All Aboard Meal Train: Can Child-Friendly Menu Labeling Promote Healthier Choices in Hospitals?

Sanjukta Basak, MSc, MD, CM[1], Alissa Steinberg, RD, MHSc, CDE[2], Alison Campbell, RD, CDE[2], Annie Dupuis, PhD[3], Shiyi Chen, MSc[4], Alisa Bar Dayan, RD[2], Susan Dello, RD[5], and Jill Hamilton, MD[6]

Objective To evaluate patient meal orders and consumption with a revised menu design that includes child-friendly labeling.

Study design A randomized controlled trial among hospitalized children was performed over a 1-month period comparing the control menu layout and the intervention menu. The intervention menu contained the same choices but was labeled to encourage healthy eating. Children on a specialized diet, receiving parenteral nutrition, or age <2 years were excluded.

Results A total of 163 patients (81 males) were included, with a mean age of 9.9 ± 5.1 year, and a mean weight *z*-score of −0.08 ± 1.3. Children receiving the intervention ordered more "green-light" healthy choices and fewer "red-light" items, with 0.65 lower odds of selecting a red-light item (95% CI, 0.55-0.76) and 1.75 higher odds of selecting a green-light item (95% CI, 1.49-2.04), both at the first meal, but with effects waning over time. There were trends toward increased intake of fruits and vegetables and decreased intake of "foods to limit", but no impact on the consumption of sugar-sweetened beverages. Both intervention and control group consumed their meals in equal proportions.

Conclusions The combination of menu labeling techniques targeted to children in the inpatient hospital setting was an effective short-term tool for increasing the intake of healthier foods, although the effect of labeling waned over time. *(J Pediatr 2019;204:59-65).*

Trial registration ClinicalTrials.gov: NCT02692001.

The food environments to which children are exposed at home, in school, in child care facilities, and within their communities can influence the healthfulness of their diets. Children are often eating outside the home with easy access and routine exposure to large portion sizes of foods high in fats, added sugars, and calories.[1-4] With one-third of all 5- to 17-year-olds classified as overweight or obese in Canada, supporting healthy food environments is a key strategy for achieving the public health goal of reducing childhood obesity.[5] Similar to food outlets outside of the home, children's hospitals often provide suboptimal nutritional environments. Studies have shown that between 38% and 89% of American hospitals and 50% of Canadian hospitals have fast food franchises in addition to a hospital cafeteria on their premises.[6,7] They also contain on average 9-16 vending machines selling only energy-dense, ultra-processed, nutrient-poor foods.[6]

Menu labeling and point-of-purchase nutrition information is a potential cost-effective public health strategy for children and adults.[8] A recent systematic review found menu labeling to be more effective in cafeterias than in restaurants and that qualitative information, such as traffic light labeling, was most effective in promoting healthier choices.[9] Providing nutrition information in adult hospitals has been associated with moderate improvements in macronutrient and energy intake in real-life and hypothetical cafeteria settings.[10-12]

Since July 2006 at The Hospital for Sick Children, inpatients have used an ordering and delivery system called Meal Train that allows food to be prepared as needed for a room service style of feeding. In a previous study from our group, using the Meal Train ordering system, we found that the hospitalized children were not meeting minimum fruit and vegetable intake recommendations, ordered 30% of their fruit and vegetable intake as juice, and ordered large volumes of energy-dense, nutrient-poor foods despite the availability of healthier options on the menu.[13] The aim of this study was to evaluate the impact of a combination of labeling techniques, including attractive characters, descriptive food names, and a traffic light system, on patient food orders and consumption with no changes in menu food options. These strategies have been successful in influencing children's food choices in research settings.[14-16] The primary outcome of interest in this study was the

CFG Canadian Food Guide

From the [1]Department of Pediatrics, The Scarborough and Rouge Hospital; [2]Department of Clinical Dietetics, The Hospital for Sick Children; [3]Department of Biostatistics, Dalla Lana School of Public Health, University of Toronto; [4]Biostatistics and Design Unit, Clinical Research Service; [5]Department of Food Services, The Hospital for Sick Children; and [6]Division of Endocrinology, The Hospital for Sick Children, Department of Paediatrics, The University of Toronto, Toronto, ON, Canada

Supported by the Fraser Mustard Institute/Center for Healthy Active Kids Catalyst Seed Grant. S.B. received support from a Canadian Pediatric Endocrine Group Fellowship Award. J.H. receives unrestricted research funds from the Mead Johnson Chair in Child Nutritional Science. The authors declare no conflicts of interest.

https://doi.org10.1016/j.jpeds.2018.08.073

number of servings of green-light and red-light food choices, as well as Canadian Food Guide (CFG) daily servings for fruits and vegetables, sugar-sweetened beverages, and "foods to limit." We hypothesized that a child-friendly menu highlighting healthier options would increase the number of healthy food choices and decrease orders of energy-dense, nutrient-poor foods.

Methods

A review of the literature was undertaken using the PubMed, Google Scholar, MEDLINE, and CINAHL databases to identify menu labeling interventions targeted at children, adolescents, and their parents. Interventions that included a traffic light system, attractive characters, and fun descriptive names are most successful at being noticed, influencing behavior, and promoting perceived healthiness of the selected food items.[14-20] They raise awareness of the food and appeal to children's sense of fun and taste expectations. In addition, these designs have broad appeal to parents, children, and teenagers of various ages. Furthermore, they do not require any a priori nutrition knowledge about calories or recommended intake and are accessible to visual learners and to those from diverse educational backgrounds. For these reasons, all 3 techniques were incorporated into the intervention menu (**Figure 1**; available at www.jpeds.com).

Based on our existing menu items, the coding of the red-, yellow-, and green-light foods was derived using a combination of tools and guidelines, including the CFG,[21] Health Canada Health Claims, and Nutrition Controls for Ontario Schools.[21-23] Using these tools, 3 dietitians classified the menu items based on the level of processing and nutrient content, with particular emphasis on fiber, added sugar, saturated fat, and sodium. Each dietitian classified items independently, and strong agreement ($\kappa = 0.85$) was seen. When differences were encountered, a consensus was achieved.

Menu items were then organized into green, yellow, and red boxes with labels reading "a great healthy choice," "choose sometimes," and "choose once in a while," respectively. A section titled "Eat Like a Superhero" was created to prime children to consider what their potential role models choose and incorporated fun descriptive names, a suggested sample breakfast, and lunch and dinner meals with photographs of portion sizes in a plate method format. Original cartoon female grapes and male broccoli superhero characters were created with the aid of a graphic designer to encourage fruit and vegetable selection. None of the menu items changed between the control and intervention menu; thus, patients and their families in both groups had the same menu items available for all meals.

Setting and Subjects

We conducted a 1-month randomized, controlled trial on 6 general pediatric and subspecialty pediatric wards at The Hospital for Sick Children, a tertiary care center in Toronto (ClinicalTrials.gov: NCT02692001). Food order and consumption data were collected on 6 wards over a 1-month period, with the control and intervention menu each used for a period of 2 weeks. Children exposed to the educational intervention menu who remained on the ward during the 2-week control menu period were excluded from the study. Children who were aged <2 years, nonfluent in written English, on nothing by mouth status during the course of admission, receiving parenteral nutrition, or prescribed a specialized diet (eg, pureed foods, infant formula, ketogenic, celiac, kosher) were excluded from the study. The study design was approved by The Hospital for Sick Children's Institutional Research Ethics Board. A waiver of consent was granted.

Patients were identified by food services ward census using Hospitality Suite Computrition, the food service operations management software. Bedside nurses distributed the menus and assisted in determining inclusion/exclusion criteria, but were asked not to disclose that this was a study, to avoid food selection bias by families. Families receiving the intervention menu were told the hospital had given the menu a "new look" but that food items were the same as on the old menu.

Data Collection

Data collected included meal orders, meal consumption, and patient/caregiver perceptions about the intervention menu. The Meal Train meal orders were accessed using the Hospitality Suite Computrition (Computrition Foodservice Software Solutions, West Hills, California) by research personnel after breakfast, lunch, and dinner meal times (9:30 a.m., 1:30 p.m., and 6:15 p.m.) and exported into an Excel database following removal of identifying name and hospital identification number. Meal orders included total number of items per day/child, serving sizes of items ordered, special diet orders (eg, nil per os, kosher, celiac, high-energy diet) as well as patient demographics including age, weight, and sex. Meal Train orders were analyzed over 2 separate 10-day periods, 2 consecutive Monday to Friday periods, with weekend days excluded. To determine information on meal consumption, meal trays of 20% of all orders were collected, weighed, and measured by a group of volunteer dietetic interns trained by the research team to determine differences in servings/day between foods ordered and foods left over on the meal trays. Finally, a 1-page paper survey was distributed by bedside nursing staff to children aged ≥10 years and their parents, to obtain feedback on the various aspects of the new menu design.

Statistical Analyses

To determine the impact of the intervention menu on the number of servings of green-light and red-light food choices, we modeled the proportion of red and green items (number of red items/total items and number of green items/total items) at each meal using a repeated-measures logistic regression model (PROC GLIMMIX in SAS 9.4, SAS Institute Inc, Cary, North Carolina),[24] with repeated meals across patients within each ward to test for the effect of menu type on item selection. Each model controlled for a random ward intercept, meal type (breakfast, lunch, or supper), meal number (ordered consecutively across each meal taken while in the study), and, where significant, 2-way interactions.

We then calculated the average number of daily servings across 3 CFG categories: fruits and vegetables, sugar-sweetened

Table I. Demographic characteristics of the study participants

Characteristics	Traffic light analysis		CFG analysis	
	Intervention menu (n = 90)	Control menu (n = 73)	Intervention menu (n = 56)	Control menu (n = 41)
Age, y, mean (SD)	9.5 (5.0)	10.6 (5.0)	9.8 (5.2)	10.6 (4.8)
Females, n (%)	43 (48)	39 (53)	31 (55)	23 (56)
Weight *z*-score, mean (SD)	−0.10 (1.45)	−0.18 (1.39)	−0.25 (1.54)	−0.18 (1.51)
Days in study, mean (SD)	2.7 (2.6)	2.6 (2.5)	3.5 (2.9)	3.4 (2.7)
Number of meal orders, mean (SD)	5.2 (4.4)	5.1 (4.7)	6.9 (4.7)	7.2 (5.1)

beverages, and foods to limit. Participants who did not order from at least 1 of each meal type were excluded from our analysis. We excluded 15 participants (8 control, 7 intervention) who ordered only 1 meal, 38 participants (18 control, 20 intervention) who ordered only 2 meals, and an additional 13 participants (6 control, 7 intervention) who ordered more than 2 meals but not 1 of each meal type. The final analysis included 97 participants (41 control, 56 intervention).

For these 97 participants, the average number of servings across each of the 3 CFG categories of interest was calculated for each meal type, and these were summed to provide an estimate of average daily servings. We then modeled average daily servings using a hierarchical linear regression (subjects within hospital ward), controlling for menu type and length of exposure to the menu (total number of meals over the course of the hospital stay).

Results

The study cohort comprised 163 patients (81 males) with a mean age of 9.9 ± 5.1 years and a mean weight-for-age *z*-score of −0.08 ± 1.3 (**Table I**). A CONSORT diagram of the study design is provided (**Figure 2**; available at www.jpeds.com).

Meal Orders

Meal orders obtained were analyzed by the traffic light system and by CFG food category. There was a significant interaction between menu type and meal number ($F_{1,834} = 8.45$; $P = .004$) with no significant trend across meal number for the standard menu (OR for every additional meal, 0.99; 95% CI, 0.97-1.01; $P = .20$) but with significantly increasing odds of selecting a red-light item across increasing meal number for the intervention menu (OR for every additional meal, 1.03; 95% CI, 1.01-1.05; $P = .003$), demonstrating a waning effect of the intervention across time. The effect of the intervention was highly significant at the first meal, with orders from the intervention menu having 0.65 lower odds of being a red-light item than those from the standard menu (95% CI, 0.55-0.76) (**Table II**). However, orders of red-light items from the intervention menu were no longer significantly different from those from the standard menu by the ninth meal (**Figure 3**). The probability of selecting a red-light item was greatest at breakfast across both menu types, with no significant difference between lunch and supper (OR for selecting a red-light item at breakfast vs lunch or supper, 1.29; 95% CI, 1.14-1.48; $P < .0001$).

Results for the green-light items mirror those for the red-light items. There was a significant interaction between menu type and meal number ($F_{1,829} = 13.93$; $P = .002$), with no significant trend across meal number for the standard menu (OR for every additional meal, 1.02; 95% CI, 1.00-1.04; $P = .07$) but with significantly decreasing odds of selecting a green-light item across increasing meal number for the intervention menu (OR for every additional meal, 0.97; 95% CI, 0.95-0.99; $P = .0006$), demonstrating a waning effect of the intervention across time. The effect of the intervention was highly significant at the first meal, with orders from the intervention menu having 1.75 higher odds of being a green-light item than those from the standard menu (95% CI, 1.49-2.04). However, orders of green-light items from the intervention menu were no longer significantly different from those from the standard menu by the ninth meal (**Figure 3**). The probability of selecting a green-light item was highest at breakfast across both menu types, with no significant difference between lunch and supper (OR for selecting a green-light item at breakfast vs at lunch or supper, 1.39; 95% CI, 1.23-1.57; $P < .0001$).

There was a trend toward an increased average number of fruit and vegetable servings ordered per day (intervention menu effect, +0.7 servings; 95% CI, 0.0-1.5; $P = .05$) and on foods to limit (intervention menu effect, −1.1 servings; 95% CI, −2.2 to 0.0; $P = .05$), but not on sugar-sweetened beverages (**Table III**). Exposure to the menu was a significant predictor of fruit and vegetable servings, with an estimated 0.08 increase in servings for each additional meal ordered ($F_{1,89}$=4.18; $P = .04$) and with no significant difference in effect between the 2 menu types. The intervention menu did not impact the number of sugar-sweetened beverages ordered.

Table II. Meal order analysis with the traffic light system

Caregory	Breakfast, % items (95% CI)		Lunch or supper, % items (95% CI)		Intervention vs control, OR (95% CI); *P* value
	Control	Intervention	Control	Intervention	
Red-light items	43 (38-48)	33 (29-38)	37 (33-42)	28 (24-32)	0.65 (0.55-0.76); <.0001
Green-light items	30 (26-34)	43 (39-47)	24 (20-27)	35 (31-39)	1.75 (1.49-2.04); <.0001

OR (Intervention Menu vs Standard Menu) of selecting a red item or a green item.

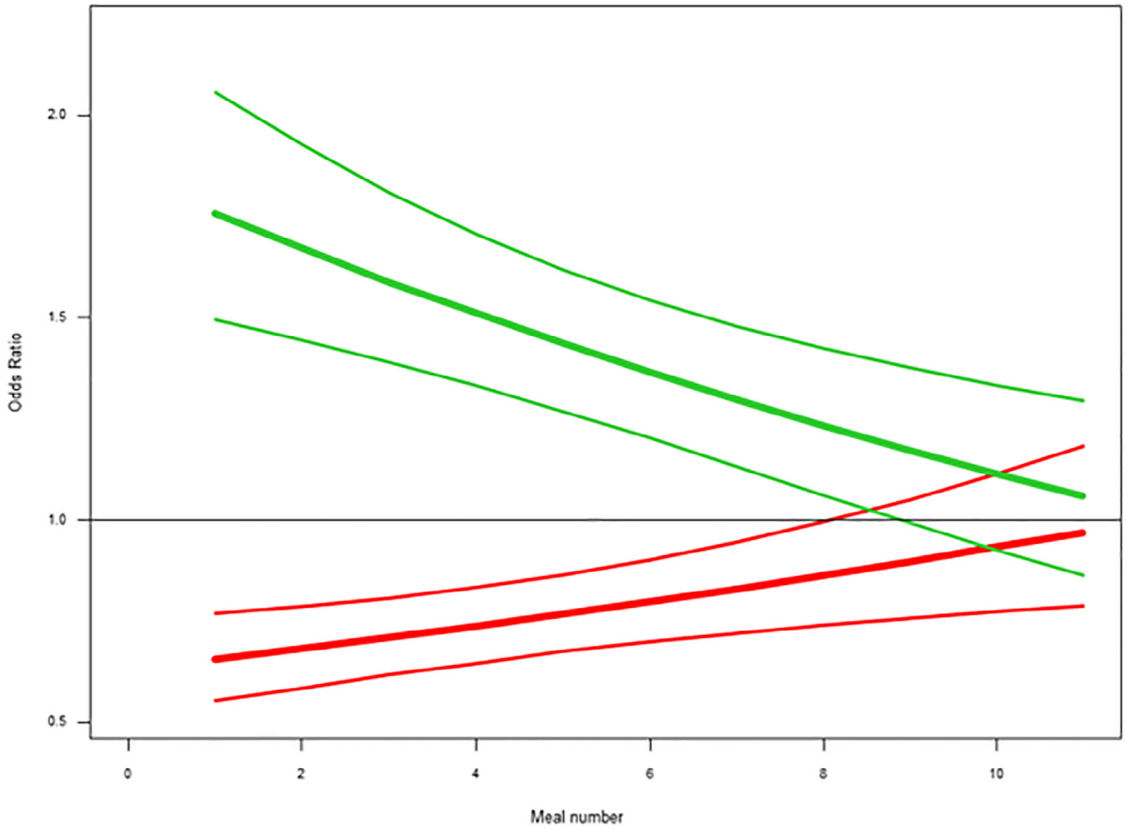

Figure 3. OR (intervention menu vs standard menu; thick line) of selecting a red-light item or a green-light item across increasing meal numbers.

Meal Consumption

The intervention and control groups did not vary in terms of their meal consumption proportions of fruits and vegetables, sugar-sweetened beverages, and foods to limit (all $P > .05$; data not shown). Both groups of patients were eating approximately one-half their provided amount of fruits and vegetables, sugar-sweetened beverages, and foods to limit.

Patient Perceptions

Parents and children aged >10 years rated their perceptions of the intervention menu. Forty-five parent surveys and 22 child surveys were distributed at random every Friday during the study period. Completed surveys were obtained from 29 parents (65% response rate) and 10 children (45% response rate). Most parent and child respondents noticed the traffic light system (82% and 100%, respectively) and fun descriptive food names (86% and 82%, respectively) (**Figure 4**, A and B). Approximately one-half of those respondents felt that the child-friendly menu labeling impacted their ultimate food choices. The vast majority of respondents (95%) felt the menu labeling provided "just enough" nutrition education, with some (5%) asking for more information. Children were actively involved in food decision making while in the hospital: 35% allowed their child alone to make these choices, 30% parents alone, and 30% cases decisions were made jointly between the parent and child. All parent respondents reported consulting nutrition labels before purchasing food items (27% "sometimes," 49% "usually," and 14% "always" checking labels). **Figure 4**, C outlines select general feedback from parents and children when surveyed about the introduction of menu

Table III. Meal order analysis by CFG category of interest

Category	Control menu, estimate (95% CI)	Intervention menu, estimate (95% CI)	Intervention vs control, estimate (95% CI)	*P* value
Fruits and vegetables*	3.4 (2.7-4.0)	4.1 (3.5-4.7)	0.7 (0.0-1.5)	.05
Sugar-sweetened beverages	2.6 (2.0-3.3)	2.7 (2.1-3.3)	0.1 (–0.7 to 0.8)	.9
Foods to limit	6.0 (5.2-6.8)	4.9 (4.2-5.6)	–1.1 (–2.2 to 0.0)	.05

Hierarchical linear model estimates of average number of servings per day across both menu types. The analysis included 97 participants (41 control, 56 intervention).
*The model for fruits and vegetables controls for a significant effect of length of exposure to the menu, which did not differ between the 2 menu types. Estimates are shown for the average exposure, corresponding to 7.1 meals.

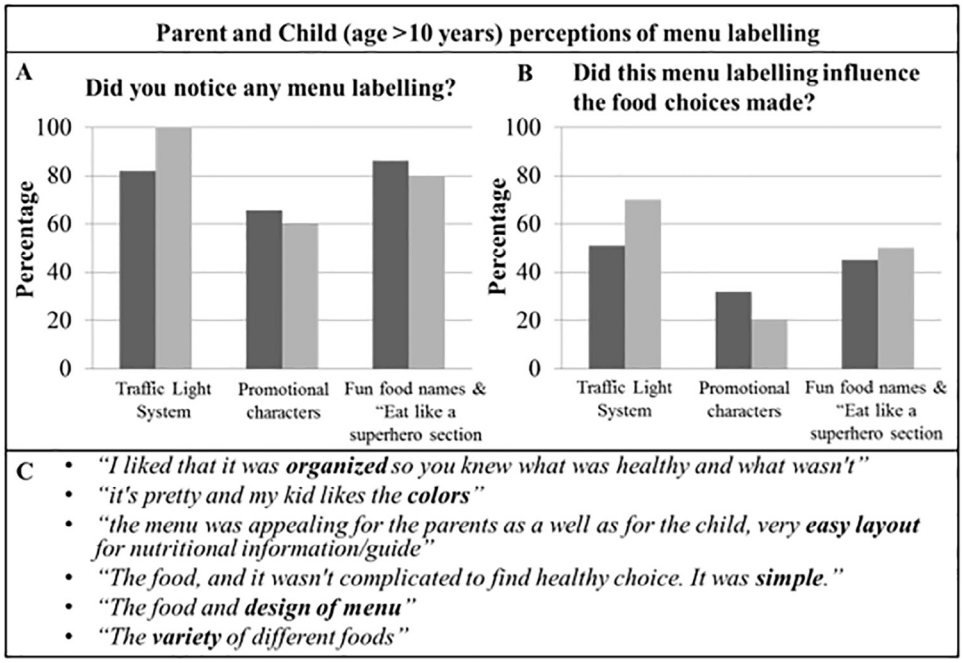

Figure 4. **A,** Parent (n = 29) and child (age >10 years; n = 10) perceptions of menu labeling and **B,** their impact on food choices made using the Meal Train menu. Parent responses are in dark bars, chid responses in light-gray bars. **C,** Parent and child qualitative responses to what they liked most and least about the menu labeling.

labeling in the Meal Train ordering service. Overall, there appears to be acceptance of incorporation of such formats.

Discussion

Our findings in this study show a significantly higher odds of ordering green-light healthier option foods and lower odds of ordering red-light foods when exposed to child-friendly menu labeling. This effect waned over time, such that after 8 meals, proportions of red-light and green-light choices were similar with both menus. There was also variation in the servings of red and green choices made at different meals, with breakfast showing a higher proportion of both red and green orders compared with lunch and dinner, which did not differ from each other. We found a trend toward increased ordering of fruits and vegetables and decreased ordering from the CFG foods to limit category. Parents and children noticed the traffic light design, fun food names, and "Eat Like a Superhero" section, and more than one-half felt that it influenced their food choices. Despite these positive findings, children continued to consume larger amounts of sugar-sweetened beverages than recommended.

Previous studies have examined menu labeling in hospital cafeterias and purchases by adults.[10-12] Lowe et al reported that nutrition information in hospital cafeterias reduced calories purchased by customers by approximately 70 kcal; however, a major limitation to the study included the possibility that participants reduced energy intake because they knew that these were outcomes of interest in the study.[10] Another study found that a 12-week menu labeling intervention was associated with increased purchases of lower-energy side dishes and snacks in a hospital cafeteria, but did not evaluate consumption of the items.[11] A third study performed in Canadian adult hospitals showed that customers consumed one-third less energy, sodium, and total fat when cafeteria menu boards reported sodium and fat content on digital menu boards and placed a "health" logo on healthier items.[12]

Several pediatric studies have explored the impact of menu labeling mostly outside of the hospital setting. Pediatric studies introducing calorie and nutrition labeling in various settings, including hypothetical fast food restaurants and supermarkets, have shown mixed results regarding family food selection and purchasing.[17-19,25-29] Child-friendly labeling, including the traffic light labeling system, also has demonstrated mixed results in fast food selection in telephone surveys.[16,18,26,30] It is important to note that these studies have largely taken place with hypothetical scenarios, in restaurant settings, or using online or paper surveys, focusing on preference or food ordering only rather than on selection and consumption. In one study that implemented traffic light and cartoon labeling in a retail food venue in a children's hospital, traffic light labeling was associated with significantly decreased purchases of unhealthy items, and cartoon labeling was associated with increased purchasing of unhealthy items.[31] We found that the intervention effects of reduced red-light items ordered and increased green-light items ordered waned over time. This may be due to several reasons. First, the "novelty" of the menu characters and labeling wears off. Second, parents may be permitting higher intake of treat food to alleviate the

potential stress of a longer hospital admission. Finally, because there were more foods to limit and red-light foods than fruits, vegetables, and green-light foods on the menu, patients may have become bored with the limited variety of healthier options available. To our knowledge, no previous pediatric menu labeling study has examined the effects of choices over the duration of the study to determine whether the effects wane.[16-18,27,28,31]

Studies focusing on younger children applying marketing techniques, such as funny names or characters, typically used to draw children to less healthy options, have shown some success. For example, in a study promoting healthy foods in a group of 1552 children in elementary school cafeterias, the use of attractive names like "X-ray vision carrots" increased consumption by 2-fold.[15] The use of character role models (eg, Batman) also increased healthier choice selection (apple slices over French fries) by 36.4% in 22 children aged 6-12 years.[32] Another study demonstrated a positive impact of branded superhero vegetable characters from SuperSprowtz web series on vegetable selection among children in elementary schools in the school cafeteria.[33] To the best of our knowledge, the utility of these marketing techniques in promoting healthier choices in older youth has not been studied.

This study has several strengths. We assessed not only meal orders, but also consumption patterns, to show that children were eating the healthier choices provided. We found that proportions of green-light foods and fruits and vegetables left on the plate were similar in control and intervention menu groups, suggesting the increased healthy food orders were being consumed. The study design reduced the influence of confounding variables, such as patient diagnosis on the different wards, because each ward grouping served as its own control. We also had a waiver of consent to avoid any observer effect bias on meal choices or consumption from the menu. Finally, the menu labeling technique used in Meal Train does not involve provision of calories or detailed macronutrient composition, but rather relies on labeling and highlighting healthier and less healthy food groups or meal choices. This is of value for the pediatric age range, where calorie counting is not routinely recommended owing to concerns about triggering eating disorders in this developmental period.

This study has several limitations. We were unable to capture body mass index data, because height is not routinely measured on inpatient wards. We addressed this issue by using weight-for-age *z*-score to get some estimates of effect of body size and types of foods ordered. The menu intervention was targeted to children and adolescents aged 2-18 years rather than being age group-specific, similar to the control Meal Train menu. The traffic light design may have influenced parents and adolescent choices, and the superhero messaging may have been more appealing to younger children. Feedback from children aged <10 years was not solicited in the qualitative aspect of the study, because it was felt that feedback could not be provided in a questionnaire without parent intervention. Finally, while collecting the meal consumption data, it was assumed that food left on the tray was the uneaten portion of the meal, and that the remainder of the meal was consumed by the child. It could be possible that a meal was consumed by someone else (eg, parent) or certain foods were removed from the tray and not eaten.

Although most children's hospital food environments include food items that have low nutritional value, this study highlights that nutrition education using menu labeling can be successfully implemented and can encourage children and their families to make healthier choices. It is our hope that labeling may also encourage hospital food providers to improve food quality at the hospital by decreasing red-light foods and increasing healthy food options at every meal. More research is needed to determine optimal techniques for various age ranges and develop menus that are age-appropriate and tailored for specific patient populations. Future studies should also consider whether menu labeling has longer-term impacts on food choices and eating behavior changes. ■

We thank Daina Kalnins and Tracy Maccorone for their input and feedback in the development of the intervention menu and study design, and Andrea Leyser for her feedback in the development of the Eat Like a Superhero menu section. We thank the 20 dietetic and nutrition students who volunteered to perform meal tray collection and to assist with the meal consumption data collection. We are indebted to Trevor Ahmedali for his graphic design expertise and creation of the cartoon grape and broccoli promotional characters in the intervention menu. Finally, we thank Ping Li for his assistance with data entry.

Submitted for publication Jan 26, 2018; last revision received Jul 6, 2018; accepted Aug 29, 2018

Reprint requests: Jill Hamilton, MD, Division of Endocrinology, The Hospital for Sick Children, 555 University Ave, Toronto, ON, Canada M5G1X8. E-mail: jill.hamilton@sickkids.ca

References

1. St-Onge MP, Keller KL, Heymsfield SB. Changes in childhood food consumption patterns: a cause for concern in light of increasing body weights. Am J Clin Nutr 2003;78:1068-73.
2. Canadian Restaurant and Foodservices Association. Canada's restaurant industry: putting jobs and economic growth on the menu. 2010. Available at: http://www.restaurantscanada.org/wp-content/uploads/2016/07/Report_IpsosPublicOpinion_Dec2010.pdf. Accessed April 21, 2017.
3. Steenhuis IH, Vermeer WM. Portion size: review and framework for interventions. Int J Behav Nutr Phys Act 2009;6:58.
4. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: conception to adolescence. J Law Med Ethics 2007;35:22-34.
5. Roberts K, Shields M, de Groh M, Aziz A, Gilbert J. Overweight and obesity in children and adolescents: results from the 2009 to 2011 Canadian health measures survey. 2012. [updated July 17, 2015]. Available at: http://www.statcan.gc.ca/pub/82-003-x/2012003/article/11706-eng.htm. Accessed April 21, 2017.
6. McDonald CM, Karamlou T, Wengle JG, Gibson J, McCrindle BW. Nutrition and exercise environment available to outpatients, visitors, and staff in children's hospitals in Canada and the United States. Arch Pediatr Adolesc Med 2006;160:900-5.
7. Cram P, Nallamothu BK, Fendrick AM, Saint S. Fast food franchises in hospitals. JAMA 2002;287:2945-6.
8. Kuo T, Jarosz CJ, Simon P, Fielding JE. Menu labeling as a potential strategy for combating the obesity epidemic: a health impact assessment. Am J Public Health 2009;99:1680-6.
9. Fernandes AC, Oliveira RC, Proença RP, Curioni CC, Rodrigues VM, Fiates GM. Influence of menu labeling on food choices in real-life settings: a systematic review. Nutr Rev 2016;74:534-48.

10. Lowe MR, Tappe KA, Butryn ML, Annunziato RA, Coletta MC, Ochner CN, et al. An intervention study targeting energy and nutrient intake in worksite cafeterias. Eat Behav 2010;11:144-51.
11. Webb KL, Solomon LS, Sanders J, Akiyama C, Crawford PB. Menu labeling responsive to consumer concerns and shows promise for changing patron purchases. J Hunger Environ Nutr 2011;6:166-78.
12. Vanderlee L, Hammond D. Does nutrition information on menus impact food choice? Comparisons across two hospital cafeterias. Public Health Nutr 2014;17:1393-402.
13. Obadia M, Rakhshani N, Jeffery AS, Chahal N, Sangha G, McCrindle BW, et al. MEALTRAIN: what do inpatient hospitalized children choose to eat? J Pediatr 2010;156:685-6.
14. Wansink B, Just DR, Payne CR. Can branding improve school lunches? Arch Pediatr Adolesc Med. 2012;166:967-8 (Retraction published, JAMA Pediatr 2017;171:1230).
15. Wansink B, Just DR, Payne CR, Klinger MZ. Attractive names sustain increased vegetable intake in schools. Prev Med 2012;55:330-2 (Retraction published, Prev Med 2018;110:116).
16. Dodds P, Wolfenden L, Chapman K, Wellard L, Hughes C, Wiggers J. The effect of energy and traffic light labelling on parent and child fast food selection: a randomised controlled trial. Appetite 2014;73:23-30.
17. Elbel B, Gyamfi J, Kersh R. Child and adolescent fast-food choice and the influence of calorie labeling: a natural experiment. Int J Obes (Lond) 2011;35:493-500.
18. Holmes AS, Serrano EL, Machin JE, Duetsch T, Davis GC. Effect of different children's menu labeling designs on family purchases. Appetite 2013;62:198-202.
19. Elliott C, Brierley M. Healthy choice?: exploring how children evaluate the healthfulness of packaged foods. Can J Public Health 2012;103:e453-8.
20. Tandon PS, Zhou C, Chan NL, Lozano P, Couch SC, Glanz K, et al. The impact of menu labeling on fast-food purchases for children and parents. Am J Prev Med 2011;41:434-8.
21. Government of Canada. Eating well with Canada's food guide. [updated September 1, 2016]. Available at: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php. Accessed April 21, 2017.
22. Government of Canada. Health claim assessments. [updated March 08, 2017]. Available at: https://www.canada.ca/en/health-canada/services/food-nutrition/food-labelling/health-claims/assessments.html. Accessed April 11, 2018.
23. Ontario Ministry of Education. Appendix: nutrition standards for Ontario schools. 2010. Available at: http://www.edu.gov.on.ca/extra/eng/ppm/Appendix 150.pdf. Accessed April 11, 2018.
24. SAS Institute Inc. SAS 9.1.4. Cary (NC): SAS Institute Inc; 2012.
25. Lawrence S, Cummings E, Chanoine JP, Metzger DL, Palmert M, Sharma A. Canadian Pediatric Endocrine Group extension to WHO growth charts: why bother? Paediatr Child Health 2013;18:295-7.
26. Hobin E, Lillico H, Zuo F, Sacco J, Rosella L, Hammond D. Estimating the impact of various menu labeling formats on parents' demand for fast-food kids' meals for their children: an experimental auction. Appetite 2016;105:582-90.
27. Hunsberger M, McGinnis P, Smith J, Beamer BA, O'Malley J. Calorie labeling in a rural middle school influences food selection: findings from community-based participatory research. J Obes 2015;2015:531690.
28. Tandon PS, Wright J, Zhou C, Rogers CB, Christakis DA. Nutrition menu labeling may lead to lower-calorie restaurant meal choices for children. Pediatrics 2010;125:244-8.
29. Ahn JY, Park HR, Lee K, Kwon S, Kim S, Yang J, et al. The effect of providing nutritional information about fast-food restaurant menus on parents' meal choices for their children. Nutr Res Pract 2015;9:667-72.
30. Comans T, Moretto N, Byrnes J. Public preferences for the use of taxation and labelling policy measures to combat obesity in young children in Australia. Int J Environ Res Public Health 2017;14:E324.
31. Whitt OR, Jilcott Pitts SB, Rafferty AP, Payne CR, Ng SW. The effects of traffic light labelling versus cartoon labelling on food and beverage purchases in a children's hospital setting. Pediatr Obes 2018;13:265-8.
32. Wansink B, Shimizu M, Camps G. What would Batman eat?: priming children to make healthier fast food choices. Pediatr Obes 2012;7:121-3.
33. Hanks AS, Just DR, Brumberg A. Marketing vegetables in elementary school cafeterias to increase uptake. Pediatrics 2016;138:e20151720.

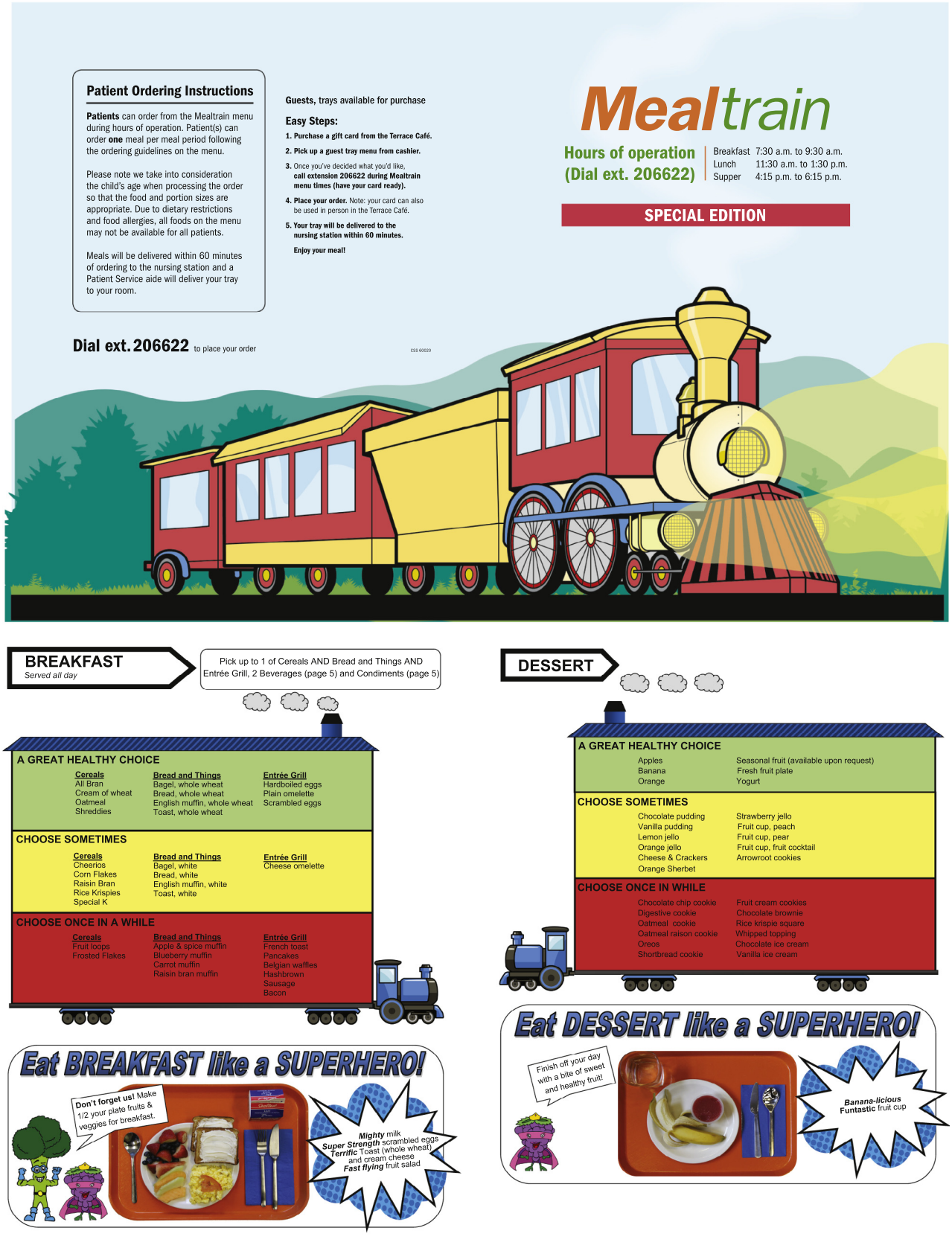

Figure 1. The intervention menu. *(Continues)*

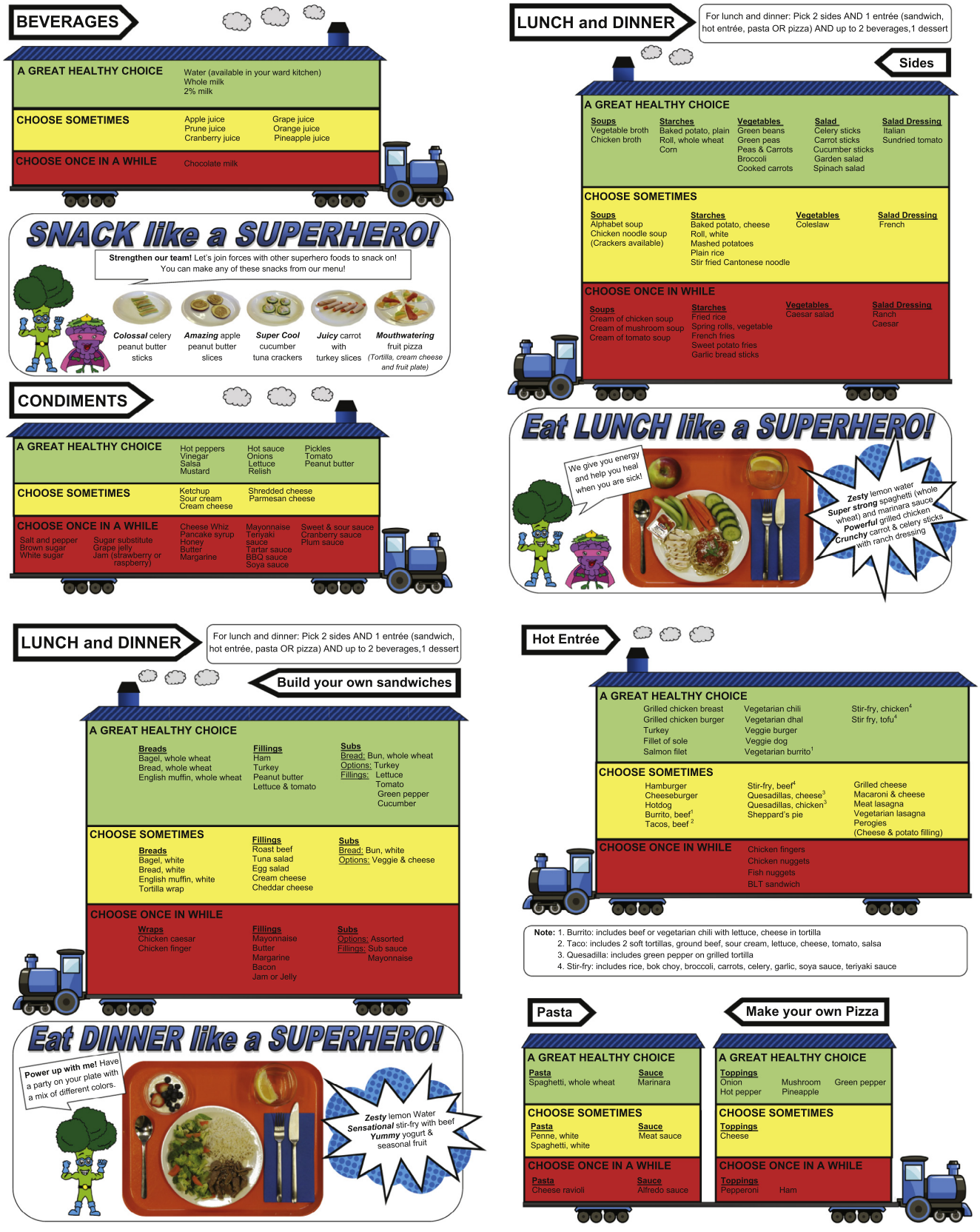

Figure. 1. Continued.

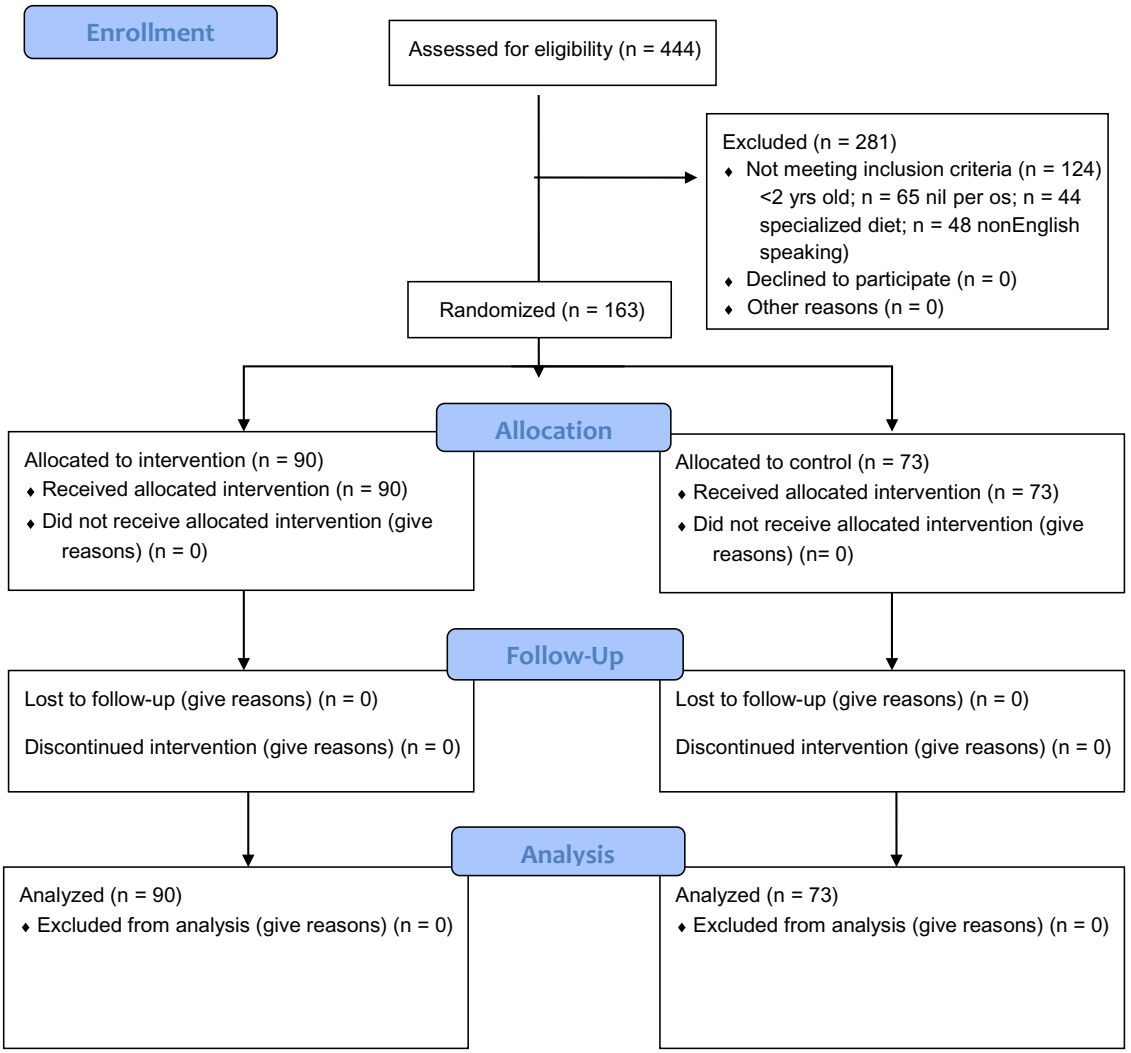

Figure 2. CONSORT diagram.