ANDREWS, SHIRLEY MARIE. The Nutrient Content of Food Served Versus Food Eaten by Hospitalized Patients on Selected Diets. (1976) Directed by: Dr. Carol Fritz. Pp. 67.

The purposes of this study were 1) to estimate the nutrient content of food served to hospitalized patients on selected diets, 2) to estimate the nutrient intake of these patients, and 3) to determine factors that influence this intake such as sex, age, diet, patient and food service related variables, and patient contact by a member of the dietary staff.

Twenty-five patients at North Carolina Baptist Hospital were selected for study on the basis of their expected length of hospitalization and specific diet prescription. Diets chosen were those most frequently used at the hospital: house, sodium restricted, fat controlled, and bland diets, and several miscellaneous ones. Food and beverages served to and returned by the patients were weighed. A computer program using food composition figures from the U. S. Department of Agriculture was used to calculate calories and seven nutrients, and to express these as percentages of the 1974 Recommended Dietary Allowances (RDA). In the absence of a suitable standard for hospitalized patients, the RDA was used as a reference point, with nutrients grouped into three levels: less than 76 percent, 76 through 125 percent, and 126 percent or more, Levels I, II, III respectively. Patients were interviewed after each meal and just prior to discharge.

It was found that 72 percent of the patients were served more than 125 percent of the RDA (Level III) for iron and riboflavin; 96 percent received this level of protein, vitamin A, and ascorbic acid. More than half the patients received a more moderate amount (Level II) of calories, calcium, and thiamin.

The majority of patients consumed the nutrients at the next lower level to that served, except for protein and ascorbic, for which consumption at the highest level was frequent, and vitamin A, which was more evenly distributed.

Patients were most likely to consume protein containing foods, and least likely to consume those rich in vitamin A. Protein had the highest level of consumption of all nutrients served, 74 percent, and vitamin A had the lowest, 55 percent.

Sex influenced nutrient intake, with males eating more than females. As each decade of life increased so did consumption, up to the sixties, where consumption dropped then increased slightly for patients above 70 years of age. Patients on a diet with both fat and sodium restriction, all males, consumed the largest amounts of all nutrients served, except for vitamin A. Patients on house diets, all females, consumed the lowest amounts. The influence of the special diets may have been confounded by sex differences.

Food temperature, preparation methods, contact by a member of the dietary staff, and to a lesser extent, food variety and appearance, influenced nutrient intake. Timing of meals had little influence on intake unless meals held for tests were served close to another meal.

Most subjects were served nutrients in amounts approximating recommendations for healthy groups of people (1974 RDA), but frequently consumed them in lower amounts. Low nutrient intake was related to many hospitalization, food service, and patient related factors. Patients with disorders requiring increased levels of nutrients require special attention.

THE NUTRIENT CONTENT OF FOOD SERVED VERSUS FOOD EATEN BY HOSPITALIZED PATIENTS ON SELECTED DIETS

by

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CHAPTER I

INTRODUCTION

In recent years there has been a developing controversy concerning malnutrition in hospitals, both because it apparently does occur and because the reasons for its occurrence most likely can be modified.

Butterworth (1) stated that little concern on the part of physicians was being given to the overall nutritional needs of many patients and to the role of good nutrition both in maintaining health and in promoting recovery from illness and injury. He felt that it was fallacious for people to assume that good nutrition was provided to patients simply because they were in the hospital. He cited specific case histories in which the condition of the patient was made worse during a prolonged hospital stay.

Meiling (2) placed much of the blame for hospital malnutrition on the institutional system itself rather than on the physicians and dietitians. He believed that until the system is changed, patients will continue to suffer from malnutrition. Physicians who are responsible solely for the final condition of the patient usually have no idea if diet orders are being carried out becuase of the many hands through which orders must travel before food reaches the patient. The preparation and timing of meals fit the convenience of the personnel and administration rather than the patient, and trays are not checked routinely to see if the patient is eating the food that was served.

Butterworth (1) also felt that an undesirable practice affecting the nutritional health of the patient is that of withholding meals because of diagnostic tests. This practice often causes a patient to miss one or more meals a day. Since hospital records generally do not show whether or not the patient has not received or eaten meals, the chance of severe nutritional depletion may be increased.

Another factor related to possible hospital malnutrition is the lack of routine procedures for detecting nutrient deficiencies. Nutrition education in medical schools is not common (3). Furthermore, the specific signs and symptoms of nutritional deficiencies are difficult to detect by untrained clinicians, particularly if one is not looking for them. Malnutrition occurs in stages, not all of which are clinically observable, and biochemical tests must be administered in order to detect some cases of nutrient deficiency. These tests are not performed routinely.

Meiling (2) pointed out that special care must be taken, particularly in a teaching hospital, to insure that the research and learning experience of interns and residents does not supercede patient care.

The stress of illness has a definite effect on food acceptance, and the problems are compounded when hospitalization becomes necessary. The change of routine, environment, and the disease itself may have a profound effect on the way one eats. When illness takes an individual away from home, food acceptance becomes even more difficult. Modified diets for hospitalized patients often are required and can impose additional problems on those who are not accustomed to such a diet. These patients require special attention to be certain that they get the right kind and amount of food (5).

The extent to which hospital malnutrition exist really is not known. It is therefore the purpose of the study 1) to estimate the nutrient content of the food served to hospitalized patients on selected diets in North Carolina Baptist Hospital in Winston-Salem, North Carolina, 2) to estimate the nutrient intake of these patients, and 3) to determine factors that might influence this nutrient intake, such as sex, age, diet, patient and food related variables, and patient contact by a member of the dietary staff.

CHAPTER II

REVIEW OF LITERATURE

A number of articles were found in the literature concerning the nutritive intake of groups of people such as pregnant women and preschool children (6, 7, 8, 9), but little could be found concerning the nutritive intake of hospitalized patients, particularly those on special diets. The studies described in the review on the diets of institutionalized patients were conducted primarily in nursing homes.

In the studies reported, the Recommended Dietary Allowances (RDA) (10, 11) were used as a point of reference in expressing the amounts of nutrients served or eaten. It should be noted that the RDA is a standard by which the diets of healthy people can be assessed, and the figures were not formulated to cover the therapeutic needs. Neither are they standards for individuals but for groups of people in a specific age range. Specific RDA figures differ according to the edition used. In the literature reviewed here, the RDA for 1953, 1968, and 1974 (Appendix A) were used.

A study was conducted by Ford and Neville (12) in two nursing homes, one serving three meals a day, and the other serving five meals, to determine whether or not both meal patterns provided sufficient nutrients for the patients. It was found that both homes offered food meeting the 1968 Recommended Dietary Allowances for most nutrients. Calories for men were lower at the nursing home serving three meals a day, and there were individuals whose thiamin and iron intake did not meet the 1968 RDA at both homes.

In Duval County, Florida, Henriksen and Cate (13) studied six nursing homes to determine the nutrient content of food served to and eaten by the patients. All food and beverages served and the portions returned were weighed and recorded. Daily calculations for calories, protein, calcium, iron, vitamin A, thiamin, riboflavin, and ascorbic acid were computed. Results indicated that in four nursing homes the average diet of the subject met or exceeded 100 percent of the 1968 Recommended Dietary Allowances for all nutrients. The two homes with the lowest levels of nutrients served provided 66 to 85 percent of the RDA for ascorbic acid for women and 60 to 78 percent for the men. One of these homes provided 67 percent of the RDA for thiamin for men and 80 percent for women. The average of all homes for levels of vitamin A and iron consumption exceeded the 1968 RDA for both sexes. The lowest intake occurred with calories, calcium, ascorbic acid, and riboflavin.

Tucker, Brine, and Wallace (14) selected 48 ambulatory patients in a public institution for the aged for their study on the nutritive intake of older institutionalized persons. The nutritive intake was compared with the average portion of food served and with the 1953 Recommended Dietary Allowances. The blood values for hemoglobin, vitamin A, carotene, and ascorbic acid for each subject were compared to the dietary intake.

More than one-half of the subjects did not eat the standard portion of food that was served. For each nutrient, more women than men had an intake of less than 75 percent of the standard. One third or more of the subjects consumed less than 75 percent of the iron, vitamin A, thiamin,

niacin, and ascorbic acid served to them.* One-sixth of the women had less than one-half of the allowances for niacin and ascorbic acid. Laboratory analysis showed a positive relationship between blood levels and dietary intake of ascorbic acid; however, no such relationship was indicated for vitamin A, and there was only a slight relationship to iron.

A study was conducted by Justice, Howe, and Clark (15) in a private nursing home with 12 men and 32 women to evaluate their dietary intake and nutritional status. The mean dietary intake approximated the 1974 Recommended Dietary Allowances. Calcium intake was found to be the lowest of all nutrients. Calories were below the recommended allowances but since all patients were sedentary or inactive and none appeared to have a disorder that increased the metabolic requirements, this may have been adequate.

Another study on the evaluation of the nutritional status of selected hospitalized patients was conducted by Bollet and Owens (16) in a hospital in Augusta, Georgia using 51 hospital employees, 144 patients supported by the Division of Vocational Rehabilitation, and 351 more seriously ill patients. There was an increased frequency of low levels of each nutritional parameter in the hospital patients as compared with the employees, with the lowest occurring in the more seriously ill patients. The highest frequency of malnutrition was found in patients

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*Although the author's summary statement omits ascorbic acid from the list, the data chart shows a consumption of seventy-five percent.

with alcoholic liver diseases and the lowest in diabetic patients. Low ascorbic acid levels were found most often in those patients with peptic ulcer diseases. These were cases of malnutrition occurring prior to hospitalization rather than during it.

In a study to determine if food purchased for nursing homes and the daily meals served to selected patients met the 1953 Recommended Dietary Allowances, Hankin and Antonmattei (17) found that there were no significant trends regarding the nutrient intake and its relationship to the availabilities of food or to the recommended allowances within the same home. Out of thirteen nursing homes, six were found to be below the recommended allowances in ascorbic acid. Both vitamin A and calcium were low in one nursing home. The intake of nutrients as compared to the Recommended Dietary Allowances showed that the following percentage of patients met 100 percent of the recommended allowances: calories, 62%; calcium, 51%; vitamin A, 83%; ascorbic acid, 40%. Texture of the food, methods of preparation, and time span between meals were found to be factors influencing the patients' intake.

Blackburn and Bistrian (18) reported a one-day survey conducted at a municipal hospital surgical service in Boston on protein-calorie malnutrition (PCM). Measurements of height/weight, triceps skinfold, muscle circumference, and serum albumin was used to determine the amount of depletion of 130 patients. It was found by the weight/height measurement that 20 percent were moderately depleted (60 to 90 percent of the standard) and only one percent severely depleted (less than 60 percent of the standard). Thirty-five percent were severely depleted by the triceps skinfold measurement and 12 percent by the muscle circumference.

Triceps skinfold and muscle circumference measurements showed that 21 percent and 36 percent respectively were moderately depleted. Out of 56 patients whose serum albumin level was measured, 15 had levels of less than 2.8 grams and 15 had levels between 3.5 and 2.8 grams. (The normal level for adults is 4.5 to 5.5 grams per 100 milliters.) Twenty-six of the patients had levels above 3.5 grams.

In an effort to lessen the occurrence of malnutrition in hospitals, Butterworth and Blackburn (19) outlined some simple and practical methods for the assessment of nutritional status that could be done without complicated laboratory equipment and should be available in all hospitals. Excerpts are contained in Appendix B. The major objective was to suggest methods and guidelines that would make it easier to identify those patients who are in need of nutritional intervention.

The literature reviewed here indicate that the nutrient intake of institutionalized patients varies with respect to the RDA, and that nutrient levels may be inadequate in some cases. In an effort to simplify the identification of patients who need nutritional intervention, guidelines have been suggested by Butterworth and Blackburn for use with hospitalized patients. See Appendix B.

CHAPTER III

METHODOLOGY

The purpose of this study was 1) to estimate the nutrient content of the food served to hospitalized patients on selected diets, 2) to estimate the nutrient intake of these patients, and 3) to determine factors that might influence this nutrient intake such as sex, age, diet, patient and food service related variables, and patient contact by a member of the dietary staff.

The study was conducted at North Carolina Baptist Hospital, a teaching hospital that is affiliated with the Bowman Gray School of Medicine of Wake Forest University. It was selected because of the receptivity of the hospital administration and staff to having research conducted in the hospital, and because of the interest on the part of the medical and dietary staff in this specific study.

Patients for the study were selected from among those whose anticipated hospitalization was about four days and whose diets would be among the four most frequently occurring diets; the house diet, sodium restricted, fat controlled, bland, and some miscellaneous diets such as low calcium, low residue, anti-dumping, and a diet with sodium and potassium restriction. Final selection was dependent upon receiving permission from the physician and the patient. Refer to the patient consent form in Appendix C.

A total of 25 patients were included in the study, 13 men and 12 women. Table I groups them according to sex and diet. In an effort to

obtain an equal number of men and women in the sample, both sexes were not represented in all groups of diets. There were more males than females on diets with both fat and sodium restriction, with sodium restriction alone, and on bland diets. This could be a reflection of the higher incidence of heart disease and peptic ulcers in men than in women.

TABLE I

COMPOSITION OF STUDY SAMPLE

Diet	Number of Men	Number of Women	Total
Regular	-	4	4
Bland	4	1	5
Fat Controlled	1	2	3
Fat and Sodium Controlled	3	-	3
Sodium Restricted	3	2	5
Miscellaneous	2	3	5
TOTAL	13	12	25

A pilot study was conducted to establish the most efficient procedures to use in estimating the nutrients served and eaten by each patient and in determining the number of patients that could be studied

adequately at one time. It was found that depending on the type of diet and the location of the patient, four to five patients could be handled in one day.

Trays for each patient were prepared by the researcher. Food and beverage items were weighed on a spring scale and were placed on a labeled tray that was sent to the proper floor and served by the nursing staff. After each meal, the trays were collected by the researcher and all remaining food and beverages were weighed and recorded. There were a few occasions when, upon the request of the researcher, a dietary employee collected the trays at night. See Appendix D for the recording form.

Although it was the responsibility of the nursing staff to serve between meal nourishments, the researcher found it necessary to serve them to insure that the patient received the nourishment. Patients frequently did not receive the bedtime nourishment when the researcher could not be there to serve it.

The researcher questioned each patient after every meal as to the opinion of the food and as to factors that may have influenced this. Refer to Appendix E. Prior to the patient's discharge, a concluding interview was conducted in order to determine factors that influenced regular food habits. The concluding interview schedule is contained in Appendix E.

A computer program using the food code numbers and composition figures from the Home and Garden Bulletin No. 72. U. S. Department of Agriculture (20) was used to analyze the data collected on each patient. Necessary information on each patient was included in the patient food service form (Appendix D). Calories and the following nutrients were

analyzed: protein, calcium, iron, vitamin A, thiamin, riboflavin, and ascorbic acid. Output from the program gave the total amount of each nutrient served during hospitalization and the total amount eaten.

These figures were expressed as a percentage of the 1974 Recommended Dietary Allowances for a person of the same sex and age as the patient. A chart giving such information is seen in Appendix A. In this study the Recommended Dietary Allowances are used only as a reference point in the absence of any more suitable standard. Refer to the review of literature for further discussion.

CHAPTER IV

RESULTS

Data will be presented in this chapter in three categories: the percentage of the Recommended Dietary Allowances of the nutrients served and eaten, the percentage of the nutrients served that was eaten, and factors such as sex, age, and diet that may have influenced the intake of the patient.

Percentage of RDA of Nutrients Served and Eaten

Data concerning the nutrient composition of food served and eaten by the hospitalized patients included in this study are displayed in Table II. Calories and seven nutrients were included: protein, calcium, iron, vitamin A, thiamin, riboflavin, and ascorbic acid. Diets included in the study were house, bland, fat controlled, sodium restricted, and miscellaneous diets such as low calcium, low residue, anti-dumping, and a sodium and potassium restricted diet. Age, sex, and weight of the patients were noted.

The Recommended Dietary Allowances has been used as a reference point to compare the nutrient content of the diets served to and consumed by the patients. For each patient, the RDA used represented the figures for a group of individuals of the same age and sex. As previously noted, the RDA represents standards for groups of healthy people, not for individuals in a poor state of health. Therefore, these data should be used as reference groups only, and not in judging the adequacy of nutrients

served and consumed. To assist in making comparisons, the researcher has employed three nutrient ranges: Level I (less than 76 percent of the RDA), Level II (76 to 125 percent of the RDA), Level III (more than 125 percent of the RDA).

In the following grouped data, two patients were considered to be extreme cases. Patient Q was given a test diet for which it was important that all food served be eaten. Patient Y was a teenager on a house diet, but because of the dislike of hospital food and the withholding of meals for diagnostic tests, practically no food was consumed. This latter person may represent the only malnourished patient in the study; therefore, special attention will be given to her in the discussion chapter.

Calories

As the data in Table II indicate, the calories served to 72 percent of the patients fell into the Level II grouping which comprised 76 to 125 percent of the RDA. Of the four patients receiving a lower level of calories (Level I), one was on a weight reduction diet and received only 40 percent of the RDA. The other three patients received fat and sodium restricted diets. Calories served ranged from 66 to 139 percent of the 1974 Recommended Dietary Allowances. See Appendix F for detailed information.

Only 44 percent of the patients had a Level II consumption of calories in contrast to 72 percent who received calories at that level. More than one-half of the patients consumed less than 76 percent of the RDA for calories (Level I). Ranges were as low as 31 percent and as

TABLE II

NUMBER AND PERCENTAGE OF PATIENTS WHO RECEIVED AND CONSUMED VARIOUS LEVELS OF NUTRIENTS

Nutrient		Level I (<76% RDA)		Level II (76 to 125% RDA)		Level III (>126% RDA)	
		n	%	n	%	n	%
Calories	Served	4	16	18	72	3	12
	Eaten	14	56	11	44	-	-
Protein	Served	-	-	-	-	25	100
	Eaten	2	8	8	32	15	60
Calcium	Served	7	28	12	48	6	24
	Eaten	12	48	11	44	2	8
Iron	Served	3	12	4	16	18	72
	Eaten	5	20	14	56	6	24
Vitamin A	Served	-	-	-	-	25	100
	Eaten	6	24	8	32	11	44
Thiamin	Served	2	8	16	64	7	28
	Eaten	12	48	11	44	2	8
Riboflavin	Served	-	-	7	28	18	72
	Eaten	7	28	10	40	8	32
Ascorbic Acid	Served	-	-	1	4	24	96
	Eaten	3	12	4	16	18	72

n = number of patients

high as 103 percent of the RDA, thus no one consumed calories at the high level (Level III) even though 12 percent of the patients were served that amount.

Patients appeared to have a lower level of caloric consumption than that which they were served.

Protein

As shown in Table II, all patients were served protein at the most liberal level (Level III), that which exceeded 125 percent of the RDA. Seven patients (28 percent) received twice the 1974 RDA for their age and sex.

Of the 25 patients that were served high amounts of protein, about one-third (eight) had a consumption level considered here to be moderate (Level II). Three-fifths of the patients consumed protein at the level at which they were served, more than 125 percent of the RDA (Level III). The lowest amount of protein eaten was 67 percent of the RDA (Level I).

To summarize, although all patients received more than 125 percent of the RDA, only 60 percent consumed that amount. Eight percent (two) ate less than 76 percent of the RDA, with the remaining 32 percent consuming 76 to 125 percent of the RDA.

Calcium

Two of the seven patients who received less than 76 percent of the RDA for calcium (Level I) were on low calcium diets. About one-half of the patients received moderate amounts of calcium (Level II), while six patients received more than 125 percent of the RDA for calcium (Level III).

The range for calcium consumption was as wide spread as the range for calcium served (Appendix G), but more patients fell within the lower range (Level I). As the data in Table II indicate, about one-half of the patients consumed less than 76 percent of the RDA with the lowest amount, 18 percent, consumed by a patient on a low calcium diet. The next lowest intake, 26 percent, was by a patient on a house diet. Two patients consumed 149 and 184 percent of the 1974 Recommended Dietary Allowances for calcium (Level III).

As was true for calories, the greatest number of patients received a moderate level of calcium (Level II), with the level of consumption being low to moderate (Levels I and II). Thus, more calcium was served than was eaten.

Iron

Data in Table II show that about three-fourths (72 percent) of the patients were served iron in excess of 125 percent of the RDA for their age and sex (Level III), with one receiving 209 percent. Three patients received amounts of iron in Level I, and four patients in Level II. The lowest amount of iron served was 63 percent of the RDA.

Although 72 percent (18) of the patients received amounts of iron exceeding 125 percent of the RDA, only about one-fourth (six) consumed that amount (Level III). Fifty-six percent of the patients consumed below 76 percent of the RDA (Level I). The range for iron consumption was from ten to 191 percent of the 1974 Recommended Dietary Allowances.

Whereas 72 percent of the patients received high levels of iron (Level III), only 25 percent consumed at that level and 56 percent

consumed moderate levels. Thus for iron, the majority of the patients consumed amounts at the next lower level to that served.

Vitamin A

Table II shows that all patients received the highest level of vitamin A, exceeding 125 percent of the RDA. Three of these patients received more than 300 percent, with 64 percent (16) receiving at least two times the RDA for vitamin A. (See Appendix F.) The amount of vitamin A served ranged from 128 to 358 percent.

There was wide variation in the amount of vitamin A eaten, with an actual range of 23 to 238 percent of the RDA. As shown in Table II, about one-fourth (24 percent) of the patients consumed the lowest level of vitamin A, while 11 of the 25 patients (44 percent) consumed vitamin A at Level III, exceeding 125 percent of the RDA for their age and sex. Approximately one-third (eight) of the patients had moderate levels of vitamin A consumption (Level II).

Although all patients received vitamin A at the highest level, the range of intake was quite broad, with less than one-half (44 percent) actually consuming vitamin A at that high level.

Thiamin

Data in Appendix F revealed that the amounts of thiamin served fell into a range narrower than that for any other nutrient. It was similar to the range for calories. Sixty-four percent of the patients received moderate levels of thiamin (Level II), while seven patients received more than 125 percent of the RDA (Level III).

As the data in Table II indicate, even though only two patients received below 76 percent of the RDA for thiamin, about one-half of the

patients consumed it at that level (Level I), with an intake range from 25 to 133 percent. Forty-four percent of the patients consumed moderate levels of thiamin (Level II), with only two patients exceeding 125 percent of the RDA for their sex and age.

In summary, the majority of the patients received moderate levels of thiamin (Level II), while the consumption was low to moderate (Levels I and II). As was true for other nutrients, more thiamin was served than was eaten.

Riboflavin

All patients received moderate (Level II) to high levels (Level III) of riboflavin, with about three-fourths (72 percent) falling within the higher level and exceeding 125 percent of the RDA. The range for the amount of riboflavin served was from 77 to 258 percent.

Table II shows that two-fifths of the patients consumed moderate levels of riboflavin (Level II), while seven of the patients consumed less than 76 percent of the RDA (Level I). Thirty-two percent (eight) of the patients consumed more than 125 percent of the RDA for riboflavin (Level III). The range of intake was from 49 to 170 percent.

All patients received moderate (Level II) to high (Level III) levels of riboflavin and 72 percent consumed riboflavin at these levels.

Ascorbic Acid

As indicated by the data in Table II, all but one patient was served ascorbic acid at Level III. The range was from 111 to 398 percent. About one-third of the sample received more than three times the RDA for ascorbic acid.

Unlike the range of that served, there was an extremely wide range of ascorbic acid consumption, 29 to 359 percent of the RDA. See Appendix G. All but three patients consumed more than 75 percent of the RDA for ascorbic acid. Two patients ate three times the 1974 RDA for their age and sex.

Of the 25 patients in the study, 24 (96 percent) received more than 125 percent of the RDA for ascorbic acid (Level III), but only 18 (72 percent) consumed this amount. Three patients consumed less than 76 percent of the ascorbic acid (Level I).

Summary

It may be said that for most nutrients, the majority of patients consumed the nutrient at the next lower level to that served. This was true for calories, iron, and riboflavin, and to a lesser extent for thiamin and calcium. The three exceptions were vitamin A, protein, and ascorbic acid, all served primarily at the highest level (Level III). In the case of ascorbic acid and protein, 60 percent of the patients actually consumed at the highest level. With vitamin A, however, levels were 24 percent for Level I, 32 for Level II, and 44 for Level III, and thus were more evenly distributed than ascorbic acid and protein.

Percentage of Nutrients Served That Was Eaten

In determining the nutritive intake of each patient, it is important to note the actual percentage of each nutrient served that was eaten. With the exception of one patient who had to eat all food that was served, these ranged from seven to ninety-nine percent. More detailed information is given in Appendix H. As displayed in Table III, the average intake of

the nutrients extended from 55 percent for vitamin A to 74 percent for protein. Of the nutrients served, the narrowest range was 51 (47 to 98)for riboflavin, and the widest range was 85 (12 to 97) for ascorbic acid.

Calories

Data in Table III show that 52 percent of the patients ate less than 71 percent of the calories served to them. Two patients consumed less than one half, the lowest being 33 percent.

TABLE III

PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN

Nutrient	Below 20	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%	Average	Range*
Calories			1	1	5	6	2	8	2	71	31-98
Protein			1		6	5	2	4	7	74	40-99
Calcium			2	5	3	3	2	5	5	69	33-98
Iron	1			1	4	6	3	6	4	71	16-97
Vitamin A	1	2	6	2	3	3	4	3	1	55	7-84
Thiamin		1	2	1	3	5	5	5	3	70	26-97
Riboflavin				3	5	6		5	6	72	47-98
Ascorbic Acid	1		1	3	2	4	7	2	6	70	12-97

*These ranges do not include the one patient who was required to eat 100 percent of the food served. However, that person was included in the average percentage.

Protein

Fifty-two percent of the patients ate more than 70 percent of the protein served. One patient consumed less than 40 percent. Seven of the 25 patients consumed more than 91 percent of the protein served.

Calcium

There was a wide range of calcium intake. It can be seen from Table III that seven of the patients ate less than one-half of the calcium served; whereas, five patients consumed more than 90 percent.

Iron

All but two patients consumed more than 50 percent of the iron served. One consumed only 16 percent, with about one half (13) consuming more than seventy percent of that served.

Vitamin A

Of all nutrients served, vitamin A had the lowest level of consumption. Data displayed in Table III indicate that 44 percent ate less than one-half of the vitamin A served. One patient consumed only seven percent.

Thiamin

There was a wide range in the amount of thiamin consumed, 26 percent to 99 percent. Four patients ate less than one-half of the thiamin served to them. Seventy-two percent consumed thiamin in amounts above 60 percent of that received.

Riboflavin

As seen in Table III, three patients consumed less than one-half of the riboflavin served. There were 11 patients in both the 81 to 100 percent range and the 51 to 70 percent range.

Ascorbic Acid

Although ascorbic acid had the widest range of consumption for all nutrients, the average amount consumed was not as low as for vitamin A. Five patients ate less than one-half of that served, with one consuming as little as 12 percent. Eleven of the 25 patients consumed 61 to 80 percent of the ascorbic acid served.

Summary

In terms of average consumption, patients seemed more likely to consume foods containing protein, with an average intake of 74 percent, and less likely to consume foods containing vitamin A. The average intake for the latter was only 55 percent. The intake ranking second was riboflavin with an average of 72 percent and a range of 47 to 98 percent.

Intermediate intake levels were observed for calories, calcium, iron, thiamin, and ascorbic acid, with the average ranging from 69 to 71 percent. The average intake for calcium was lower than that for calories, but the ranges were the same. The range intake for this group of nutrients was as low as 12 percent for ascorbic acid and as high as 98 percent for calories and calcium.

Factors Influencing Nutrient Intake

Several factors that may influence the nutrient intake of a hospitalized patient are sex, age, and diet. These will be discussed not as a percentage of the Recommended Dietary Allowances but as the percentage of each nutrient served that was eaten.

Other factors that may influence nutrient intake were identified by interviewing the patients. There was no control for these factors

and no hard data collected on them; therefore, these will be presented in the discussion chapter.

Sex

It can be seen in Figure I that men consumed a higher percentage of all of the nutrients served than did women. The average intake of each nutrient ranged from 49 to 69 percent for women and 60 to 79 percent for men. Individual intake ranges were wider for the women than men, except for riboflavin (Table IV).

For women, protein intake was the highest, while for men protein and riboflavin were consumed in almost equal percentages. For both men and women, vitamin A had the lowest level of consumption.

Age

The data in Table V indicate that with each increased decade up to age 60, consumption of nutrients increased. In the sixties, nutrient consumption dropped, then increased slightly above age 70.

The age group with the highest percentage of nutrient consumption was the fifties. The fifties exceeded the other decades for all nutrients even if the diet of one patient who was required to eat all the food served was excluded. The twenties and under, on the other hand, was the group consuming the least percentage of the nutrients served. For this youngest group, which consisted of two females, age and sex may be confounding variables.

Intake of vitamin A was the lowest of all nutrients served for all decades except the fifties during which ascorbic acid was the least consumed nutrient. For patients up to the sixties, protein was consumed in the highest amount. This nutrient was served in equally high amounts

FIGURE I

AVERAGE PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN GROUPED BY SEX

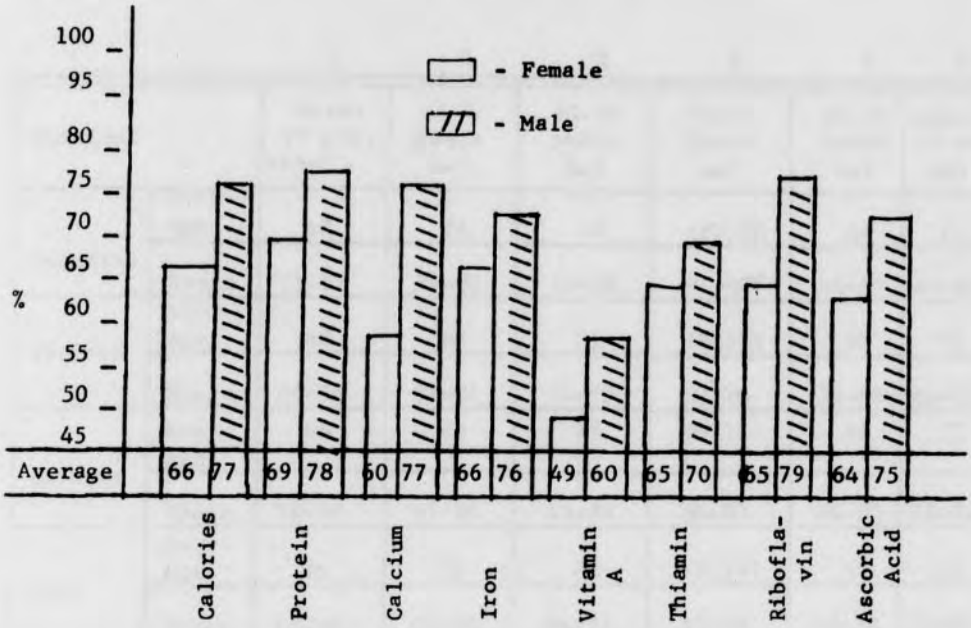

TABLE IV

RANGE OF PERCENTAGES OF NUTRIENTS SERVED THAT WAS EATEN GROUPED BY SEX

Sex	Calories	Protein	Calcium	Iron	Vitamin A	Thiamin	Riboflavin	Ascorbic Acid
Women*	33-90	40-91	33-92	16-94	7-84	26-88	47-91	12-97
Men	54-98	75-99	49-98	54-97	21-84	40-97	52-98	50-96

*The ranges for women do not include the one patient who consumed 100 percent of the food served.

TABLE V

AVERAGE AND RANGE OF PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN GROUPED BY AGE

Nutrient		% Below 29 yrs. **n=2	% 30-39 years n=5	% 40-49 years n=5	% 50-59 years n=3	% 60-69 years n=7	% Above 70 yrs n=3
Calories	Average	42	76	78	(82)88	64	75
	Range	33-51	59-90	54-98	81-82*	44-87	65-82
Protein	Average	48	82	81	(92)94	62	75
	Range	40-55	67-91	54-99	87-96	51-83	64-83
Calcium	Average	46	65	79	(87)91	61	72
	Range	36-56	51-90	49-98	86-87	44-91	33-92
Iron	Average	36	78	80	(87)91	59	77
	Range	16-56	65-94	64-97	83-90	45-81	73-83
Vitamin A	Average	19	45	67	(82)88	43	72
	Range	7-31	21-84	59-76	79-84	25-81	59-79
Thiamin	Average	39	78	77	(86)90	57	76
	Range	26-52	68-88	58-97	80-91	40-82	64-87
Riboflavin	Average	48	73	80	(89)93	62	77
	Range	47-48	62-92	57-98	87-91	52-91	57-91
Ascorbic Acid	Average	29	77	81	(80)83	62	84
	Range	12-46	62-92	72-96	65-95	50-86	67-97

*Ranges and the averages in parentheses do not include the patient who consumed 100 percent of the food served.

**n = number of patients

TABLE VI

AVERAGE AND RANGE OF PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN GROUPED BY DIET

Nutrient		House **n=3 %	Bland n=5 %	Fat Control n=3 %	Fat & Na Control n=3 %	Sodium Control n=5 %	Miscellaneous n=5 %
Calories	Average	54	75	77	84	69	(68)*74
	Range	33-67	58-87	67-90	67-98	44-84	59-82*
Protein	Average	56	75	79	86	72	(74)79
	Range	40-65	56-91	66-91	67-93	51-94	58-96
Calcium	Average	51	76	67	79	74	(58)66
	Range	36-66	49-91	48-78	59-98	49-92	33-87
Iron	Average	36	71	80	84	70	(71)77
	Range	16-63	51-85	65-94	65-97	45-85	56-90
Vitamin A	Average	27	53	65	53	66	(53)62
	Range	7-38	25-81	42-84	21-76	52-77	31-84
Thiamin	Average	47	69	75	85	69	(74)79
	Range	26-61	40-85	58-88	68-97	40-79	71-91
Riboflavin	Average	53	76	71	83	75	(61)73
	Range	47-67	52-91	64-83	63-98	52-91	50-91
Ascorbic Acid	Average	46	70	80	83	75	(60)68
	Range	12-69	50-86	72-92	76-96	51-88	31-95

*Ranges and the averages in parentheses do not include the patient who consumed 100 percent of the food served.

**n = number of patients.

as riboflavin for patients in the forties, and in equally high amounts as ascorbic acid for patients below 29.

With regard to the range of nutrients consumed, several observations can be made. For the two patients below age 29, the widest range for nutrients consumed occurred for iron. The narrowest range was for riboflavin with both patients consuming almost equal amounts. Patients in the thirties had the widest range for vitamin A. Intake varied from 21 to 84 percent. In the forties, sixties, and above seventy, the widest range of intake occurred for calcium. Ranges for the two patients in the fifties were very narrow.

Diet

The patients on diets with both a fat and sodium restriction consumed the highest amount of each nutrient served with the exception of vitamin A as seen from the data in Table VI. This could be a sex related factor since all subjects were males. Patients on sodium restricted diets and patients on fat controlled diets consumed the highest levels of vitamin A, except when the patient had both restrictions imposed. Patients on house diets ate the lowest percentage of all nutrients served. This could be because the group was composed of all females.

Regardless of the diet, vitamin A was the nutrient consumed at the lowest percentage of that served. The nutrient with the highest consumption varied from diet to diet.

The fat controlled diets had the narrowest range for calories, iron, and riboflavin. Calories and protein had the widest range in the sodium controlled diets, vitamin A in the bland diets, and iron in the house diets.

Summary

In summary, the patient's sex influenced nutrient intake, with men consuming more than women. As the age of a patient increased, so did nutrient consumption, up to the sixties. Consumption dropped during the sixties then increased slightly in the seventies and above. Patients on house diets ate the lowest amounts of the nutrients served in all of the diets studied, while patients on diets with both a fat and sodium restriction consumed the highest level of nutrients, except for vitamin A. It should be noted that all of the patients on diets with both fat and sodium restriction were men.

CHAPTER V

DISCUSSION

The purpose of this study was 1) to estimate the nutritive content of food served to hospitalized patients on selected diets, 2) to estimate the nutritive intake by these patients, and 3) to determine factors influencing this intake such as sex, age, diet, patient and food service related variables, and patient contact by a member of the dietary staff.

To accomplish these objectives, all food and beverages served to and returned by the patients were weighed. Patients were questioned after each meal as to their opinion of the food and reasons for rejecting any of it. A concluding interview was conducted to determine factors that might influence the nutrient intake by the patient. By means of a computer program the total amount of each nutrient served and eaten during hospitalization was calculated and was expressed as percentages of the 1974 Recommended Dietary Allowances for a person of the same age and sex. The RDA, which gives recommended levels of nutrient intake for healthy people, was chosen as a reference point by which to compare the ranges of nutritive content of the food served and eaten by the patients, even though it was questionable as to whether this standard should be used for any hospitalized patient.

Up to this point, the terms adequate and inadequate have been avoided purposefully because of the lack of a standard by which the adequacy of the patient's diet could be determined. These two terms

have been used in a variety of ways in previous studies. Some researchers who have conducted studies with hospitalized and nursing home patients considered adequacy to be one hundred percent of the Recommended Dietary Allowances, while others have considered it to be a given percentage of the RDA, such as 80 or 90 percent. What may have been termed adequate in some studies may or may not be a proper assessment, and this assessment may differ by definition from study to study.

To assist in estimating the adequacy of the patients' diets, the researcher employed three nutrient ranges: Level I (less than 76 percent of the RDA), Level II (76 to 125 percent of the RDA), and Level III (more than 125 percent of the RDA). It was found that for most nutrients, the majority of patients consumed the nutrient at the next lower level to that served. This was true for calories, iron, and riboflavin, and to a lesser extent for thiamin and calcium. The three exceptions were vitamin A, protein, and ascorbic acid. All these nutrients were served primarily at the highest level, but in the case of ascorbic acid and protein, 60 percent of the patients actually consumed at the highest level. With vitamin A, however, levels were 24 percent for Level I, 32 for Level II, and 44 for Level III, and thus were more evenly distributed than for ascorbic acid and protein.

The patient's sex was found to influence nutrient intake, with males consuming more than females. In relation to age, nutrient consumption increased with each increase in decade up to the sixties, where it dropped then increased for patients above 70. Patients on a diet with both fat and sodium restriction consumed the highest amount of nutrients, while the patients on house diets, all females, consumed the least.

There were other factors besides sex, age, and diet that may have influenced the patients' intake, thereby causing them to receive inadequate amounts of certain nutrients. Included in these factors are patient and food service related variables, and patient contact by a member of the dietary staff.

Influence of Patient Related Variables

It is difficult to determine if the patient's intake really is adequate since needs fluctuate, depending on the patient's condition. There may be an increased need for certain nutrients, and an increased or decreased need for calories. Some patients require fewer calories since they are inactive, while others may require more than given in the RDA, particularly if they are underweight, febrile, or recovering from surgery or a debilitating disorder. For specific therapy, sodium and fat are often decreased. A patient with a fever or cirrhosis would have an increased need for protein. Hemorrhagic patients have an increased need for iron, and an immobile patient requires less calcium than given in the RDA, thereby preventing the formation of renal calculi. Patients with prolonged diarrhea have an increased need for iron, as well as for vitamin A and some of the B complex vitamins (5).

One patient most likely did have an overall inadequate intake of nutrients. This was the 19 year old female previously mentioned (p. 14) who was on a house diet and was admitted for diagnostic tests. She received only nine out of twelve meals because of tests; nonetheless, all nutrients served to her, except for iron, exceeded 93 percent of the RDA for healthy people. She received only 63 percent of this latter nutrient.

This patient expressed a strong dislike for the hospital food without trying to eat it. She refused to eat nearly all food served with the exception of milk and some desserts. A special request for a cheeseburger was honored by the researcher, but she ate less than one-half of it. The nutritive intake of the patient ranged from ten percent of the RDA for iron to 73 percent for calcium. On an average, she consumed approximately 30 percent of all nutrients served. In her interview, she indicated that her daily food intake consisted mainly of snack foods. Her parents upon occasion brought food to her in the hospital, but this could not be analyzed in this study.

An example of probable inadequate caloric consumption was patient S, who was very much underweight and had been ordered by the physician to gain weight. This meant an increased need for calories. She was served 111 percent of the RDA for calories and consumed 91 percent. Chances for higher caloric consumption might have been greater if calories had been served at a higher level since, as found from data previously presented, patients frequently consumed nutrients at a lower level than that which had been served (p.20).

Patient N, who was diagnosed as having cirrhosis, had a protein intake of only 72 percent of the RDA. This is inadequate for a patient with this disorder in the absence of uremia.

Patient G, who was not extremely overweight but was placed on a weight reduction diet during the time of hospitalization, received only 40 percent of the RDA for calories and consumed only 34 percent. It is questionable whether a patient should be placed on such a strict diet under the stressful conditions imposed by being hospitalized.

As previously mentioned, iron needs are increased for hemorrhagic patients; therefore, iron consumption may have been inadequate for two patients with bleeding ulcers who consumed only 80 and 82 percent of the RDA for iron.

There were patients who had questionable levels of calcium, riboflavin, and vitamin A. Calcium consumption was found to be low for patients who were on sodium restricted diets and for six of the twenty-five patients in the study who did not drink milk. No substitutions of calcium rich foods were given to patients who did not drink milk. In most cases where calcium consumption was low, the same was true for riboflavin, since milk is a good source of riboflavin.

There was a dislike for many of the foods containing high amounts of vitamin A, which may explain why this nutrient was consumed at the lowest level of all nutrients studied. Such foods included spinach, tomatoes, squash, and carrots. One patient chose to eat no vegetables that were green in color for reasons not specified.

Since orange juice was served for breakfast every morning, consumption of ascorbic acid was high for all but three patients, the teenager who ate very little of any food, and two patients who drank no juices of any kind. Patients often consider orange juice or some other source of ascorbic acid as essential to recovery from illness, perhaps because of recent publicity on the usage of megadoses of ascorbic acid as a cold preventative, a questionable procedure.

Influence of Food Service

Of the twenty patients given a discharge interview, 75 percent (15) found the hot food to be cold when served. Two said it was always hot and three said it was hot some of the time. Thirty percent (six) of those interviewed said the cold food was not cold when served, while 40 percent (eight) thought it was.

On many occasions, it was noted that 45 minutes to one hour lapsed between the time the tray was prepared and the time the patient received it. Many patients found it very difficult, if not impossible, to eat the food when they received it because of the temperature. Thus, food temperature had a definite effect on the patient's intake.

When patients were asked why they did not eat particular foods, they frequently indicated that it "had no taste," that is the food was not seasoned the way the patient liked it. Seventy percent (14) of the patients interviewed stated that the food was not seasoned properly or did not "taste good." The remaining 30 percent (six) liked it the way it was seasoned. Salt was the seasoning most often mentioned was missing even by patients who had no salt restriction in their diets.

Sixty percent (12) of the patients interviewed stated that the food was cooked to the proper doneness, and 35 percent (7) felt it was overcooked. Foods such as rice, noodles, and some meats, particularly hamburger, were mentioned as being too dry or too hard to eat. Only one patient felt that the food was undercooked.

When patients were asked if there were enough variety in the menu during their hospitalization, 55 percent (11) said there was, 30 percent (six) said there was not, and the remaining 15 percent (three) said

there was some of the time. Tossed salad, rolls, poatoes, and green beans were foods mentioned by the patients as being served too frequently. Seventy percent (14) of the patients thought the meals looked appetizing while 15 percent (three) thought they did not.

The timing of the meals was satisfactory for 70 percent of the patients, while ten percent (two) felt they were not frequent enough, and 20 percent (four) felt they were too frequent. Patients who felt that the meals were too frequent were those who received between meal feedings or preferred a later lunch or supper. Patients whose diets were held for tests often received meals very close together; therefore, the patient was unable to eat all that was served. When food was served at regular times, it did not appear to have an effect on the amount of food consumed. Some did state that they were not used to eating so much food, particularly those who ate a light lunch while at work.

Forty percent (eight) of the patients said they enjoyed the meals during their hospitalization, 20 percent (four) did not, and 40 percent (eight) enjoyed them some of the time.

With regard to food service, it can be said that food temperature did have an effect on the nutrient intake of the patients in this study. Some patients found a lack of variety among some foods served, and most patients were satisfied with the appearance of the meals. Timing of the meals had little influence on the nutritive intake of the patients except when trays were held for tests and the patients received two meals very close together. Less than one-half of the patients enjoyed the meals during the time of hospitalization.

Influence of Patient Contact

There was a noticeable improvement in the food intake of some of the patients after the researcher began working with them. One patient, in particular, was eating very little upon entering the study, but by the time of discharge was consuming almost everything served. She disliked many of the foods served and did not eat them. When note was taken of these dislikes and substitutions were made for them by the researcher, food consumption increased. If contact had not been made with the patient, there would have been no one to whom the patient could express her food preferences. Much food served would not have been eaten, thereby lowering the patient's nutritive intake.

In a report by Mason (21) on a meeting of 43 dietitians who discussed the list of undesirable practices that affect the nutritional health of hospital patients as presented by Butterworth (1), it was agreed that many of the responsibilities in preventing hospital malnutrition lie in the hands of the dietitians. One of these responsibilities was observing the patients' food intake, which would certainly require patient contact.

It had been noted at the beginning of the study that the between meal nourishments were not always served. Because these nourishments were served by the researcher which ordinarily the patient might not have received, and because adjustments were made in the diets of those patients requesting them, the data presented here to a certain extent may not be true of the actual intake of hospitalized patients.

CHAPTER VI

SUMMARY AND RECOMMENDATIONS

A study was conducted 1) to estimate the nutritive content of the food served to hospitalized patients on selected diets, 2) to estimate the nutritive intake of these patients, and 3) to determine factors that might influence this intake such as sex, age, diet, patient and food service related variables, and patient contact by a member of the dietary staff.

Twenty-five patients at North Carolina Baptist Hospital participated in the study. The selected diets included house, bland, sodium restricted, fat controlled, and miscellaneous diets such as low calcium, low residue, anti-dumping, and a sodium and potassium restricted diet.

All food and beverages served to the patients were weighed and recorded. Returned portions were weighed also and subtracted from that served. Patients were questioned as to their opinion of the food after each meal and reasons for rejecting any particular food item. A concluding interview was conducted prior to the patient's discharge to determine food and patient related variables influencing the nutritive intake during the time of hospitalization.

A computer program using food code numbers and composition figures from Home and Garden Bulletin No. 72. U. S. Department of Agriculture (20) was used to analyze calories and the following nutrients in terms of the total amount served and eaten during hospitalization: protein, calcium, iron, vitamin A, thiamin, riboflavin, ascorbic acid. These figures were

expressed also as percentages of the 1974 Recommended Dietary Allowances for a healthy person of the same age and sex.

For purposes of comparison and determining what may be termed adequacy of the nutrients served to and eaten by the patients, three groups of nutrient levels were employed: Level I (less than 76 percent of the RDA), Level II (76 to 125 percent of the RDA), Level III (more than 125 percent of the RDA). It was found that for calories, calcium, iron, thiamin, and riboflavin the majority of the patients consumed the nutrient at the next lower level to that served. Forty to fifty-six percent of the patients consumed only moderate levels (76 to 125 percent of the RDA) of iron and riboflavin even though 72 percent of the patients were served amounts exceeding 125 percent of the RDA. About one-half to three-fourths (48 to 72 percent) of the patients received moderate levels of calcium, thiamin, and calories, but the consumption level was less than 76 percent of the RDA for about one-half of the patients. Protein, vitamin A, and ascorbic acid were served in amounts exceeding 125 percent of the 1974 RDA to 96 percent of the patients. Sixty to seventy-two percent consumed this amount of protein and ascorbic acid, while only 44 percent of the patients consumed vitamin A at this level.

With regard to the amount of food served that was eaten, it was found that only 55 percent of the vitamin A served was eaten, the lowest intake of all nutrients studied. Protein had the highest level of consumption, 74 percent. The average for all other nutrients ranged from 69 percent for calcium to 72 percent for riboflavin for the amount served that was eaten. Individual ranges of intake were as low as seven percent for vitamin A and as high as 99 percent for protein, excluding the patient who was required to eat all the food served.

The patient's sex was found to influence nutrient intake, with males eating more than females. In relation to age, nutrient consumption increased with each increase in decade up to the sixties where it dropped then increased slightly for patients above 70. Patients on a diet with both a fat and sodium restriction consumed the highest amount of nutrients, while patients on house diets consumed the least.

Depending on the disorder, there were patients in the study who apparently had inadequate intakes of calories, especially a patient trying to gain weight and a patient on a strict weight reduction diet, protein for a patient with cirrhosis, and iron for two patients with bleeding ulcers.

Calcium, riboflavin, and vitamin A appeared to be inadequate for some patients. Calcium and riboflavin were low for patients whose diets were restricted in sodium and for patients who did not drink milk. Inadequate consumption of vitamin A seemed to be related to the patients' dislike of foods rich in vitamin A, such as spinach, tomatoes, carrots, and squash. For all but three patients, consumption levels of ascorbic acid was related to the high levels of intake of orange juice or other good sources of ascorbic acid.

By interviewing the patients, it was found that less than one-half (40 percent) of the patients enjoyed the meals during their hospitalization. Food temperature and food preparation had an influence on the nutrient intake of the patients. The majority of patients thought the appearance of the trays was good, but some patients felt that foods such as tossed salads, potatoes, green beans and rolls were included too often on the menus. Timing of the meals had very little influence on the

patient's intake unless the tray was held for tests purposes which often caused meals to be served very close together.

Food consumption increased when there was patient contact, and when notice was taken of the foods the patient did not eat and substitutions were made for them.

Recommendations for Hospital Care

It is recommended that more careful monitoring of the tray service be done to insure the patients getting food at the proper temperature, thereby increasing the intake. A better monitoring of serving between meal nourishments is recommended so that patients will get what the diet requires.

To prevent unnecessary wasting of food and to have better satisfied patients, it is suggested that more patient visitation by dietitians be made. A patient can have a better understanding of his diet and substitutions can be made by the dietitian for those foods the patient does not eat.

Since data in this study indicated that, in general, a patient consumes nutrients at the next lower level to that served, it is suggested that patients be served a higher level of nutrients than given in the Recommended Dietary Allowances to insure an adequate intake of all nutrients.

Because there are many patients who do not drink milk, levels of calcium consumption are often low. To assist these patients in getting the amount of calcium needed, more milk products, other calcium containing foods, or calcium salts need to be included.

The nutrient consumed at the lowest level of that served was vitamin A, and many patients seemed to dislike most of the vitamin A containing foods that were served. It would be beneficial to the patients if a greater variety of vitamin A rich foods could be included on the menus.

It is suggested that menus be written providing calories at levels high enough to insure as adequate intake, especially for those patients whose conditions require higher caloric levels.

It is recommended also that diet manuals be checked to see that diets for specific disorders meet any increased needs for certain nutrients. Not all food served will be eaten, and a margin of safety should be taken into account.

Recommendations for Future Studies

It would be valuable to conduct a similar study including young children and teenagers. The one teenager in this study had a strong dislike for hospital food, and she consumed very little of it. This one teenager may or may not be a typical example of all hospitalized children and teenagers.

Since the present Recommended Dietary Allowances are standards used to determine the adequacy of diets for healthy people, it would be useful to have sets of recommended allowances for persons not in a good state of health, noting such things as the patient's disorder and body temperature which may impose additional metabolic needs. One may then be able to analyze diets of hospitalized patients to determine if the intake by the patient really is adequate.

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APPENDIX A

RECOMMENDED DIETARY ALLOWANCES

1941 - 1974

Recommended Dietary Allowances and minimum daily requirements for adult men (11)

YEAR	WEIGHT	HEIGHT	KCALORIES	PROTEIN	CALCIUM	IRON	VITAMIN A ACTIVITY	THIAMINE	RIBOFLAVIN	NIACIN	ASCORBIC ACID	VITAMIN D[a]
Recommended Dietary Allowances: Men 18 to 35 Years of Age												
	kg. (lb.)	*cm. (in.)*		*gm.*	*gm.*	*mg.*	*I.U.*	*mg.*	*mg.*	*mg.*	*mg.*	*I.U.*
1941[b]	70 (154)		4,500[f]	70	0.8	12	5,000	2.3	3.3	23	75	
1943[b]	70 (154)		4,500[f]	70	0.8	12	5,000	2.3	3.3	23	75	
1945[b]	70 (154)		4,500[f]	70	0.8	12	5,000	2.0	2.6	20	75	
1948[c]	70 (154)		4,500[f]	70	1.0	12	5,000	1.8	1.8	18	75	
1953[d]	65 (143)	170 (67)	3,200	65	0.8	12	5,000	1.6	1.6	16	75	
1958[d]	70 (154)	175 (69)	3,200	70	0.8	10	5,000	1.6	1.8	21[g]	75	
1964	70 (154)	175 (69)	2,900	70	0.8	10	5,000	1.2	1.7	19[g]	70	
1968[e]	67 (147)	175 (69)	2,800	60	0.8	10	5,000	1.4	1.6	18[g]	60	[h]
	70 (154)			65					1.7			
Recommended Dietary Allowances: Men 35 to 55 Years of Age												
1941[i]	70 (154)		3,000	70	0.8	12	5,000	1.8	2.7	18	75	
1943[i]	70 (154)		3,000	70	0.8	12	5,000	1.8	2.7	18	75	
1945[i]	70 (154)		3,000	70	0.8	12	5,000	1.5	2.0	15	75	
1948[j]	70 (154)		3,000	70	1.0	12	5,000	1.5	1.8	15	75	
1953[k]	65 (143)	170 (67)	2,900	65	0.8	12	5,000	1.5	1.6	15	75	
1958[k]	70 (154)	175 (69)	3,000	70	0.8	10	5,000	1.5	1.8	20[g]	75	
1964	70 (154)	175 (69)	2,600	70	0.8	10	5,000	1.0	1.6	17[g]	70	
1968	70 (154)	173 (68)	2,600	65	0.8	10	5,000	1.3	1.7	17[g]	60	
Recommended Dietary Allowances: Men 55 to 75 Years of Age												
1941[l]	70 (154)		2,500	70	0.8	12	5,000	1.5	2.2	15	75	
1943[l]	70 (154)		2,500	70	0.8	12	5,000	1.5	2.2	15	75	
1945[l]	70 (154)		2,500	70	0.8	12	5,000	1.2	1.6	12	75	
1948[l]	70 (154)		2,400	70	1.0	12	5,000	1.2	1.8	12	75	
1953[m]	65 (143)	170 (67)	2,600	65	0.8	12	5,000	1.3	1.6	13	75	
1958[m]	70 (154)	175 (69)	2,550	70	0.8	10	5,000	1.3	1.8	18[g]	75	
1964	70 (154)	175 (69)	2,200	70	0.8	10	5,000	0.9	1.3	15[g]	70	
1968	70 (154)	171 (67)	2,400	65	0.8	10	5,000	1.2	1.7	14[g]	60	
Minimum Daily Requirements for Men[n]												
1968					0.75	10	4,000	1.0	1.2	10	30	400

[a]Small amounts of vitamin D are needed by persons not exposed to sunshine.
[b]Classified as "man, very active," no age specification.
[c]Classified as "with heavy work," no age specification.
[d]Classified as 25-year-old men.
[e]First value is for males 18 to 22 years of age; second, 22 to 35. Where recommendations are the same for both groups, only one value is shown.
[f]Not applicable for the "reference" man. The recommended allowance for moderately active or physically active men was 3,000 kcalories.
[g]Niacin equivalents. Includes sources of vitamin itself plus 1 mg. equivalent for each 60 mg. tryptophan.
[h]A value of 400 I.U. is reported for 18- to 22-year-old males.
[i]Classified as "man, moderately active," no age specification.
[j]Classified as "man, physically active," no age specification.
[k]Classified as 45-year-old men.
[l]Classified as "man, sedentary," no age specification.
[m]Classified as 65-year-old men.
[n]Minimum daily requirements for persons 12 years of age or older except calcium (children or adults), iron (6 years of age or older), and vitamin D (infants, children, and adults). The riboflavin requirement was 2.0 mg. prior to June 1, 1957. A niacin requirement was first established June 1, 1957.

Recommended Dietary Allowances and minimum daily requirements for adult women (11)

YEAR	WEIGHT	HEIGHT	KCALORIES	PROTEIN	CALCIUM	IRON	VITAMIN A ACTIVITY	THIAMINE	RIBOFLAVIN	NIACIN	ASCORBIC ACID	VITAMIN D[a]
Recommended Dietary Allowances: Women, 18 to 35 Years of Age												
	kg. (lb.)	*cm. (in.)*		*gm.*	*gm.*	*mg.*	*I.U.*	*mg.*	*mg.*	*mg.*	*mg.*	*I.U.*
1941[b]	56 (123)		3,000[d]	60	0.8	12	5,000	1.8	2.7	18	70	
1943[b]	56 (123)		3,000[d]	60	0.8	12	5,000	1.8	2.7	18	70	
1945[b]	56 (123)		3,000[d]	60	0.8	12	5,000	1.5	2.0	15	70	
1948[b]	56 (123)		3,000[d]	60	1.0	12	5,000	1.5	1.5	15	70	
1953[e]	55 (121)	157 (62)	2,300	55	0.8	12	5,000	1.2	1.4	12	70	
1958[e]	58 (128)	163 (64)	2,300	58	0.8	12	5,000	1.2	1.5	17[e]	70	
1964	58 (128)	163 (64)	2,100	58	0.8	15	5,000	0.8	1.3	14[e]	70	
1968	58 (128)	163 (64)[f]	2,000	55	0.8	18	5,000	1.0	1.5	13[e]	55	[f]
Recommended Dietary Allowances: Women, 35 to 55 Years of Age												
1941[c]	56 (123)		2,500	60	0.8	12	5,000	1.5	2.2	15	70	
1943[c]	56 (123)		2,500	60	0.8	12	5,000	1.5	2.2	15	70	
1945[c]	56 (123)		2,500	60	0.8	12	5,000	1.2	1.6	12	70	
1948[c]	56 (123)		2,400	60	1.0	12	5,000	1.2	1.5	12	70	
1953[g]	55 (121)	157 (62)	2,100	55	0.8	12	5,000	1.1	1.4	11	70	
1958[h]	58 (128)	163 (64)	2,200	58	0.8	12	5,000	1.1	1.5	17[e]	70	
1964	58 (128)	163 (64)	1,900	58	0.8	15	5,000	0.8	1.2	13[e]	70	
1968	58 (128)	160 (63)	1,850	55	0.8	18	5,000	1.0	1.5	13[e]	55	
Recommended Dietary Allowances: Women, 55 to 75 Years of Age												
1941[i]	56 (123)		2,100	60	0.8	12	5,000	1.2	1.8	12	70	
1943[i]	56 (123)		2,100	60	0.8	12	5,000	1.2	1.8	12	70	
1945[i]	56 (123)		2,100	60	0.8	12	5,000	1.1	1.5	11	70	
1948[i]	56 (123)		2,000	60	1.0	12	5,000	1.0	1.5	10	70	
1953[j]	55 (121)	157 (62)	1,800	55	0.8	12	5,000	1.0	1.4	10	70	
1958	58 (128)	163 (64)	1,800	58	0.8	12	5,000	1.0	1.5	17[e]	70	
1964	58 (128)	163 (64)	1,600	58	0.8	10	5,000	0.8	1.2	13[e]	70	
1968	58 (128)	157 (62)	1,700	55	0.8	10	5,000	1.0	1.5	13[e]	55	
Minimum Daily Requirements for Women[k]												
1968					0.75	10	4,000	1.0	1.2	10	30	400

[a]Small amounts of vitamin D are needed by persons not exposed to sunshine.

[b]Classified as "woman, very active," no age specification.

[c]Classified as 25-year-old women.

[d]Not applicable for the "reference" woman. The recommended allowance for moderately active women was 2,500 kcalories until 1948, at which time it was lowered to 2,400 kcalories.

[e]Niacin equivalents. Includes sources of vitamin itself plus 1 mg. equivalent for each 60 mg. tryptophan.

[f]A value of 400 I.U. is reported for 18- to 22-year-old females.

[g]Classified as "woman, moderately active," no age specification.

[h]Classified as 45-year-old women.

[i]Classified as "woman, sedentary," no age specification.

[j]Classified as 65-year-old women.

[k]Minimum daily requirement for persons 12 years of age or older except calcium (children or adults), iron (6 years of age or older), and vitamin D (infants, children, and adults). The riboflavin requirement was 2.0 mg. prior to June 1, 1957. A niacin requirement was first established June 1, 1957.

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL
RECOMMENDED DAILY DIETARY ALLOWANCES,[a] Revised 1974 (10)

Designed for the maintenance of good nutrition of practically all healthy people in the U.S.A.

	Age	Weight		Height		Energy	Protein	Fat-Soluble Vitamins				Water-Soluble Vitamins							Minerals					
								Vitamin A Activity		Vitamin D	Vitamin E Activity[e]	Ascorbic Acid	Folacin[f]	Niacin[g]	Riboflavin	Thiamin	Vitamin B_6	Vitamin B_{12}	Calcium	Phosphorus	Iodine	Iron	Magnesium	Zinc
	(years)	(kg)	(lbs)	(cm)	(in)	(kcal)[b]	(g)	(RE)[c]	(IU)	(IU)	(IU)	(mg)	(μg)	(mg)	(mg)	(mg)	(mg)	(μg)	(mg)	(mg)	(μg)	(mg)	(mg)	(mg)
Infants	0.0–0.5	6	14	60	24	kg × 117	kg × 2.2	420[d]	1,400	400	4	35	50	5	0.4	0.3	0.3	0.3	360	240	35	10	60	3
	0.5–1.0	9	20	71	28	kg × 108	kg × 2.0	400	2,000	400	5	35	50	8	0.6	0.5	0.4	0.3	540	400	45	15	70	5
Children	1–3	13	28	86	34	1,300	23	400	2,000	400	7	40	100	9	0.8	0.7	0.6	1.0	800	800	60	15	150	10
	4–6	20	44	110	44	1,800	30	500	2,500	400	9	40	200	12	1.1	0.9	0.9	1.5	800	800	80	10	200	10
	7–10	30	66	135	54	2,400	36	700	3,300	400	10	40	300	16	1.2	1.2	1.2	2.0	800	800	110	10	250	10
Males	11–14	44	97	158	63	2,800	44	1,000	5,000	400	12	45	400	18	1.5	1.4	1.6	3.0	1,200	1,200	150	18	350	15
	15–18	61	134	172	69	3,000	54	1,000	5,000	400	15	45	400	20	1.8	1.5	2.0	3.0	1,200	1,200	150	18	400	15
	19–22	67	147	172	69	3,000	54	1,000	5,000	400	15	45	400	20	1.8	1.5	2.0	3.0	800	800	140	10	350	15
	23–50	70	154	172	69	2,700	56	1,000	5,000		15	45	400	18	1.6	1.4	2.0	3.0	800	800	130	10	350	15
	51+	70	154	172	69	2,400	56	1,000	5,000		15	45	400	16	1.5	1.2	2.0	3.0	800	800	110	10	350	15
Females	11–14	44	97	155	62	2,400	44	800	4,000	400	12	45	400	16	1.3	1.2	1.6	3.0	1,200	1,200	115	18	300	15
	15–18	54	119	162	65	2,100	48	800	4,000	400	12	45	400	14	1.4	1.1	2.0	3.0	1,200	1,200	115	18	300	15
	19–22	58	128	162	65	2,100	46	800	4,000	400	12	45	400	14	1.4	1.1	2.0	3.0	800	800	100	18	300	15
	23–50	58	128	162	65	2,000	46	800	4,000		12	45	400	13	1.2	1.0	2.0	3.0	800	800	100	18	300	15
	51+	58	128	162	65	1,800	46	800	4,000		12	45	400	12	1.1	1.0	2.0	3.0	800	800	80	10	300	15
Pregnant						+300	+30	1,000	5,000	400	15	60	800	+2	+0.3	+0.3	2.5	4.0	1,200	1,200	125	18+[h]	450	20
Lactating						+500	+20	1,200	6,000	400	15	80	600	+4	+0.5	+0.3	2.5	4.0	1,200	1,200	150	18	450	25

[a] The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for more detailed discussion of allowances and of nutrients not tabulated. See Table I (p. 6) for weights and heights by individual year of age.

[b] Kilojoules (kJ) = 4.2 × kcal.

[c] Retinol equivalents.

[d] Assumed to be all as retinol in milk during the first six months of life. All subsequent intakes are assumed to be half as retinol and half as β-carotene when calculated from international units. As retinol equivalents, three fourths are as retinol and one fourth as β-carotene.

[e] Total vitamin E activity, estimated to be 80 percent as α-tocopherol and 20 percent other tocopherols. See text for variation in allowances.

[f] The folacin allowances refer to dietary sources as determined by *Lactobacillus casei* assay. Pure forms of folacin may be effective in doses less than one fourth of the recommended dietary allowance.

[g] Although allowances are expressed as niacin, it is recognized that on the average 1 mg of niacin is derived from each 60 mg of dietary tryptophan.

[h] This increased requirement cannot be met by ordinary diets; therefore, the use of supplemental iron is recommended.

APPENDIX B

CHECK LIST FOR ASSESSMENT OF NUTRITIONAL STATUS

CHECK LIST FOR ASSESSMENT OF NUTRITIONAL STATUS (19)

Part I

(To be completed by trained staff member, physician's assistant, or other)

	YES	NO
Usual body weight 20% above or below desirable?		
Recent loss or gain of 10% of usual body weight?		
Any evidence that income and meals are not adequate for needs:		
More than half of meals eaten away from home?		
Does patient live alone and prepare own meals?		
Ill fitting dentures?		
Excessive use of alcohol?		
Frequent use of fad diets, or monotonous diets?		
Any chronic disease of GI tract? (describe)		
Has there been any surgical procedure on GI tract (other than appendectomy? (describe)		
Recent major surgery, illness, or injury?		
Recent use of large doses of:		
catabolic steroids?		
immunosuppressants?		
anti-tumor agents?		
anti-convulsants?		
anti-biotics?		
oral contraceptives?		
vitamins?		
other?		
Has patient been maintained more than 10 days on intravenous fluids?		
Any reason to anticipate that patient will be unable to eat for 10 days or longer?		
Is patient known to have:		
diabetes?		
hypertension?		
hyperlipidemia?		
coronary artery disease?		
malabsorption?		
chronic lung disease?		
chronic renal disease?		
chronic liver disease?		
circulatory problem or heart failure?		
neurological disorder or paralysis?		
mental retardation?		

(Note: If all answers to the above items are "No", the patient may be regarded as a "low-risk" or "acceptable risk." The risk increases in direct proportion to the number of "Yes" answers. Patients with more than 3 "Yes" answers should be considered at an increased risk of developing medical complications, unless special attention is given to providing their nutritional requirements.)

Part II

(To be completed by dietitian)

Description of recent food consumption patterns, eating habits, and meal composition.
Circumstances of food purchase, storage and preparation in the home.
Estimate of daily average caloric consumption.
Estimate of energy expenditure (e.g. low, average, or high level of physical activity).
Estimate of possible nutrient deficiencies, based on suspected imbalances.
Food tray viewed

Part III

(To be completed by nursing staff)

Estimate of actual food consumption, including any provided by non-hospital sources.
Estimate of fluid intake.
Estimate of stool frequency, urinary losses, losses by suction tube, drainage, etc.
Behavior patterns, eccentricities, vomiting (including surreptitious vomiting).
Careful recording of body weight at regular intervals.

Table 1

Table 2
THE PHYSICAL EXAMINATION

General appearance—obese? skinny?
Head—bossing, deformities, craniotabes (under 1 year old)
Eyes—ophthalmoplegia, cataracts, xerosis, Bitot's spots, retinal hemorrhage, papilledema, night blindness
Mouth—glossitis, gingivitis, caries, periodontal disease, cheilosis, ageusia, dysgeusia
Nose—anosmia, dysosmia, nasolabial seborrhea
Skin—pallor, abnormal pigmentation (carotenemia, hemochromatosis), follicular hyperkeratosis, bruises, peri-follicular petechiae, pellagrous dermatitis, flaky-paint dermatitis, fistulas, status of wound healing, subcutaneous fat and skin-fold thickness, edema
Hair—easy-pluckability, sparseness, depigmentation
Nails—friability, bands and lines
Neck—goiter
Heart—enlargement, high-output failure, resting tachycardia
Lungs—none? Use of accessory muscles to breathe?
Abdomen—enlarged (fatty) liver, distended loops of bowel, ascites, varices
Genito-urinary—secondary sexual characteristics, hypogonadism, delayed onset of puberty
Skeletal—epiphyseal thickening, bowing, rachitic rosary, osteoporosis, frog leg position, tenderness
Muscle—atrophy, wasting, hemorrhage, pain
Joints—effusions, arthralgia
Neurol—foot drop, confabulation, improper position and vibratory sense, hyperreflexia, hyporeflexia, irritability, convulsions

Table 3
EXAMPLES OF SOME "HIGH-RISK" PATIENTS

1. Patients who are grossly overweight, or grossly underweight (the former because of a tendency on the part of some physicians to overlook protein requirements; the latter because of limited protein reserves in organs and lean body mass)
2. Any patient with prior maldigestion, malabsorption, or inadequate mutrient intake, e.g.
   a. pancreatic insufficiency
   b. celiac disease; Crohn's disease; surgical removal of portions of stomach or small bowel; small bowel by-pass, congenital malformations of GI tract
   c. chronic alcoholism, anorexia nervosa; any form of dietary faddism or abuse
   d. patients maintained for more than 10 days on simple solutions of glucose and saline
3. Patients with increased metabolic requirements, e.g. fever, infection, trauma, hyperthyroidism, pregnancy, burns, infancy
4. Patients with external losses, e.g. draining fistulas, wounds, abscesses, effusions, exudative enteropathies, chronic blood loss; chronic renal dialysis
5. Any patient who is likely to be unable to consume adequate amounts of food for 10 days (especially if reserves are limited), e.g. head and neck trauma; injury or surgery involving GI tract.

APPENDIX C

PATIENT CONSENT FORM

PATIENT CONSENT FORM

A study is being conducted at Baptist Hospital on the volume of food eaten compared with the volume served to patients on selected diets. This information will be given to the medical and dietary departments to assist in planning future meals for patients on these diets. We request your cooperation. If you are willing to participate in this, please sign below.

I agree to participate in a study on the volume of food eaten compared to the volume served to me during my hospitalization and to be interviewed with regard to my food habits.

I have the right to discontinue this participation if I should so wish by notifying the interviewer.

_____ Date

_____ Signature

APPENDIX D

RECORDING FORMS

RECORDING FORM FOR PATIENT FOOD SERVICE

NAME _____ ROOM _____ BED _____

DOCTOR _____ DIET _____

DAY BEGAN _____ ENDED _____ DIAGNOSIS _____

CHART INFORMATION:

Weight _____

Age _____

Sex _____

COMMENTS:

_____

_____

_____

MENU	I.D.#	SERVED	RETURNED	CONSUMED

COMMENTS:

APPENDIX E

INTERVIEW SCHEDULE

CONCLUDING INTERVIEW SCHEDULE

1. Did you enjoy your meals during your stay in the hospital
   _____ Yes _____ No _____ Sometimes

2. Did you think the food was cooked
   _____ To proper doneness _____ Overcooked _____ Undercooked

3. Did your food taste good (seasoned properly)
   _____ Yes _____ No _____ Sometimes

4. Did the meal look appetizing
   _____ Yes _____ No _____ Sometimes

5. Was the hot food hot when you received it
   _____ Yes _____ No _____ Sometimes

6. Was the cold food cold when you received it
   _____ Yes _____ No _____ Sometimes

7. Was there enough variety in the menu within the week
   _____ Yes _____ No _____ Sometimes

8. What is your opinion of the timing of the meals
   _____ Satisfactory _____ Not often enough _____ Too frequent

9. At home, what do you normally eat when you get up
   _____ Hot cereal _____ Sweet roll _____ Other
   _____ Cold cereal _____ Juice/fruit _____ Nothing
   _____ Eggs _____ Milk
   _____ Toast _____ Coffee

10. When is the next time you eat something
    _____ Midmorning _____ Lunch _____ Other

11. What do you normally eat at that time
    _____ Fruit/Juice _____ Vegetable _____ Dessert
    _____ Sandwich _____ Bread _____ Other
    _____ Meat _____ Milk _____ Nothing

12. When do you next eat something
    _____ Lunch _____ Midafternoon _____ Dinner _____ Other

13. What do you normally eat at that time
    _____ Fruit/Juice _____ Vegetable _____ Tea
    _____ Sandwich _____ Bread _____ Dessert
    _____ Salad _____ Coffee _____ Other
    _____ Meat _____ Milk

CONCLUDING INTERVIEW SCHEDULE - CONTINUED

14. Do you eat anything during the afternoon

_____ Yes _____ No _____ Sometimes

15. What do you eat then

_____ Fruit/Juice _____ Dessert _____ Other
_____ Sandwich _____ Milk
_____ Snack Food _____ Coffee

16. Of what does your last meal of the day consist

_____ Fruit/Juice _____ Vegetable _____ Tea
_____ Sandwich _____ Bread _____ Dessert
_____ Meat _____ Milk

17. Do you eat a snack in the evening

_____ Yes _____ No _____ Sometimes

INTERVIEW SCHEDULE AT CONCLUSION

OF EACH MEAL

1. Did you enjoy your meal?
   _____ Yes _____No

   If the answer was negative or if there were food left on the tray, the following question was asked:

2. What reason(s) can you give for not enjoying the meal or for leaving food on the tray?

APPENDIX F

PERCENTAGE OF RDA OF NUTRIENTS SERVED

PERCENTAGE OF THE RDA OF NUTRIENTS SERVED

I.D.	Age	Sex	Diet	Cal.	Pro.	Ca.	Iron	Vit. A	Thi.	Ribo.	Ascor. Acid
A	59	M	Low Calcium	106	152	41	163	199	122	88	376
B	37	F	Low Calcium	89	135	35	71	140	102	77	185
C	36	M	Low Fat 40 meq. Na	73	151	128	116	291	77	128	254
D	58	M	Bland C	77	144	109	121	195	76	116	181
E	39	F	100 gm. Fat	114	225	118	98	285	151	205	354
F	36	F	100 gm. Fat	110	224	91	99	270	127	167	328
G	43	M	1000 cal. 40 meq. Na	40	155	98	138	128	60	114	264
H	63	F	Bland C	131	225	169	159	275	141	254	275
I	48	M	Low Fat 80 meq. Na	69	182	110	167	166	104	148	312
J	64	M	Bland B	96	179	171	145	188	98	165	208
K	69	F	House	137	221	119	150	304	158	192	320
L	62	M	Anti-Dumping	77	198	70	160	168	62	85	111
M	28	F	House	95	152	72	63	208	97	115	229
N	47	M	40 meq. Sodium	66	134	63	142	134	84	98	262
O	76	F	Low Residue	139	225	87	164	213	110	142	222
P	61	F	3000 cal. 40 meq. Na	98	199	54	164	223	128	147	398
Q	51	F	Na and K Control	121	149	65	156	236	133	148	299
R	40	M	Low Chol. 80 meq. Na	82	201	97	209	201	114	139	312
S	81	F	Soft 80 meq. Na	111	190	100	157	256	127	178	248
T	82	M	80 meq. Sodium	90	182	114	164	158	109	141	302
U	33	M	Bland C	104	199	201	146	237	92	179	185
V	63	F	House	116	163	90	127	358	121	143	285
W	68	M	Bland C	105	183	163	158	219	112	184	225
X	45	M	Low Chol.	81	206	115	178	206	114	153	335
Y	19	F	House	94	166	131	63	307	93	135	232
Range				40-139	134-225	35-204	63-209	128-358	60-158	77-254	111-398

APPENDIX G

PERCENTAGE OF RDA OF NUTRIENTS EATEN

PERCENTAGE OF THE RDA OF NUTRIENTS EATEN

I.D.	Age	Sex	Diet	Cal.	Pro.	Ca.	Iron	Vit. A	Thi.	Ribo.	Ascor. Acid
A	59	M	Low Calcium	87	145	36	151	167	112	80	359
B	37	F	Low Calcium	52	105	18	46	43	72	49	114
C	36	M	Low Fat 40 meq. Na	49	101	75	75	61	52	80	192
D	58	M	Bland C	62	125	94	101	155	61	102	119
E	39	F	100 gm. Fat	103	205	93	91	238	133	170	324
F	36	F	100 gm. Fat	81	181	43	80	113	101	107	253
G	43	M	1000 cal. 40 meq. Na	34	146	89	117	83	47	103	191
H	63	F	Bland C	78	127	108	82	103	84	153	199
I	48	M	Low Fat 80 meq. Na	68	180	107	162	126	102	145	298
J	64	M	Bland B	56	101	84	80	48	39	86	103
K	69	F	House	91	143	78	94	96	97	129	186
L	62	M	Anti-Dumping	50	115	43	90	61	41	52	55
M	28	F	House	48	84	26	35	64	50	54	106
N	47	M	40 meq. Sodium	36	72	31	91	79	53	55	231
O	76	F	Low Residue	91	151	28	119	127	76	70	68
P	61	F	3000 cal. 40 meq. Na	44	102	27	74	115	51	77	202
Q*	51	F	Na and K Control	121	149	65	156	236	133	148	299
R	40	M	Low Chol. 40 meq. Na	70	187	81	191	127	101	121	245
S	81	F	Soft 80 meq. Na	91	164	92	130	203	110	163	241
T	82	M	80 meq. Sodium	71	141	102	121	122	82	117	201
U	33	M	Bland C	94	182	184	124	106	79	164	143
V	63	F	House	78	103	40	78	135	61	75	198
W	68	M	Bland C	92	152	149	128	178	92	166	193
X	45	M	Low Chol.	55	137	87	117	144	66	101	238
Y	19	F	House	31	67	73	10	23	25	65	29
Range				31-121	67-205	18-184	10-191	23-238	25-133	49-170	29-359

* Patient Q was required to eat all food served; therefore, the nutrients served as well as eaten are the same.

APPENDIX H

PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN

PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN
EXPRESSED AS RAW DATA

I.D.	Age	Sex	Diet	Cal.	Pro.	Ca.	Iron	Vit. A	Thi.	Ribo.	Ascor. Acid
A	59	M	Low Calcium	82	96	87	90	84	91	91	95
B	37	F	Low Calcium	59	78	51	65	31	71	62	62
C	36	M	Low Fat 40 meq. Na	67	67	59	65	21	68	63	76
D	58	M	Bland C	81	87	86	83	79	80	87	65
E	39	F	100 gm. Fat	90	91	78	94	84	88	83	92
F	36	F	100 gm. Fat	73	81	48	80	42	80	64	77
G	43	M	1000 cal. 40 meq. Na	84	94	92	85	65	79	90	72
H	63	F	Bland C	60	56	63	51	37	59	60	73
I	48	M	Low Fat 80 meq. Na	98	99	98	97	76	97	98	96
J	64	M	Bland B	58	56	49	54	25	40	52	50
K	69	F	House	66	65	66	63	32	61	67	58
L	62	M	Anti-Dumping	64	58	61	56	36	65	61	50
M	28	F	House	51	55	36	56	31	52	47	46
N	47	M	80 meq. Sodium	54	54	49	64	59	64	57	88
O	76	F	Low Residue	65	64	33	73	59	69	50	31
P	61	F	3000 cal. 40 meq. Na	44	51	50	45	52	40	52	51
Q	51	F	Na and K Control	100	100	100	100	100	100	100	100
R	40	M	Low Chol. 80 meq. Na	86	93	81	91	63	89	87	78
S	81	F	Soft 80 meq. Na	82	83	92	83	79	87	91	97
T	82	M	80 meq. Sodium	79	77	90	74	77	76	83	67
U	33	M	Bland C	90	91	90	85	45	85	92	77
V	63	F	House	67	63	44	61	38	50	53	69
W	68	M	Bland C	87	83	91	81	81	82	91	86
X	45	M	Low Chol.	67	66	76	65	70	58	66	72
Y	19	F	House	33	40	56	16	7	26	48	12
RANGE*				33-98	40-99	33-98	16-97	7-84	26-97	47-98	12-97
AVERAGE				71	74	69	71	55	70	72	70

* Ranges do not include Patient Q who consumed one hundred per cent of that served. However, that person was included in the average percentage.

PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN
GROUPED BY NUTRIENTS

Calories	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served		1	3	10	8	3							
Eaten		7	7	9	2								

Protein	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served						4	6	8	7				
Eaten			2	1	7	7	3	4	1				

Calcium	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served		2	5	6	6	2	3		1				
Eaten	1	8	3	8	3	1		1					

Iron	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served			3	2	2	6	10	1	1				
Eaten	1	2	2	8	6	2	3	1					

PERCENTAGE OF NUTRIENTS SERVED THAT WAS EATEN
GROUPED BY NUTRIENTS - CONTINUED

Vitamin A	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served						3	3	3	6	2	3	2	3
Eaten		2	3	3	5	5	2	1	1	2			

Thiamin	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served			2	7	9	5	2						
Eaten	1	4	7	6	5	2							

Riboflavin	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served				4	3	9	3	4	1	1			
Eaten		1	6	4	6	3	5						

Ascorbic Acid	0-25%	26-50%	51-75%	76-100%	101-125%	126-150%	151-175%	176-200%	201-225%	226-250%	251-275%	276-300%	301-above
Served					1			3	3	3	4	2	9
Eaten		1	2	4	1			6	2	4	1	2	2