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Kaiser Permanente Georgia's Experience with Operation Zero: A Group Medical Appointment to Address Pediatric Overweight

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Abstract

Context: The rate of overweight (OW) in children in the United States has more than tripled since 1980. The health consequences of pediatric OW include type 2 diabetes and significant illness later in life. Treating pediatric OW is a necessity; however, health care clinicians have minimal access to successful and comprehensive treatment modalities for addressing it.

Objective: Kaiser Permanente of Georgia (KPGA) offers a group medical appointment clinic, Operation Zero (O.Z.), as a referral program for preadolescent and adolescent patients who are in the 85th or higher percentile for body mass index (BMI) for their age. The eight-session clinic uses a family-oriented approach and provides a supportive group environment with interactive learning, games, physical activity, and creative problem solving. The goal of the program is to improve lifestyle behaviors for nutrition and physical activity. Clinically, meeting these goals can manifest as reductions in body fat (BF), waist size, and BMI-for-age percentile. Two implementation models help improve dissemination of the program within KPGA.

Design: Baseline and eight-week postclinical outcomes for O.Z. participants were analyzed to determine program effectiveness. A retrospective analysis with a control group looked at long-term clinical outcomes to determine weight maintenance. Main outcome measures were weight, BMI-for-age percentile, waist size, and percentage of body fat (%BF).

Results: At eight weeks after program completion compared with baseline, there were significant reductions in %BF and waist size for the total sample and specifically for adolescents, preteens, and participants who attended six or more sessions. Among O.Z. participants, there were insignificant increases in weight at six months after program participation and BMI-for-age percentile at one year after participation. At six months, the mean change in weight and BMI in the O.Z. group was statistically less than the mean change in the control group.

Conclusions: A structured, family-oriented weight management program is effective in changing measures consistent with improved weight management.

Introduction

Both the prevalence and health consequences of childhood overweight (OW) make it an issue that the health care industry can no longer sidestep. Kaiser Permanente Georgia (KPGA) has stepped into a leadership role by improving the delivery of care for overweight pediatric patients and those pediatric patients at risk for OW. Specifically, KPGA offers and strongly recommends an award-winning weight management group medical appointment program, Operation Zero (O.Z.), for preadolescent and adolescent patients who are in the 85th or higher percentile for body mass index (BMI%) for their age. (In 2005, the Cooper Institute conducted an in-depth review and evaluation of programs addressing childhood OW and awarded O.Z. a Gold Star.)

The rate of OW in children, defined as a BMI% ≥ 95th percentile, has more than tripled since 1980 in the United States. Among children and teens aged 6 to 19 years, 16% are considered OW.[1] Compared with national rates, the rates for the state of Georgia show that it has a particularly remarkable epidemic of childhood OW, where 33% of middle school and 26% of high school students are OW or at risk for being OW, defined as having a BMI% between the 85th and 95th percentile.[2] Likewise, among youth aged 5 to 18 years within KPGA, 17% are OW and another 17% are at risk for being OW.[3]



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OW children are at risk for many health problems.[4] Immediate physical health conditions are strongly correlated with OW, including orthopedic conditions, respiratory problems and sleep apnea, and gastrointestinal diseases. A child's mental health, self-esteem, and body image can also be affected by OW.[5]

Perhaps the greatest health condition linked with pediatric OW is insulin-resistant diabetes mellitus (type 2 diabetes). One study documented a ten-fold increase in the incidence of juvenile-onset type 2 diabetes, with >90% of the new cases being OW.[6] OW often leads to an increased magnitude of insulin resistance, which in turn leads to type 2 diabetes.[7,8] Childhood OW is the most prominent and modifiable risk factor for type 2 diabetes.[9]

The long-term complications of childhood OW are significant. Data suggest that the risk of illness later in life is proportional to the level of OW in childhood.[10] These illnesses include coronary artery disease, atherosclerosis, colon cancer, arthritis, and diabetes.[4] Plus, the development of cardiovascular risk factors progresses with OW from childhood into adulthood. For example, prospective studies show that OW children are nine-to-ten times more likely to develop hypertension in adulthood than their non-OW matched peers.[5]

The health complications of childhood OW will eventually place an ever-expanding burden on the health care system, underscoring the necessity to treat pediatric OW before it becomes adult OW. Although different approaches have been used at all levels of health care to address pediatric OW, health care clinicians have had few successful and comprehensive alternatives to offer to OW pediatric patients and their families. In fact, there has not been a comprehensive program addressing the management of pediatric OW with sufficient sample sizes to demonstrate statistically significant improvements in primary care practices and patient outcomes.[11,12] For KPGA, finding a solution to the problem was motivated by the need to fill the void that had been felt by pediatric clinicians, members, and the overall health system.

Program Description

O.Z., a pediatric OW group medical appointment clinic, is a referral program for at-risk-of-OW and OW preadolescent and adolescent patients. The clinic uses a family-oriented approach and incorporates behavior-change strategies to address the behaviors, knowledge, attitudes, and self-efficacy of patients and their parents regarding nutrition and physical activity. Monitoring clinical outcomes on a weekly basis, setting weekly goals, and self-monitoring are integral to the success of the program. *Operation Zero* was chosen as the name because the program's long-term goal is zero incidence of health problems associated with being OW—namely, hypertension, hypercholesterolemia, and type 2 diabetes. The goals for O.Z. are weight maintenance in growing children and adolescents and improved knowledge about and lifestyle behaviors regarding nutrition and physical activity. Clinically, these goals can manifest as reductions in body fat, waist size, and BMI%. Reductions in cost of care are an expected long-term benefit for the Health Plan.

Dr Beno and O.Z. staff review patient's clinical data. From left to right, Melanie Baker, RD; Joann Huffstickler, LPN; Luke Beno MD; Sherry Pierce, MA.

O.Z. includes weekly one-hour appointments for two months (the core program), followed by another four appointments at three-month intervals (the After-O.Z. program), for a maximum group of 15 patients and their parents. O.Z. provides a supportive group environment with interactive learning, games, physical activity, and creative problem solving. The O.Z. sessions are held either on weekday evenings or Saturday mornings. O.Z. is a family-based intervention that requires one parent or guardian to participate in each session and at home. Participants and parents receive an O.Z. manual that includes health education, activities, and recipes. Either a health educator or a clinician facilitates the group sessions with nursing staff support and participation of either a dietitian or professional chef at various sessions. Every session begins with measure-

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Table 1. Content of Operation Zero program sessions

Core program sessions	**Concept**
"What's the Big Deal?"	Motivation
"Making the Cut"	Knowledge deficit
"Get Moving and Grooving"	Lifestyle activity
"Shaping Up in the Kitchen"	Cooking techniques
"Who's to Blame?"	Disordered eating
"Label It Before You Table It"	Confusing labels
"Smart Choices Eating Out"	Temptation
"Operation Snack Attack"	Maintaining change
After-Operation Zero sessions	**Concept**
"You Don't Eat Meat?"	Protein benefits
"Cooking with Beans"	Fiber benefits
"What Are You Drinking?"	Empty calories
"Grilling to Perfection"	Healthy cooking

ment of weight, waist size, and body fat, as measured by bioelectrical impedance, and about 20 minutes of physical activity followed by the main content of the session. The concepts covered in the O.Z. sessions are outlined in Table 1. Strategies for addressing attitudes and building self-efficacy are incorporated into the program, including pedometer games, interactive learning, competition (for prizes), cooking demonstrations, and exercising as a group.

O.Z. is designed for participants to sequentially improve on specific behavioral goals for nutrition and physical activity. Homework assignments are provided weekly to move participants stepwise toward reaching these behavioral goals. Goals are designed to be easily achievable, yet also help reverse the factors contributing to pediatric OW.[13–16] The lifestyle goals are as follows:

- Increase milk consumption until drinking four glasses a day.
- Decrease milk fat until drinking fat-free milk.
- Increase fruit and vegetable servings until eating five servings a day.
- Eat breakfast every morning.
- Increase the number of days being physically active for 60 minutes until active five days a week.
- Decrease sedentary behavior to less than one hour per day.
- Increase the number of steps per week on a pedometer until taking 70,000 steps per week.

O.Z. was originally designed by Luke Beno, MD, and has been successfully implemented with his health care team at his medical office since July 2001. In 2003, the Department of Prevention and Health Promotion began leveraging O.Z. The program was disseminated to additional medical offices, and a process evaluation was conducted with staff members and facilitators. This effort resulted in awareness of implementation barriers, including staffing, patient attendance, financial support, and enrollment issues. Most health care teams found end-of-day staffing and acute care patient demand to be barriers to replicating O.Z. This led to creating two new implementation models for the program:

- The Health Care Team Model with support from the Health Education Department: A pediatrician facilitates the program on weekday evenings; the health care team supports the program with managing referrals, scheduling, and conducting measurements; and the Health Education Department supports the program fiscally and with coordination.
- The Health Education Model: The Health Education Department supports and coordinates the program by having health educators facilitate the program on the weekends.

The models differ by variables for facilitation, scheduling (time of day, day of week), composition of support staff, and participants' financial input. The program goals, intervention strategies, clinician referrals, cofacilitation, and program content remain consistent between the two implementation models. These new formats better suit the needs of the other medical offices and improve dissemination of the program within KPGA and for the other Kaiser Permanente (KP) regions that have expressed interest in replicating the O.Z. program.

The cost of O.Z. is approximately $2000 for the core program and $1200 for the After-O.Z. program. With full participation, the cost is equivalent to $137 and $80 per participant for the core and After-O.Z. programs, respectively. These costs include consultation fees and/or salary for chefs, dietitians, health educators, and nursing staff members and costs for class supplies, including pedometers, workout videos, and prizes. Costs also include in-kind contribution for physician facilitation. O.Z. facilitators, cofacilitators, and nursing staff members commit approximately two hours per week for an O.Z. session, whether it is the core or After-O.Z. program.

Program Evaluation

Between 2001 and 2003, there were 135 participants in the O.Z. program. KPGA analyzed this sample to describe program participation and to determine the extent to which O.Z. is effective. Data collection occurred as part of the O.Z. program, not specifically for program evaluation, and data are often incomplete because of attrition and poor documentation.

Table 2. Characteristics of Operation Zero participants (2001–2003)

	Count (n = 135)	Percentage
Sex		
Female	74	55
Male	61	45
Age category		
Youth (≤ age 10 years)	36	27
Preteen (age 11–12 years)	41	31
Adolescent (≥ age 13 years)	57	43
Insulin resistance at baseline[a]		
Yes	88	87
No	13	13
Attendance		
< 6 sessions	57	42
≥ 6 sessions	78	58
BMI% at baseline[b]		
< 85th percentile	6	5
85th – 94.99 percentile	26	22
≥ 95th	85	73

BMI%, percentile for body mass index for age.
[a] Testing for insulin resistance is not a prerequisite for participation in O.Z., so data are missing.
[b] In 18 cases, height was missing and BMI% could not be determined.

Examination of a sample of the participants (Table 2) shows:

- Insulin resistance (defined as the ratio of fasting glucose to fasting insulin of < 7)[17] in 87% of participants
- OW in 73% of participants
- Risk of OW in 22% of participants
- Risk for developing type 2 diabetes for the majority of O.Z. participants because they are OW and may already have insulin resistance.

During the eight-week core program, participants demonstrated a mean weight change of 0.47 lbs and a body mass index change of –0.11 kg/m^2 (Table 3). BMI% was reduced, on average, by 0.04%, and there were mean reductions in percentage of body fat (%BF) and waist size.

Paired samples *t*-tests were conducted to determine whether eight-week post-test values were significantly different than baseline values for weight, BMI%, %BF, and waist size. There were no significant reductions in weight or BMI%, but significant reductions in %BF and waist size were demonstrated with the total sample (Table 3) and specifically among patients who attended six or more sessions, preteens and adolescents. Among boys, there were significant reductions in %BF only, and among girls, there were significant reductions in waist size, plus a trend for significant reductions in %BF (Table 4). There were no significant reductions in any body composition variable for children who attended fewer than six sessions and for youth aged eight-to-ten years.

Retrospective Analysis

Although the short-term alteration in body fat and waist size is an exciting outcome, long-term weight maintenance and subsequent decreases in BMI% are other important outcomes for O.Z. A retrospective analysis was conducted to determine long-term clinical outcomes for O.Z. participants and a control sample. We abstracted weight, BMI, and BMI% from medical records for a sample of patients aged 11-to-17 years (youth were omitted) who completed O.Z. in 2001–2002 and a control sample of members who never attended O.Z. and were matched for age, sex, and BMI% (Table 5). Data were pulled from clinic visits, where body fat, waist circumference, and sometimes height were not routinely documented. For the control group, data from a clinic visit in 2002 were used as a baseline. Clinic visits 4 months to 8 months later were regarded as a 6-month postvisit and visits 9 months to 18 months later as a 1-year postvisit.

Paired samples *t*-tests were conducted to determine whether six-month and one-year postvisit values were significantly different from baseline values for weight, BMI, and BMI%. O.Z. participants had an insignificant weight gain of 2.35 ± 9.90 lbs, whereas the control group had a significant weight gain of 7.64 ± 10.00 lbs at the six-month postvisit (Table 6). For both the control and O.Z. groups, there were insignificant increases in BMI or BMI% at the six-month postvisit.

From baseline to the one-year postvisit, for both the O.Z. and control groups, there were significant increases

Table 3. Change in body composition variables from baseline to after intervention and significance testing for the total sample

Body composition variable	n	Mean change	Range (minimum–maximum)	SD	p value (1-tailed)
Weight change (lb)	115	0.24	–11.00 to 8.80	4.11	NS
BMI change (kg/m^2)	113	–0.11	5.70 to 4.21	1.15	NS
BMI% change (%)	112	–0.04	–13.00 to 19.00	2.79	NS
Body fat change (%)	68	–1.18	–23.40 to 6.60	3.8	<.05[a]
Waist size change (in.)	32	–0.61	–4.00 to 2.50	1.5	<.05[b]

BMI, body mass index; BMI%, percentile for body mass index for age; NS, not significant.
[a] *t* value = 2.254.
[b] *t* value = 2.590.

Table 4. Statistically significant subpopulations of the total sample

Sample	Variable	n	Mean change	SD	p value (1-tailed)
Attended ≥ 6 sessions	Waist (in.)	28	–0.55	1.41	< .05[a]
	Body fat (%)	45	–1.63	4.39	< .05[b]
Preteens (age 11–12 years)	Waist (in.)	6	–1.21	1.40	< .05[c]
	Body fat (%)	20	–1.68	4.09	< .05[d]
Adolescents (age ≥ 13 years)	Waist (in.)	16	–0.70	1.57	< .05[e]
	Body fat (%)	31	–0.58	1.61	< .05[f]
Girls	Waist (in.)	19	–0.92	1.34	< .005[g]
	Body fat (%)	37	–1.09	4.07	0.06[h]
Boys	Body fat (%)	31	–1.28	3.41	< .05[i]

[a] $t(27) = 2.085$, $p < .05$. [d] $t(19) = 1.84$, $p < .04$. [g] $t(18) = 3.005$, $p < .005$.
[b] $t(44) = 2.500$, $p < .05$. [e] $t(15) = 1.790$, $p < .05$. [h] $t(36) = 1.626$, $p = .06$.
[c] $t(5) = 2.114$, $p < .05$. [f] $t(30) = 2.023$, $p < .05$. [i] $t(30) = 2.109$, $p < .05$.

Table. 5 Characteristics of retrospective analysis population

	Count (%)	
	Operation Zero group (n = 43)	Control group (n = 42)
Sex		
Female	24 (56%)	19 (45%)
Male	19 (44%)	23 (55%)
Age category		
Preteen (age 11–12 years)	19 (44%)	18 (42%)
Adolescent (≥ age 13 years)	24 (56%)	24 (57%)
BMI% at baseline		
85th–94.99th percentile	1 (2%)	5 (15%)
≥ 95th percentile	39 (98%)	29 (85%)
Attendance at Operation Zero		
< 6 sessions	19 (44%)	NA
≥ 6 sessions	24 (56%)	NA

BMI%, percentile for body mass index for age; NA, not applicable.

in weight and BMI. For the control group, there was also a significant increase in BMI% of 0.76% ± 1.86%, and the O.Z. group had an insignificant increase of 0.22% ± 1.22% (Table 7).

Independent sample *t*-tests were conducted to determine whether mean changes in weight, BMI, and BMI% in the O.Z. group differed from the mean changes in the control group. From baseline to the six months postvisit, there was a significant difference between the mean scores for weight and BMI for the O.Z. and control groups (Table 6). The O.Z. group had significantly lower mean changes than the control group. From baseline to the one-year postvisit no significant difference was demonstrated for any mean score (Table 7).

O.Z. is affordable and presents reasonable long-term outcomes for weight maintenance.

Conclusions

The results demonstrate that the O.Z. program helps children reduce %BF and waist size within the eight weeks of the core program. These levels of significance are maintained among patients who attend more than six sessions, preteens and adolescents.

There are no significant reductions or trend for significant reductions, along any body composition variable, for youth aged eight-to-ten years. As a result, KPGA now offers the program to only preteens and adolescents aged 11 to 17 years.

Participants must attend six or more sessions (75% of the program) to realize the immediate benefits. To help bolster retention, program improvements were implemented in 2005, including use of weekly reminder calls and placement of the most satisfying sessions early in the program. In addition, clinicians are encouraged to be selective with their referrals, referring patients and parents who are ready to change and willing to commit to an eight-week program.

Long-term clinical data for O.Z. participants and a control sample suggest that the program is effective for weight maintenance at six months after completion but not at one year afterward. The trend for statistically significant increases in BMI% over the course of a year was not true for the O.Z. group. However, the mean change in BMI% in the O.Z. group was not different from the mean change in the control group. Although these results demonstrate that the program is on track for attaining its goal of being a long-term weight maintenance program, more effort is needed to keep participants on course with weight maintenance for one year afterward.

One explanation for this long-term result can be ex-

Table 6. Mean changes from baseline to six months afterward and significance testing

Body composition variable	Arm	Mean change from baseline to six months afterward			p value (1-tailed)	
		n	Mean	SD	Paired *t*-test	Independent *t*-test
Weight (lb)	O.Z. group	26	2.35	9.90	NS	< .05[a]
	Control group	18	7.64	10.00	< .05[b]	
BMI (kg/m^2)	O.Z. group	12	–1.06	2.27	NS	< .05[c]
	Control group	10	0.79	1.67	NS	
BMI%	O.Z. group	12	–0.10	0.22	NS	NS
	Control group	10	–0.36	1.11	NS	

BMI, body mass index; BMI%, percentile for body mass index for age; NS, not significant; O.Z., Operation Zero.
[a] $t(17) = -3.246$, $p < .05$.
[b] $t(42) = -1.736$, $p < .05$.
[c] $t(20) = -2.129$, $p < .05$.

Table 7. Mean changes from baseline to one year afterward and significance testing

Body composition variable	Arm	Mean change from baseline to one year afterward			p value (1-tailed)	
		n	Mean	SD	Paired *t*-test	Independent *t*-test
Weight (lb)	O.Z. group	36	14.75	14.20	< .05[a]	NS
	Control group	27	19.53	14.95	< .05[b]	
BMI (kg/m^2)	O.Z. group	24	1.22	2.80	< .05[c]	NS
	Control group	18	1.60	2.29	< .05[d]	
BMI%	O.Z. group	24	0.22	1.20	NS	NS
	Control group	18	0.76	1.86	< .05[e]	

BMI, body mass index; BMI%, percentile for body mass index for age; NS, not significant; O.Z., Operation Zero.
[a] $t(35) = -6.228$, $p < .05$.
[b] $t(27) = -6.791$, $p < .05$.
[c] $t(23) = -2.124$, $p < .05$.
[d] $t(17) = -2.973$, $p < .05$.
[e] $t(17) = -1.741$, $p < .05$.

plained by the After-O.Z. program. After-O.Z. was not implemented during the early years of O.Z., from which the retrospective sample was pulled. Plus, KPGA has experienced trouble with implementing a well-attended and effective After-O.Z. program ever since. Developing and implementing successful methods for a follow-up program may improve long-term results for O.Z.

The power of the analysis might have been limited by the small sample size of both the program evaluation and retrospective analysis. The data had been collected at either an O.Z. session or clinic visit, and data collection was often incomplete and inconsistent. Body fatness data were not available from clinic visits, so we were unable to follow whether decreases in body fat and waist size were sustained over time.

This evaluation looked solely at clinical variables; however; implementation of lifestyle changes is an important goal of O.Z. A current study is measuring lifestyle changes for O.Z. participants and sustainability of changes. This same study, funded by the Garfield Weight Management Initiative, is also evaluating the two implementation models of O.Z. and the process of disseminating the program to the Mid-Atlantic States Region. Other future studies can examine cost savings, reversal of insulin resistance, outcomes for parents and siblings, and whether certain homework goals are more important and effective than others.

Expense is going to be a concern for any health plan interested in replicating O.Z. Funding decisions are based both on expense and realistic long-term outcomes. O.Z. is affordable and presents reasonable long-term outcomes for weight maintenance. A structured, family-oriented weight management program that is affordable to implement in a health care setting is effective in changing measures consistent with improved weight management. O.Z. offers a successful and comprehensive alternative for pediatric clinicians to offer OW patients and their families. ❖

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