex to deliver.

The home visit model has shown promising efficacy for management of paediatric obesity [9]. Whānau Pakari is a home-based, multi-disciplinary obesity intervention programme for children and adolescents in Taranaki, NZ [10]. It specifically targeted high-risk groups in this region in terms of obesity statistics; namely Māori (NZ's indigenous population) and those from greater household deprivation [10]. Taranaki has a population of approximately 23,139 children aged 0–15 years, of whom 81% identify as NZ European (NZE), 28% as Māori, and 1% as other ethnicity (includes each ethnic group stated, if more than one reported) [11]. Whānau Pakari commenced in 2012 as a clinical trial delivering a 12-month intervention, with follow-up to 24 months. It evolved out of review of the previous model running in Taranaki, Green Prescription Active Families (GRxAF) [12]. GRxAF is a community-based health initiative designed to increase physical activity and improve nutrition in children and young people aged 5–18 years. It currently operates within 15 district health boards (DHBs) in NZ (DHBs fund and provide health services within their geographical area). Compared to the previous standard of care, the Whānau Pakari service has achieved greater accessibility and appropriateness for high-risk groups struggling with child obesity, seeing over three times the number of participants per annum than the prior GRxAF programme, with over-representation from Māori and those from the most deprived households compared with background population rates [12,13]. The Whānau Pakari randomised clinical trial has also shown a significant mean reduction in body mass index standard deviation score (BMI SDS) with those who engaged in the service at the 12-month assessment from baseline (−0.12 low-intensity control, −0.10 high-intensity intervention) [13]. Younger age and NZE ethnicity were positively associated with a greater reduction in BMI SDS, and attendance in the intensive intervention of ≥70% resulted in a change in BMI SDS of −0.22 [13].

Prior to Whānau Pakari, Taranaki had a conventional model of care where children and adolescents with obesity were referred by their general practitioner (family physician) to the paediatric service. They were then seen in the medical clinic at the hospital, and referred to dietitians and GRxAF for nutrition and physical activity advice. Follow-up occurred with the paediatrician (approximately 6-monthly) and dietitian (approximately 3-monthly). When Whānau Pakari commenced, a clinical trial was embedded in the service (from January 2012 to August 2014) [13].

To date, there have been no economic evaluations of multi-disciplinary intervention programmes (incorporating professionals from multiple areas of expertise) for children and adolescents with obesity in NZ. Prevention programmes of interventions at a community level (through schools) have been evaluated [14,15], as has the Green Prescription (GRx) programme, an adult physical activity counselling programme for NZ primary care [16]. International literature has shown mixed findings in terms of cost-effectiveness of intervention programmes. 'Families for Health', a 10-week community-based family programme in the United King-

dom was found to be neither effective (nor cost-effective) when compared with usual care [17], although this was a notably short programme duration for a multi-disciplinary intervention, which may have affected outcome. Treating the parent or child alone is almost five times more expensive per unit of weight loss than family-based treatment [18]. Unsurprisingly, in terms of intervention, family-based intervention in a group setting has been found to be more cost-effective than a mixed group plus individual format [19].

The objective of this study was to determine the cost-effectiveness of the 12-month Whānau Pakari model, compared with the conventional model of care prior to 2012.

Methods

We conducted an economic evaluation, comparing Whānau Pakari, a multi-disciplinary intervention home-based programme delivered to children and adolescents with obesity, with conventional hospital-based care. The analysis was conducted from a health funder perspective, considering programme intervention costs only, with costs and BMI SDS analysed at an individual participant level at the 12 month follow-up time point.

Study design and setting

The Whānau Pakari trial was an unblinded randomised controlled trial with a 12-month intervention, with planned follow-up at 24 months and five years [10]. Recruitment ran from January 2012 to August 2014. Children and adolescents from the Taranaki region aged 5–16 years with a body mass index (BMI) ≥98th centile (obese) or those >91st centile (overweight) with weight-related comorbidities [20] were referred to Whānau Pakari by health professionals within the community, including public health nurses in schools and Māori health workers. Children with significant medical or psychological conditions that limited their ability to participate in physical activity, or who were identified as not ready to make lifestyle changes, were not eligible for the programme.

Participants entered either the intensive intervention (n = 100) or minimal intensity control (n = 99) arm, herein referred to as the high-intensity group and low-intensity group respectively. Two participants were excluded prior to the 6-month assessment in the low-intensity group, resulting in an n = 97. Both groups were offered 6-monthly home visits and assessments with advice from a healthy lifestyle coordinator (replacing the paediatrician hospital visit) at baseline, six, and 12 months. A multi-disciplinary team meeting review with paediatrician oversight to address any identified weight-related comorbidities was held to discuss all assessments. Those in the high-intensity group were also invited to participate in a 12-month multi-disciplinary programme with weekly group sessions during the school year delivered by a physical activity coordinator, dietitian, and psychologist. Sessions occurred at community sporting venues, and incorporated family physical activity sessions (including introduction to various sports to find a participant's interests), psychology sessions (discussing topics such as how to make and maintain healthy lifestyle change, and self-esteem), and dietary sessions (including virtual supermarket tours, cooking sessions, portion size, and the concept of healthy food). A home visit by the dietitian and physical activity coordinator was also offered to the high-intensity group within the first month.

Ethics approval for the trial was granted by the Central Health and Disability Ethics Committee (NZ) (CEN/11/09/054). Written and verbal informed consents were obtained from all participants or their guardians for the trial. Trial registration was with the Australian NZ Clinical Trials Registry (ANZCTR: 12611000862943).

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