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Short communication

The nutritional value of food service meals ordered by hospitalized children



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SUMMARY

Background and aims: US hospitals routinely provide food to hospitalized children. The nutritional content of provided foods has not been evaluated. We performed our study to examine meal orders of hospitalized youth and determine whether the nutritional contents of ordered meals meet dietary guidelines.

Methods: We performed a cross-sectional evaluation among hospitalized youth ≥ 1 y receiving all nutritional intake by mouth and not on a clear liquid diet. Meal orders from hospitalized youth were analyzed for nutritional content. Daily calories, fiber, protein, fat content, and sugar-sweetened beverages ordered were determined and compared with published dietary recommendations. Distribution analyses and odds ratios for meeting v. not meeting dietary recommendations were calculated for select factors and adjusted for hospital length of stay.

Results: 969 meal orders from 247 patients [13 (1, 26) [median (min, max)] years, 50% male, 47% Hispanic] at a tertiary care pediatric hospital were reviewed. Forty-four percent of daily meals exceeded caloric recommendations, 9% met fiber recommendations, 36% met fat recommendations, all met protein requirements, and 53% included sugar-sweetened beverages. Overweight/obese boys <13 y hospitalized ≤ 7 d were more likely to place meal orders exceeding daily caloric recommendations while Hispanic overweight/obese youth hospitalized ≤ 7 d were more likely to order sugar-sweetened beverages than inpatient counterparts.

Conclusions: Pediatric hospital meal orders commonly do not meet dietary guidelines. Hospitals should encourage youth and families to order within nutritional guidelines to prevent additional health risk.

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Over twelve million youth in the United States (US) are affected by obesity (www.cdc.gov). An imbalance in calorie intake versus energy expenditure underlies these malnutrition states. While Expert Committee recommendations promote counseling families regarding healthy diets regardless of weight status [1], clinician compliance with national guidelines remains poor.

Nourishment during illness is an important aspect of patient care and recovery, and hospitals commonly provide food to inpatients. However, the nutritional content of this food has been questioned [2,3]. In a recent evaluation of hospital meal orders in

Canada, children only met the 5 fruits and vegetables per day recommendation [1] when juice was included (3.5 fruits and vegetables/day otherwise) [2]. In Ireland, only 3–30% of children had fruits/vegetables during a given hospital meal [3]. Nutritional evaluations beyond fruit and vegetable content of meal orders in the pediatric inpatient setting are needed.

We evaluated the nutritional content of hospital meals distributed to youth at a pediatric tertiary care academic medical center in the context of current dietary recommendations. To our knowledge, this is the first evaluation of hospital-based meals for US children.

1. Materials and methods

We performed a cross-sectional evaluation of the nutritional contents of daily meal orders (where at least 2 meals/day were

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ordered) from patients 1 y and older hospitalized during a 3-month period (June–August 2014) who received all nutritional intake by mouth and were not on a clear liquid diet. At the studied hospital, patients were given bedside menus to order meals. Menus included food items from all food groups (fruits and vegetables, cereals, meats, and dairy) but did not provide caloric or nutritional content, and no nutritional recommendations were provided. Meals were prepared individually by order and delivered via room service. Meal orders were analyzed for caloric, protein, and fiber content (according to the Atwater system), % calories derived from fat, and number of sugar-sweetened beverages.

Daily meal nutritional contents were compared with dietary recommendations from the American Heart Association and the American Academy of Pediatrics (AAP) [4] as well as with U.S. Department of Health and Human Services [3] recommendations (Table 1). We chose to compare meal order nutrient content to dietary guidelines for otherwise healthy youth since a hyper-metabolic response to illness/trauma has not been demonstrated in children [5]. Consumption of sugar-sweetened beverages was compared to no/zero sugar-sweetened beverages (AAP 5-2-1-0 recommendations [1]). Demographic data, physician diet orders, and length of hospital stay were collected. Patients were considered to have received dietary guidance if physician diet orders or the hospital food service restricted meal options or portion size. At the studied hospital, meal portion size was automatically based on age (1–3 years (half-portion) v. older (full portion)). Odds ratios for meeting v. not meeting dietary recommendations were calculated according to select demographic factors and adjusted for hospital length of stay (JMP software version 11, Cary, NC). Weight status was determined by CDC-defined age and sex BMI percentile criteria.

The study protocol was reviewed and approved by the institutional review board. Waiver of consent was granted to accurately assess the nutritional quality of meal orders placed by hospitalized children meeting inclusion criteria.

2. Results

Nine hundred sixty-nine meal orders from 247 patients were reviewed. Studied patients were 13 (1, 26) [median (min, max) years old, 50% male, 47% Hispanic, and 57% were hospitalized ≤ 7 days. 55% of patients were normal weight, 10% overweight, 20% obese, and 15% underweight using age-and-gender BMI-based criteria. Half of meal orders (50%) had no restrictions imposed by care teams. The portion sizes of 14% meal orders were automatically restricted by the hospital food service based on age.

Forty-four percent of daily meal orders exceeded daily dietary caloric recommendations, 9% met fiber recommendations, 36% met fat recommendations, all met protein recommendations, and 53% of meals included a sugar-sweetened beverage. Average ordered daily calories exceeded dietary recommendations in 4–8 year old boys and girls and 14–18 year old females (Table 2). Average ordered fiber contents did not meet and average sugar-sweetened

beverage orders exceeded daily dietary recommendations for all ages.

On days where meal orders exceeded caloric recommendations, daily ordered calories exceeded recommendations by 716 (666) [mean (standard deviation)] calories. Youth < 13 years, who were male, overweight/obese (OW/OB), and hospitalized ≤ 7 days were more likely to place meal orders exceeding daily caloric recommendations while OW/OB youth, Hispanic youth, and youth hospitalized ≤ 7 days were more likely to order sugar-sweetened beverages with meals than inpatient counterparts (Table 3). In contrast, youth who were underweight were less likely to exceed caloric recommendations or to consume sugar-sweetened beverages, but more likely to meet daily protein and fat requirements than non-underweight counterparts.

Among youth with physician-specified dietary restriction orders or food service imposed portion size control (compared to those without), the odds of compliance with daily dietary guidelines was significantly greater for daily caloric intake and sugar-sweetened beverage avoidance but was reduced for daily fiber intake.

3. Discussion

We demonstrate a high prevalence of suboptimal dietary intake in hospitalized youth as represented by the meal orders of orally fed youth hospitalized at a tertiary pediatric academic medical center. Only one of the hospitalized children studied met all dietary recommendations throughout their hospital stay but that child only stayed one day.

In 2011–2012, 17% of youth ages 2–19 were obese (www.cdc.gov). Obesity-related complications include hypertension and atherosclerosis, obstructive sleep apnea, insulin resistance, fatty liver disease, renal and orthopedic issues, among others. Hospitalizations have increased due to obesity-related complications, and related costs have increased from \$125.9 million in 2001 to \$237.6 million in 2005 [6]. Weight-related interventions are needed not only in the community but also in the inpatient setting.

Hospital malnutrition in children has been a significant problem and is a risk factor for mortality. Children may refuse meals due to unfamiliar surroundings, taste, and meal timing, leading to inadequate food intake and malnutrition. We similarly demonstrated an increased likelihood among underweight patients to not exceed caloric recommendations in our cohort (Table 3). In order to combat this problem, a room-service style system was instituted that served meals with familiar food items upon patient request to improve patients' appetites and encourage food consumption [7].

However, prior evaluations of dietary choices by pediatric inpatients in Canada and Ireland revealed that children tend to choose energy-dense foods with low nutritional value [2,3]. Limitations of these prior works were that the researchers primarily evaluated servings of fruits and vegetables per day or within a given meal and not total caloric content or how ordering practices differed by patient characteristics. Our study also demonstrates poor dietary choices by hospitalized youth (and presumably by

Table 1
Dietary recommendations by age and gender.

F = female, M = male	1 y	2–3 y	4–8 y		9–13 y		14–18 y	
			F	M	F	M	F	M
Kilocalories	900	1000	1200	1400	1600	1800	1800	2200
Fat, % of total kcal	30–40	30–35	25–35		25–35		25–35	
Fiber, g	19	19	25		26	31	29	38
Protein, g	13	13	19		34		46	52
Sugar Sweetened Beverages (#/day)	0	0	0		0		0	

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