THE EFFECT OF INFORMATIONAL FEEDBACK ON FOOD INTAKE OF ADULT BURN PATIENTS

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The effect of informational feedback on the protein and caloric consumption of burn patients was investigated using a multiple-baseline across subjects. The patients were four severely burned adult males who failed to consume sufficient foods to achieve prescribed levels of protein or kilocalories via standard burn unit procedures during recovery. Feedback consisted of informing patients of (a) their prescribed levels of protein and kilocalories, (b) the protein and kilocalorie content of hospital foods and beverages, and (c) their actual intake of protein and kilocalories. Following the provision of feedback, there was an increase in protein and kilocalorie intakes and in the number of days during which prescribed levels for protein and kilocalories were achieved. These results suggest that the informational feedback was effective for improving the oral caloric intake of burn patients.

DESCRIPTORS: burn trauma, informational feedback, food intake, behavioral medicine

Adequate food intake is essential for recovery of patients who have experienced the trauma of serious burn injury. Because of nutrient losses from burn wounds and postburn hypermetabolism, protein and kilocalorie requirements may double or triple, compared to normal preburn needs (Curreri, 1978; Gump & Kinney, 1971). Paradoxically, during this same time period, burn patients often have a decreased appetite and a low voluntary consumption of foods (Cohen, Schecter, & Kenkin, 1973; Newsome, Mason, & Pruitt, 1973). Typically, this situation promotes staff strategies such as coercion and nagging to increase food consumption, which are likely to increase anxiety and stress in already highly stressed patients and staff.

Although researchers have studied the need for supranormal protein and kilocalorie intakes after major burn injuries, none have focused on the behavioral aspects of achieving patient compliance

with this goal via oral food intake. Results of implementing behavioral procedures to improve a variety of other eating behaviors have been encouraging. Agras, Barlow, Chapin, Abel, and Leitenberg (1974) demonstrated increased caloric intake when anorexic patients were given informational feedback and when they were offered higher calorie meals. The need for increased caloric intake in burn patients, although obviously of different etiology, may also be responsive to informational feedback. Improvements in the eating behavior of burn patients could result directly in increased protein and kilocalorie intakes needed for wound healing and could possibly decrease the length of the hospital stay.

Patients and Setting

Four patients admitted to the Burn Unit at the University of Kansas College of Health Sciences and Hospital participated in this study. Each met the criteria of a "typical" burn patient based on a chart survey of past Burn Unit patients: male, between 18 and 50 years of age, greater than 20% of total body surface (TBS) burned, sighted, able to consume food by mouth, no special restrictions on diet, and failure to consume at least 80% of the protein or kilocalories prescribed during one-half of the baseline period.

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Table 1
Description of Patients

Patient	Age	Preburn weight (kg)	Admission weight (kg)	Discharge weight (kg)	% TBS	% Full thickness	Days baseline
1	18	60	61.0	60.0	29	15	4
2	35	93	95.8	87.5	41	20	6
3	24	80	82.1	73.6	49	45	10
4	23	130	142.1	103.4	75	45	12

Patient 1 received gasoline burns to his chest, underarm, and back and leg areas, which required one surgical eschar debridement and autografting procedure. Patient 2 was burned when the gasoline he was using to start a fire in the fireplace exploded, killing one of his children and severely burning the other. His burns involved the lower half of his body, his face, and his forearms. He required one surgical eschar debridement and autografting procedure. Patient 3 was injured in an apartment house fire. His burns included his arms, back, chest, legs, face, and neck. He required two separate eschar debridement and autografting procedures. Patient 4 was injured in a truck fire. Burns were found on all areas of his body with the exception of the palms of his hands, the back of his head, and both feet. A total of five surgical eschar debridement and autografting procedures were conducted during his hospitalization. Table 1 provides additional information on the four patients.

Because of the critical condition of these patients, all procedures were conducted at the bedside. Mealtimes were flexible and determined by the patient's readiness to eat. A full-time food service worker was assigned to serve meals and provide "catering" services. A small refrigerator stocked with between-meal nourishments was located near the bedside, but all of the patients were nonambulatory during the study and could not get food without staff assistance.

Design and Intervention

A multiple-baseline across subjects design was used. At least the first 5 days were excluded because eating is not possible during the first few

days of hospitalization and patients start out on I.V. feedings.

A staff orientation was conducted to acquaint both dietetics and nursing personnel with the purpose and procedures of the study. All personnel were instructed to provide their usual strategies to promote the food intake of each patient during the baseline and intervention conditions of the study. These strategies included patient selection of food from the menu, feeding of the patient by staff if desired, comments such as "You've got to eat your way out of here," comments on burn wound healing during dressing changes, and announcements of daily body weights during the bathing of a patient. These procedures are typical for a burn trauma center.

On or after the fifth postburn day, each patient's informed consent was obtained and a meal plan form was completed by the first author. The meal plan was based on the prescribed levels of protein and kilocalories and indicated dietary preferences for meals and snacks. The prescribed levels of protein and kilocalories were determined using a formula based on Curreri's (1972) recommendations: (a) grams of protein = preburn weight (kg) $\times$ 3 and (b) kilocalories = grams of protein $\times$ 25.

Copies of the meal plan were placed at the bedside of each patient for use by nursing personnel, in the serving area for the food service worker, and in the medical chart. Each patient was told by the investigator that a postburn diet high in protein and kilocalories was needed for recovery, that protein was important for wound healing, that his body would heal faster if he would eat all the food

served to him, and that the high kilocalorie intake would not lead to weight gain. Also mentioned were examples of protein-rich foods.

Baseline. During the baseline condition each patient selected foods and beverages using the regular hospital menu and menu selectors routinely used in most burn units. The food service worker reviewed the food and beverage selections and supplemented them when necessary to assure that foods served would permit the patient to achieve prescribed levels of protein and kilocalories each day, according to his meal plan.

Intervention. Feedback consisted of informing patients of (a) their prescribed levels of protein and kilocalories, (b) the protein and kilocalorie content of hospital foods and beverages, and (c) their actual intake of protein and kilocalories. Vertical bar graphs on the wall next to the patient's bed depicted the prescribed levels of daily protein and kilocalories and the actual daily intakes of these nutrients in terms of protein points (1 point = 8 grams of protein) and calorie points (1 point = 75 kilocalories). In addition, menu selectors indicated the minimum number of protein and calorie points needed for each meal to assure the prescribed levels of protein and kilocalories for the day.

On the first day of the intervention condition, each patient was told that he would receive menu selectors with protein and kilocalorie values for each food available and that his daily food intake would be plotted on bar graphs twice daily. The first graphing was done after breakfast to complete the intake from the previous day. After marking the graph, the patient was shown how closely he came to reaching his point goals for that day and a new daily bar graph was marked for food and beverages consumed since midnight. During the second visit, which took place in the late afternoon before dinner, the points were plotted for foods and beverages consumed since breakfast. Also, small marks were made in the corners of the boxes on the graph to project how close to his goal the patient would come if he ate all of his evening meal. Points accumulated for each meal and between-meal feedings were indicated separately by lines drawn on the sides of the graphs.

Response Definition and Data Collection

Protein and kilocalorie intakes on days of surgery or at other times when food consumption was restricted were not included in the study. Intakes were determined from information derived from two sources. First, the amounts of each food item consumed at every meal were estimated and recorded by the food service worker immediately on return of the meal tray to the serving area of the burn unit. These estimates were noted on a copy of the menu selector using terms such as "all taken," "half taken," or "none taken." In the dietetics literature, visual estimates have been shown to be highly correlated with actual "plate weighings" and have the advantage that they are in use in most burn centers (Comstock, St. Pierre, & Mackiernan, 1981). Second, intakes of between-meal supplements were recorded by nursing personnel each time food or beverages were consumed by patients. These intakes were noted as milliliters of a fluid or quantity of a food consumed and recorded on the Intake and Output (I&O) Worksheets kept at the bedside of each patient.

Interobserver Reliability

Reliability was checked on the amount of food eaten at mealtimes, the amount consumed between meals, and on the food service workers' calculations used to convert the amounts consumed into calorie points. The reliability checks were conducted without prior warning, with the reliability coefficients calculated using the procedures described by Wolf and Sherman (1973): percent agreement = (sum of agreements of occurrence/sum of agreements + sum of disagreements) $\times$ 100. The amount of each food consumed was checked on 14 different occasions, with an average reliability of 93% (range = 71% to 100%). On six occasions, reliability was calculated for the I&O sheets for between-meal consumption with a coefficient of 100%. All food service workers' calculations were checked and yielded a reliability coefficient of 100%. This high level of agreement was not surprising because the food service workers knew that all of their figures would be checked.

Table 2
Prescribed Level, and Intake of Daily Protein and Percentage of Days Prescribed Levels Were Achieved

Patient	Prescribed level (g)	Mean daily protein intake		Percentage of days prescribed levels achieved	
		Baseline $M \pm SD$	Intervention $M \pm SD$	Baseline	Intervention
1	180	175 $\pm$ 23	220 $\pm$ 21	50	100
2	280	265 $\pm$ 31	310 $\pm$ 38	33	80
3	240	205 $\pm$ 37	240 $\pm$ 10	10	50
4	390	370 $\pm$ 35	400 $\pm$ 50	41	60
Grand Ms	273	254 $\pm$ 32	293 $\pm$ 35	34	73

RESULTS

Protein Intake Data

Table 2 displays the prescribed levels of protein and the protein intake per day for each patient. During the baseline condition, when patients did not receive informational feedback, the mean protein intake was less than the prescribed level, both individually and collectively. During intervention, the mean for each patient increased to the prescribed level or above. As a group, the patients achieved prescribed levels of protein more than twice as often during the intervention condition as they did during the baseline condition.

Kilocalorie Intake Data

The prescribed levels of kilocalories and kilocalorie intake per day for each patient are displayed in Table 3. During the baseline conditions, intake

levels for kilocalories were less than those prescribed, both individually and collectively. The mean level for each patient increased during the intervention conditions. Mean increases ranged from 620 kilocalories per day by Patient 3 to 1,430 kilocalories per day by Patient 2. Collectively, there was a mean increase of 1,039 kilocalories per day after the provision of informational feedback. Prescribed levels for kilocalories were never achieved by the patients during the baseline conditions of the study. However, during intervention, prescribed levels were achieved 35% of the days.

All four patients showed the same general pattern of effects with the provision of informational feedback. Compared with the baseline condition, protein and kilocalorie intakes and the number of days prescribed levels of these nutrients were achieved increased during the intervention condition.

Table 3
Prescribed Level, and Intake of Kilocalories and Percentages of Days Prescribed Levels Were Achieved

Patient	Prescribed level (kcal)	Mean daily kilocalorie intake		Percentage of days prescribed levels achieved	
		Baseline kcal $\pm$ SD	Intervention kcal $\pm$ SD	Baseline	Intervention
1	4,500	3,680 $\pm$ 132	4,775 $\pm$ 472	0	80
2	7,000	5,130 $\pm$ 651	6,560 $\pm$ 952	0	30
3	6,000	4,645 $\pm$ 842	5,265 $\pm$ 642	0	20
4	9,500	6,960 $\pm$ 530	7,970 $\pm$ 887	0	10
Grand Ms	6,750	5,104 $\pm$ 539	6,143 $\pm$ 738	0	35

DISCUSSION

The results of this investigation indicate that informational feedback can be an effective procedure for improving the oral caloric intakes of burn patients. Daily consumption of protein-rich and kilocalorie-rich foods and beverages was increased when the patients were informed of their prescribed levels for protein and kilocalories, the protein and kilocalorie content of available food items, and their daily intakes of protein and kilocalories.

Protein intake was high during the baseline condition and even higher (above prescribed levels) during intervention. The high protein level in baseline may result from an emphasis on high protein intakes in the Burn Unit. The nursing team, aware of protein needs in the postburn recovery period, tended to emphasize protein intake more than kilocalorie intake when offering foods and beverages to patients. This emphasis may explain why protein levels were higher than kilocalories during baseline conditions.

The design of this study did not permit examination of the effects of each of the three components of informational feedback on eating behavior. However, we observed that the method used to provide one component, the protein and kilocalorie content of foods and beverages, promoted participation by the patients in food selection. This method consisted of a food selection instrument (menu selector) listing not only foods available in the hospital, but also the protein and kilocalorie content of each food. Perhaps this menu selector was beneficial because information was confined to one sheet of paper for each meal and might have been easier for the patients to use. During the baseline condition of the study, protein and kilocalorie content of available foods was compiled in a multipage booklet, not easily handled by the patients, especially if arms or hands were immobilized by burn wound dressings.

The frequency of achieving prescribed levels for protein and kilocalories increased when patients were given informational feedback. The bar graphs posted daily at the bedside of each patient served as constant reminders (prompts) of prescribed levels

for protein and kilocalories and daily progress toward achieving those goals. Initially, each of the patients was surprised at the high levels of protein and kilocalorie intakes expected and verbalized doubt that they could eat sufficient food to attain the goals. Thus, as daily goals were achieved, patients expressed delight and a sense of accomplishment. The bar graphs also served as a source of conversation among patients, health care providers, and family members.

The informational feedback techniques described in this study suggest a benign, effective, and practical method for improving the eating behavior of burn patients. With training, paraprofessional dietetics service employees could be assigned the daily graphing of nutrient intakes as a part of the overall nutritional care plan coordinated by the clinical dietitian. Costs associated with the informational feedback techniques are limited to preparation of a menu selection instrument listing protein and kilocalorie values of available foods and bar graphs designed to provide an adequate number of spaces to plot daily nutrient intakes. Future research might best be concentrated on a more rigorous analysis of the components of the informational feedback package. Actual plate weighings before and after each meal may yield more precise estimates of the amount of food actually consumed.

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