Calorie Counts Posted by Restaurants Are Generally Accurate; Sit-down Restaurants Underreport Compared with Fast Food

Urban LE, McCrory MA, Dallal GE, et al. Accuracy of stated energy contents of restaurant foods. JAMA 2011; 306:287–93.

Study Overview

Objective. To determine whether the posted calorie counts of restaurant food are accurate.

Design. Cross-sectional observational study using validated bomb calorimetry to measure energy content of restaurant foods.

Setting and participants. 269 food items in 42 restaurants in Massachusetts, Arkansas, and Indiana. Restaurants included chain restaurants with national sales in the top 400 for restaurants in 2008 that had available nutritional information posted on websites and had at least 1 location in each of the 3 regions. Among all eligible restaurants, authors randomly selected 7 sit-down and 7 fast-food restaurants in each region. Within restaurants, 4 food items (2 < 600 calories, 2 ≥ 600 calories) were randomly selected among entrees and accompanying side dishes (if the calorie count of the side dish was provided separately) at sit-down restaurants and among all foods except beverages, condiments, children's meals, and blended drinks at fast-food restaurants.

Main outcome measures. Difference between restaurant-posted and laboratory-measured energy content of foods.

Main results. Restaurant-posted calorie information was generally accurate with no overall statistical difference between posted and measured energy content (difference of 10 kcal; 95% confidence interval [CI], –15 to 34 kcal; $P = 0.52$). However, 19% of the foods measured (50 items) had measurements of at least 100 kcal more in the laboratory assessment than was posted by the restaurant. When broken down by food type (sandwiches, pizza, meat, mixed dishes, vegetables and fruit, salads, soups, desserts, and carbohydrate-rich foods), only desserts and carbohydrate-rich foods showed significant differences between stated and measure energy content. Both groups had higher measured energy content than posted (desserts, 38 more calories when measured, $P = 0.02$; carbohydrate-rich foods, 81 more calories when measured, $P = 0.004$). Foods from sit-down restaurants with high posted calorie counts (> 625 calories) had lower measured energy content, while foods with low posted calorie counts (≤ 625 calories) had higher measured energy content ($P < 0.001$). Sit-down restaurants also had more variability in the discrepancy between posted and measured energy content than fast-food restaurants (ie, larger standard deviation), and posted calorie counts of side dishes from sit-down restaurants had larger underestimations of calorie content than

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entrees. Inaccurate portion size assessments of food seemed to underlie some of the discrepancies between posted and measured energy content, and fast-food restaurants had better consistency between stated and measured portion sizes than sit-down restaurants did.

Conclusion. Overall, calorie counts posted by restaurants an accurate, but discrepancies are evident for certain foods, especially at sit-down restaurants.

Commentary

Consumption of foods in restaurants has increased at a similar trajectory to the obesity epidemic in the United States. These foods contribute to excess calorie consumption and have been associated with weight gain and obesity among adults and children [1–6]. One strategy proposed to partially address this trend is calorie menu labeling in restaurants. The federal Patient Protection and Affordable Care Act of 2010 included a requirement for all chain restaurants with more than 20 sites nationally to post calorie counts on menus. These policies were driven by the belief that individuals may consume excess calories while eating fast food because of limited awareness of its calorie content. Burton et al provided empiric evidence for this belief in a survey of 193 adults. They found that 90% of subjects underestimated the calorie content of high-calorie restaurant meals [7]. The mean underestimate was 642 calories, 50% of the mean calorie content of these meals (1336 calories). Because of the high-calorie content of fast food, its consumption may be associated with larger systematic underestimates of intake than other food.

Labeling of foods may help to remedy underestimation of calorie content. Thus far, evidence to support the effectiveness of menu labeling is decidedly mixed [8]. Some studies report that subjects order lower-calorie meals when receiving calorie information [7,9–14]. Others report no change [15–18] or even an increase in the calorie content of meals with the provision of nutritional information [16,19].

This study by Urban et al brings important new information about calorie menu labeling. Prior studies of the effect of menu labeling have taken posted calorie content of restaurant foods as accurate. This study suggests that this assumption is generally fair, with no difference in posted and measured calorie content in the overall analysis. However, some foods, especially sit-down restaurant foods, do have discrepancies. In particular, items at sit-down restaurants with posted lower calories tend to underreport calorie content, perhaps confounding efforts by some to consume low-calorie meals. In contrast, items with posted higher calories tend to over-report calorie content; in reality, these items are healthier than stated. Sit-down restaurants also tended to underreport calorie content of side items when compared to entrees. While the study was not designed to look at the mechanism for discrepancies between posted and measured calories, inaccuracies of stated portion sizes appeared to explain some of the discrepancy.

This study had several weaknesses. First, authors sampled only a few items at each restaurant and therefore could not assess differences between restaurant chains. Identifying which restaurants provide inaccurate estimates would be helpful for both the restaurants, so that they might alter their methods of calculating energy content, and for consumers, who may become more aware of specific chains where calorie information may be unreliable. The Table accompanying the article does provide details about the food items sampled. The entree food items that had the largest underreporting of calorie content (posted calories < measured calories) were from the following chains: Don Pablo's, Chuck E. Cheese's, Bob Evans, Paradise Bakery and Café, Hungry Howie's Pizza, and McAlister's Deli in Indiana; Mimi's Café in Arkansas; and Chipotle Mexican Grill and Boston Market in Massachusetts Most of these restaurants are sit-down restaurants. While providing interesting details, this table still cannot demonstrate a clear association between the specific chain and their propensity to underreport calorie content because of too few items per chain. In the Table, additional information shows that rice and chips and salsa side dishes massively underreport calorie content at several of the restaurants.

Second, the authors discuss the possibility that one-time sampling of restaurant foods may allow for random error to explain some of the discrepancies in calorie content. They do address this issue somewhat by resampling 13 of the entrees that showed the greatest discrepancy (they intended to sample 17 items, but 4 of the items were no longer on the menu when they returned for the repeat sampling). Repeat sampling showed similar discrepancies; however, this is still a limited sample to make a clear determination that restaurants are consistently reporting inaccurate calorie counts.

This article provides new information for ongoing efforts to help people made informed decisions while

eating at restaurants. Perhaps the most important lessons gained from this article are that (1) overall, restaurants accurately report calorie content of food; (2) calorie content of carbohydrate-rich foods and desserts are most often underreported; and (3) sit-down restaurants are less accurate than fast-food restaurants, especially for items ≤ 625 calories and for side dishes.

Applications for Clinical Practice

Doctors and other health professionals should counsel patients to monitor nutritional information of restaurant foods when eating out; however, they should use some caution with this information, especially at sit-down restaurants. Perhaps the Affordable Care Act's provision that will require calorie labeling at chain restaurants will compel restaurants to more accurately report the content of their meals.

—Review by Jason P. Block, MD, MPH

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