DIETARIES IN MATERNITY HOSPITALS

BY

E. W. H. CRUICKSHANK, D.Sc., Ph.D., M.D.

AND

C. P. STEWART, M.Sc., Ph.D.

From the Department of Physiology, Marischal College, Aberdeen, and the Biochemical Laboratory, The Royal Infirmary, Edinburgh

Several comprehensive studies of hospital feeding have been planned to show as precisely as possible the nutritive value of representative diets provided in hospitals for patients and staff. The Scientific Advisory Committee of the Department of Health for Scotland has been carefully examining the problem of hospital diets and has made surveys and will publish a report in due course.

The purpose of this survey, which was carried out under the aegis of the Subcommittee on Nutrition of the Department of Health for Scotland, was to determine the nutritive value of diets provided to nursing mothers while in hospital. Fifteen hospitals were visited during the period February to August 1945; 8 were voluntary hospitals, and, of these, 2 were solely maternity hospitals; 5 were local authority hospitals, and, of these, 4 formed parts of general hospitals; and 2 were E.M.S. hospitals, both of these dealing only with maternity cases. Except for the north-west area of Scotland, the hospitals, urban and rural, were representative of the maternity hospital service in Scotland. The kitchens were of various sizes, the smallest catering for some 60 persons (staff and patients), the largest for 2,000. The results of the surveys show that there was no correlation between the dietary standard and the type of hospital, its size and location or the season of the year when the survey was made.

METHODS

Surveys were carried out throughout one week in each hospital. The ward containing the greatest number of beds was chosen, and when practicable more than one ward was included. Usually the wards contained both antenatal and postnatal patients but little differentiation, in most cases none at all, was found between the feeding of these two groups. All aspects of the catering service were observed, and particularly those concerning the condition of the food as it reached the patients.

Hospital meals

During the survey an extra diet was ordered each day for the ward concerned, and at every meal time a sample serving of each dish provided was chosen and the contents weighed. Bread, milk, tea, etc., were averaged daily on the individual

intake of six or more patients at separate meals: general and plate wastage was observed. Calculations of carbohydrate, protein, animal protein, and fat in each day's diet were made: an estimation of mineral salts and vitamins was made from a daily average of the total intake of the various foods contained in the week's diet as a whole. Extras were checked by a detailed examination of a chosen number of patients in each ward.

"Extras"

Six patients were chosen: in each case, a record of the weight of foodstuffs already in the possession of individual patients was kept, and all additions that were made throughout the week. The amount of food wasted, given away, or otherwise disposed of, and also the amount which remained, were deducted at the end of the week and a daily average intake was calculated in each case. Finally, an average of the "extras" consumed by the six patients was taken.

The basis of calculations

The calculations of the various nutrients were made from the Medical Research Council's *Nutritive Values of War-time Foods* (War Memo. No. 14, 1944), and from *The Chemical Composition of Foods* (McCance and Widdowson, 1940). Vitamin C values are in every case the result of analyses by one of us (C.P.S.) of foods taken at the time of serving. Made up foods, and unknown and doubtful articles of diet, such as sausages, were analysed chemically, and the food values of soups, sauces, etc., were calculated from the actual quantities of the ingredients used in their preparation in the hospital kitchen.

Standards of comparison

In determining the adequacy of a diet the nutrient requirements of the community or group under examination must be estimated. In all dietary surveys the difficulty of determining a standard of comparison is ever present. Numerous dietary standards of required nutrients have been published, e.g. that suggested by the National Research Council, U.S.A. (1941), but this does not necessarily give the minimal amount compatible with health. Indeed it is now generally accepted that, as far as this country is concerned, the National Research Council requirements are in most cases well above the optimum for health. It should also be borne in mind that these requirements are for nursing mothers who are not confined to bed, that they are supplied by food as purchased, that, in following them, allowance has been made for losses in storage and preparation as well as in absorption and utilization of the foodstuff.

To arrive at a standard of comparison, a diet was devised which was regarded as possible within the existing conditions of food rationing and supply, and which would generally be accepted as good. The composition of the diet in terms of nutrients was calculated, and thus a reasonable target was adopted, the attainment of which was certainly possible for every maternity hospital. It should, however, be emphasized that the target represents *the food consumed* by the subject, that allowance has been made only for unavoidable losses, and that the attainment of

such a target from the foods suggested demands a higher standard of preparation and cooking than that which generally obtains. The suggested diet is shown in Table I. The calculated average daily consumption of nutrients from the suggested

TABLE I
SUGGESTED MATERNITY DIET.—CALCULATIONS BASED ON THE M.R.C. "NUTRITIVE VALUE OF WAR-TIME FOODS"

	Average g. per day	Calories	Protein	Fat	Cho.	Ca. Mg.	Fe. Mg.	Vitamin A I.U.	Thiamin µg.	Riboflavin µg.	Nicotinic acid mg.	Vitamin C mg.
Milk ..	1,150	723	37.0	41.4	50.6	1,380.0	1.15	805	518	1,725	24.0	7
Margarine ..	17	131	—	14.5	—	0.7	.05	340	—	—	—	—
Butter ..	8	60	—	6.6	—	1.2	.01	320	—	—	—	—
Cocoa ..	6	26	1.2	1.5	1.9	3.1	.86	3	7	—	—	—
Sugar ..	32	115	—	—	30.4	0.3	—	—	—	—	—	—
Egg, fresh 15g. } dried 10g. }	25	35	2.8	2.5	0.2	15.0	.75	220	38	88	.10	—
Bacon ..	10	45	0.8	4.7	—	0.9	.09	—	41	20	.11	—
Meat (rationed) ..	30	60	4.8	4.5	—	3.0	1.10	14	23	60	.36	—
Bread, buns, etc., 150 } 50 }	200	498	17.2	2.0	102.8	108.0	2.40	—	257	105	.68	—
Cabbage, greens ..	50	13	0.8	—	2.5	33.0	.50	150	38	25	.02	9
Semolina, etc. ..	12	41	1.3	0.2	8.3	2.2	.12	—	11	8	.04	—
Flour ..	20	69	2.4	0.3	14.2	16.4	.32	—	49	40	.09	—
Potato ..	160	117	3.2	—	25.9	12.8	1.10	—	192	80	.32	16
Carrots ..	20	4	0.1	—	1.0	9.6	.12	1,333	12	10	.04	1
Turnips ..	15	3	0.1	—	0.5	8.9	.06	—	5	8	.03	2
Cheese ..	8	29	1.8	2.5	—	58.0	.05	104	2	40	—	—
Jam ..	16	40	—	—	9.9	1.9	—	1	—	—	—	1
Oatmeal ..	28	109	3.3	2.4	18.3	15.4	1.14	—	126	8	.08	—
Cooking fat ..	13	116	0.1	12.9	—	—	.01	—	—	—	—	—
Beans, peas ..	20	58	4.4	—	10.2	6.6	1.08	13	90	60	.02	—
Fish { fatty ..	20	27	3.2	1.6	—	20.0	.30	30	2	30	.16	—
{ white ..	20	14	3.2	0.1	—	5.0	.20	—	12	30	.10	—
Raisins ..	4	8	—	—	2.3	2.4	.06	1	—	1	.01	—
Prunes ..	8	11	0.2	—	2.6	2.7	.12	66	—	2	.16	—
Barley ..	4	13	0.3	0.1	2.9	0.4	.03	—	3	3	.01	—
Macaroni ..	6	20	0.6	0.1	4.2	1.6	.08	—	5	—	.02	—
Spam ..	9	23	1.4	1.9	—	0.9	.18	—	40	3	.06	—
Bridie ..	14	51	1.5	3.2	3.9	2.1	.28	—	14	2	.07	—
Black pudding ..	9	23	0.9	1.6	1.2	2.7	.09	—	15	6	.05	—
Sausage ..	9	23	0.9	1.6	1.2	2.7	.09	—	15	6	.05	—
Tripe (or other offal) ..	16	13	2.4	0.7	—	1.2	.28	—	4	12	.13	—
Rabbit ..	16	13	2.4	0.7	—	1.2	.28	—	4	12	.13	—
Baked beans ..	14	12	0.8	—	2.2	7.7	.35	23	8	5	.03	—
Stewed apple ..	12	2	—	—	0.5	0.2	.01	6	5	—	—	—
Onion ..	6	1	—	—	0.3	1.6	.02	—	1	—	—	—
Totals ..		2,546	99.1	107.6	298.0	1,729.4	13.28	3,429	1,537	2,389	27	36

NOTES

Bread: taken as 150 g. bread plus 50 g. buns calculated as bread except for thiamin and riboflavin, which are taken as 50% of the bread figure.

Milk: Vitamin A—winter figure used.

Butter: calculated at 2,000 I.U. Vitamin A per 100 g.

Thiamin: 15% of total allowed for cooking losses, etc.

Vitamin C: cooking losses taken as 75% for green vegetables and 50% for other vegetables.

Thiamin: 1,537 µg. less 15%—1,306 µg.=1.3 mg.

MENU FOR WEEK

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
BREAKFAST Porridge and Milk Bacon Fried bread Bread and margarine Tea	Porridge and Milk Herring Marmalade Bread and margarine Tea	Porridge and Milk Omelette (dried egg) Bread and margarine Tea	Porridge and Milk Bacon Bread and margarine Tea	Porridge and Milk Sausage Bread and margarine Tea	Porridge and Milk Black pudding Marmalade Bread and margarine Tea	Porridge and Milk Egg, boiled, etc. Bread and margarine Tea
MID-MORNING Milk or milk shake Bun or biscuit	Milk or milk shake Bun or biscuit	Milk or milk shake Bun or biscuit	Milk or milk shake Bun or biscuit	Milk or milk shake Bun or biscuit	Milk or milk shake Bun or biscuit	Milk or milk shake Bun or biscuit
DINNER Vegetable broth Stewed rabbit Carrot, turnip Onion Beans/peas Potato Semolina Stewed apple Milk	Split pea soup Spam Green salad, etc., or cooked greens Potato Steamed jam or syrup pudding Custard Milk	Potato soup Mince Cabbage Potato Semolina/prunes Milk	Brown vegetable soup Macaroni cheese Cauliflower Potato Chocolate cornflour pudding Milk	Bean/pea soup White fish Parsley sauce Potato Steamed fruit pudding Custard Milk	Vegetable broth Steak pie Brussels sprouts Potato Custard pudding Milk	Barley soup Roast beef or mutton Cabbage Potato Semolina Raisin pudding Milk
TEA Bread and butter Scone or bun Jam Tea	Bread and butter Scone or bun Madeira cake Tea	Bread and butter Scone or bun Jam Tea	Bread and butter Scone or bun Sponge cake Tea	Bread and butter Scone or bun Jam Tea	Bread and butter Scone or bun Fruit cake Tea	Bread and butter Scone or bun Gingerbread Tea
SUPPER Shepherd's pie Bread and margarine Milk/cocoa	Tripe (or offal) Bread and margarine Coffee blanc-mange	Bridie Baked potatoes or chips Bread and margarine Milk/cocoa	Baked beans Roast potatoes Bread and margarine Milk	Egg (fresh) Bread and margarine Raspberry blanc-mange	Welsh rarebit Bread and margarine Milk/cocoa	Sardines Salmon Bread and margarine Chocolate mould
LATE EVENING Milk/cocoa	Milk/cocoa	Milk/cocoa	Milk/cocoa	Milk/cocoa	Milk/cocoa	Milk/cocoa

diet is shown in Table II; this Table constitutes the target with the exception of the figure of 2,500 for calories. The following points concerning the nutrients suggested should be noted.

1. *Calories*.—The number of calories, 2,546, or 2,500 per day as a round number, while lower than that suggested by the National Research Council for a lactating woman, represents approximately the amount of food which can be eaten by nursing mothers who are confined to bed. It has been found almost impossible to get hospital patients to eat a daily diet of 3,000 Calories.

TABLE II

	Calculated average daily consumption of nutrients from the suggested diet	Recommended daily allowance, Food and Nutrition Board, National Research Council
Calories	2,546	3 000
Carbohydrate	298 g.	—
Protein	99 g.	100 g.
Animal protein	60 g.	—
Fat	108 g.	—
Calcium	1.7 g.	2 g.
Iron	13 mg.	15 mg.
Vitamin A	3,429 I.U.	8,000 I.U.
Thiamin	1.3 mg.	2.3 mg.
Riboflavin	2.4 mg.	3.0 mg.
Nicotinic acid	27 mg.	23 mg.
Ascorbic acid	36 mg.	150 mg.

2. *Protein*.—The target figure for animal protein, 60 g. per head per day, is essentially a sound requirement.

3. *Vitamins*.—*Vitamin A*.—The content of Vitamin A, 3,429 I.U. per head per day, is but half the N.R.C. figure. It could easily be increased, e.g. 2 oz. of sheep's liver per week would raise the figure to the region of 6,000 I.U. per day. The difficulty of obtaining liver today simply rules liver out of such a target diet.

Thiamin (B₁).—The target of 1.3 mg. per head per day is regarded as ample for women living under hospital conditions.

Vitamin C.—In view of the N.R.C. requirement of 150 mg. per head per day, the target figure, 36 mg. per head per day may be regarded as wholly inadequate. Details of the survey certainly show how low is the intake of vitamin C. Recent work on vitamin C requirements has enforced a revision of our ideas as to what is an adequate intake of this vitamin: 36 mg. of ascorbic acid per day are regarded as adequate for nursing mothers under hospital conditions. There are no reasons why this amount should not be secured within the range of an ordinary diet. This corresponds to about 100 mg. per day in the "as purchased" basis, since a combined wastage and cooking loss may amount to 60%.

TOTAL FOOD CONSUMPTION

This includes food supplied by the hospital and the relatives and friends of the patients.

Calories

The mean for all hospitals was 2,284 Calories, not very far below the suggested target of 2,500 Calories. The range was considerable, from 1,901 Calories in a large urban hospital with over 200 maternity beds, to 2,679 Calories in a rural hospital of 30 maternity beds. This cannot be regarded as indicating that rural hospitals are always better off than the city hospitals, because one rural hospital supplied 2,206, and a small town hospital 2,071, and a large city hospital 2,508 Calories per head per day (Table III). With respect to total calories, of nine large

TABLE III
CALORIES AND PROTEIN IN DIETS IN MATERNITY WARDS OF SCOTTISH HOSPITALS
Target: Calories=2,500. Protein=99 g. Animal Protein=60 g.

No.	Total food consumption			Food supplied by hospital		
	Calories	Total protein	Animal protein	Calories	Total protein	Animal protein
1	2,508	88	46	1,941	78	46
2	2,114	79	39	1,690	69	39
3	2,321	79	40	1,829	70	40
4	2,054	68	34	1,615	60	34
5	1,901	78	43	1,648	73	43
6	2,357	70	28	1,495	58	28
7	2,110	84	48	1,929	81	48
8	2,625	107	54	2,270	100	54
9	2,363	81	42	2,173	79	42
10	2,435	86	47	1,894	76	47
11	2,212	80	36	1,695	68	36
12	2,071	76	42	1,845	70	42
13	2,310	84	45	2,054	77	45
14	2,679	93	50	2,647	91	50
15	2,206	79	38	1,986	76	38
Average	2,284	82.1	42.1	1,914	75.1	42.1

city hospitals only one was above the target; of the smaller towns and rural hospitals, two out of six were above the target. Since practically all the beds in our maternity hospitals are occupied, it is of interest to note the number of patients who, in large city and small town and rural hospitals, are supplied with a diet which, in terms of energy, is above or below the number of required calories. The number of beds in the maternity wards of the large city hospitals was 610, in the smaller towns and rural hospitals 263 (see Table IV). Out of 610 patients in the large city hospitals, 68 were above, 542 below the average in calories, i.e. 11.1 and 88.9% respectively. Out of the 263 patients in smaller towns and rural area hospitals, 60 were above, 203 below the target for calories, i.e. 22.8 and 77.2% respectively. Therefore, on the assumption that all the beds were occupied, it is

apparent that out of a total of 873 patients, 745 or 85.3% were below, and 128 or 14.7% were above the calorie target (Table IV).

Protein.—The standard of comparison demands 99 g. of total protein and 60 g. of animal protein per head per day; the average figures were 82.1 g. and

TABLE IV

TABLE SHOWING THE NUMBER OF BEDS IN HOSPITALS IN WHICH THE DIET SUPPLIED BY HOSPITAL AND PATIENTS IS ABOVE OR BELOW THE CALORIE REQUIREMENT
The Target for Calories=2,500.

Large cities			Small towns and rural areas		
No.	Above	Below	No.	Above	Below
1	68		7		24
2		40	8	30	
3		90	12		66
4		60	13		73
5		205	14	30*	
6		30	15		40
9		38			
10		43			
11		36			
	68	542		60	203
Total beds	610			263	
Per cent	11.1	88.9		22.8	77.2

Total above. 128=14.7%

Total below. 745=85.3%

* The only hospital supplied with a diet giving more than 2,500 calories.

TABLE V

TABLE SHOWING THE NUMBER OF BEDS IN HOSPITALS IN RELATION TO PROTEIN IN THE DIET SUPPLIED BY THE HOSPITALS

The Target for Total Protein=99 g. All but one below.

The Target for Animal Protein=60 g. All below.

The number of beds in hospitals in which the animal protein of the diet is above or below 40g.

Large cities				Small towns and rural areas			
No.	Above 40 g.	No.	Below 40 g.	No.	Above 40 g.	No.	Below 40 g.
1	68	2	40	7	24	15	40
3	90	4	60	8	30		
5	205	6	30	12	66		
9	38	11	36	13	73		
10	43			14	30		
	444		166		223		40
Total	610			263			
Per-centage	72.8		27.2		84.7		15.3

Total above 40 g. 667=76.4%

Total below 40 g. 206=23.6%

42.1 g. per head per day respectively. The range for total protein was 68 to 107 g. per day, one hospital only exceeding the target; for animal protein the range was 28 to 54 g. per head per day. The deficiency in total protein was 17%, in animal protein it was 30%; the latter is a very serious deficit.

Fat.—In this nutrient there was a 16% deficiency, which, in view of the non-active life of the nursing mother in hospital, may be less seriously regarded; but nevertheless the fat deficiency, coupled with lack of animal protein, has been responsible for the monotony of our wartime dietaries.

Carbohydrate.—This, while generally adequate, could bear some increase (Table VI).

TABLE VI
FAT AND CARBOHYDRATE IN MATERNITY HOSPITAL DIETS WITH THE AVERAGE DAILY AMOUNTS
OF EACH SUPPLIED BY THE HOSPITAL AND PATIENT'S FRIENDS
Fat (g.) *Carbohydrate (g.)*
Target=108 g. *Target=298 g.*

	Hospital	Patient's friends	Total	Hospital	Patient's friends	Total
1	83	21	104	217	85	302
2	59	15	74	222	62	284
3	71	16	87	226	64	290
4	65	22	87	198	53	251
5	66	7	73	192	43	235
6	42	40	82	222	113	335
7	79	7	86	225	26	251
8	90	15	105	265	47	312
9	85	5	90	273	33	306
10	76	21	97	226	78	304
11	65	22	87	211	69	280
12	78	9	87	220	30	250
13	86	12	98	244	32	276
14	114	2	116	316	3	319
15	77	8	85	249	34	283
Average	75.7	14.8	90.5	233.7	51.4	285.2
Percentage deficiency	30	—	16	22	—	4
% Amount supplied by	84	16		82	18	

Calcium.—An average of 1.28 g. per day with a range of 0.97 to 1.51 g., indicates a deficiency in the diet of nursing mothers.

Vitamins.—*Vitamin A* is seriously deficient in all diets. The average intake was 2,496 I.U. per head per day; the target demands 3,429 I.U. per head per day. The range was 1,886 to 3,750 I.U. per head per day. Only four hospitals could show an intake of over 3,000 I.U. daily, and only one hospital exceeded the target by 300 I.U.

Vitamin B₁.—The target requires 1.3 mg. per head per day, and the average was 1.37 mg. per head per day; the range was 1.09 to 1.80 mg. It should be noted that the figures were satisfactory because of the use of high-extraction flour.

Vitamin B₂ (Riboflavin).—Target 2·4 mg.; average 2·0 mg. per head per day; range 1·60 to 2·43 mg.

Vitamin C.—The figures for vitamin C are of interest in that they are so markedly less than the N.R.C. requirements. As a result of the maximum amount of the vitamin that could possibly be secured by the suggested diet, the target was set at 36 mg. per head per day. Numerous dietary surveys of children and of members of the Forces have indicated that the generally accepted standard for this vitamin is probably far too high. One may criticize the target figure as too low: what can be said in defence of it is that it is about all one can secure in this land of austerity, and the surveys referred to do not entirely condemn it. The target of 36 mg. per head per day was almost attained, the average being 31·2 mg. per head per day. We may admit that the standard is somewhat austere, but the degree to which some hospitals have failed to reach it is interesting. Three large city hospitals and one smaller town hospital were above the target, which means that 74% of hospitals do not reach the target; neither of the rural hospitals reached it.

FOOD SUPPLIED BY THE HOSPITALS

Since the total nutrient consumption falls short of the target in almost every particular, it is obvious that the food supplied by the hospitals must do so to an even greater extent. The extent whereby diets are supplemented by gifts of food varies greatly, but nevertheless no patient in hospital should be dependent on extraneous food supplies. Apart from the fact that the food supplied by relatives and friends is or may be nutritively unbalanced, it is entirely wrong to rely upon such supplies. It should be the aim—as it is the duty—of all hospitals to supply the full quota of required nutrients.

Calories.—The average energy intake by food supplied by the hospitals was 1,914 Calories per day (Table III). The range was 1,495 to 2,647 Calories. The range for a single day was tremendous, the highest being 3,002 Calories and the lowest 1,418 Calories. Out of 15 hospitals surveyed only one, a rural hospital of 30 beds, supplied a diet which exceeded the target for calories. In terms of possible patients in 873 beds in the hospitals examined, 30, i.e. 3·4%, received a diet supplying over 2,500 Calories per day. Four out of 15 hospitals gave over 2,000 Calories, which means that 73% of hospitals supplied, for their maternity patients, a diet containing less than 2,000 Calories (Table III). After a careful survey of diets as eaten daily for seven consecutive days by patients in the wards of 15 hospitals, it is fair comment to state that such figures are worthy of attention and point to a general inadequacy of dietary intake by far too many nursing mothers in the maternity wards of Scottish hospitals.

Protein.—The hospitals supplied on an average 75·1 g. of total protein and 42·1 g. of animal protein per head per day, the range being for total protein 58 to 100 g., and for animal protein 28 to 54 g. In terms of total protein, only one hospital gave in its dietary more than 99 g. per head per day—the amount was 100 g. It has been and still is very difficult to obtain sufficient amounts of animal

protein. That no hospital reached the requirement of 60 g. per head per day, that the average intake was 42.1 g., and the minimum 28 g., indicate not only a serious deficiency in first-class protein but a faulty catering in certain hospitals. This statement is supported by the observation that, in 30% of the hospitals surveyed, nursing mothers received less than 40 g. of animal protein, and by the data in Table V, where the number is given of patients in the hospitals in which the

TABLE VII
CHIEF SOURCES OF CALCIUM (mg.) IN DIETS SUPPLIED BY HOSPITALS
Target=1.70 g./Head/day.

No.	Milk.	Cheese	Potato	Cabbage	Bread	Porridge	Starchy foods*	Rice and raisins	Broths and soups		Total
1	969	57	7	12	69	12	56	22	43	—	1,315
2	697	24	9	13	67	12	64	9	54	—	1,007
3	950	49	5	12	88	13	60	—	45	—	1,303
4	508	—	6	—	59	7	80	26	5	Split peas 40	918
5	720	—	10	—	76	7	212	—	70	—	1,273
6	812	—	5	12	96	12	96	20	30	—	1,146
7	636	24	6	12	70	13	173	—	37	—	1,114
8	860	48	8	1	80	—	172	—	57	—	1,381
9	708	32	13	7	91	13	95	24	76	—	1,145
10	1,049	16	6	6	87	14	123	—	60	—	1,411
11	953	40	5	5	75	12	191	—	69	—	1,381
12	674	—	6	3	71	10	45	—	47	Ice cream 41	933
13	835	73	9	7	89	10	98	—	43	—	1,299
14	846	—	—	—	127	16	111	—	25	Gruel 324	1,514
15	836	24	5	8	94	11	85	—	53	—	1,363
Av.	803.5	25.8	6.7	6.5	82.6	10.4	110.7		49		1,233.5
%	65.1	2.3	0.54	0.53	6.7	0.84	9.0		4.0		

* Starchy foods=cornflour, cocoa, semolina, chocolate mould, rice.

animal protein of the diet is above or below 40 g. That 27.2% of the patients in large city, and 15.3% in small town and rural hospitals received less than 40 g., indicates the magnitude of the wartime deficiency in animal protein.

Fat.—The amount supplied averaged 75.7 g. per head per day; the range was 42 to 114 g.; with the exception of these two extremes the range was between 59 and 90 g. of fat (Table VI). The hospitals have suffered, as have all in this country, from a deplorable lack of dietary fat. The 30% deficiency of fat in the hospital diet is, even for wartime conditions, too great. That patients' friends supplied 16% of the requirement of fat would indicate that the hospital deficiencies of 30% could certainly be lessened.

Carbohydrate.—The average figure was 233.7 g. per head per day; the range was 192 to 316 g. The deficiency in the hospital supply is 22%. The deficiency in energy in terms of foods supplied by the hospitals is striking. None the less striking is the fact that the patients' friends and relatives supplied 16 and 18% respectively of the total intake of fat and carbohydrate (Table VI).

Minerals.—The average figures for calcium and iron were 1.23 g. and 10.63 mg. per head per day respectively (Tables VII and VIII). The intake of these minerals was comparatively constant. The chief sources of calcium and iron as supplied

TABLE VIII
CHIEF SOURCES OF IRON IN MG. IN DIETS SUPPLIED BY THE HOSPITALS
Target=13 mg./head/day.

No.	Milk	Eggs	Meat	Liver	Bread	Porridge	Potato	Cocoa	Broth and soups	Total
1	0.81	0.42	0.74	.70	1.71	0.90	0.55	1.71	2.10	11.47
2	0.58	0.42	0.82	—	1.65	0.89	0.76	2.00	1.71	10.60
3	0.79	0.82	1.30	—	2.17	1.01	0.42	1.29	1.45	10.33
4	0.51	0.24	0.93	—	1.45	—	0.50	0.72	0.10	9.03
5	0.60	0.92	0.90	—	1.90	0.50	0.87	—	3.00	9.80
6	0.69	0.21	0.68	—	2.35	0.88	0.43	0.17	1.81	7.70
7	0.53	2.02	1.30	—	1.74	0.99	0.55	—	1.59	13.00
8	0.72	0.39	0.88	0.97	2.27	1.82	0.57	0.57	2.59	13.00
9	0.66	0.55	0.65	—	2.56	1.00	1.08	0.29	2.71	10.80
10	0.87	0.90	1.10	—	2.10	1.05	0.49	—	2.11	10.04
11	0.79	0.80	0.66	—	1.83	0.88	0.39	—	2.54	8.61
12	0.56	0.21	0.79	1.11	1.75	0.73	0.05	—	1.60	9.32
13	0.70	0.21	0.99	0.83	2.19	0.75	0.80	—	1.17	13.22
14	0.71	0.22	1.43	—	3.12	2.49	0.60	0.72	0.75	12.50
15	0.70	0.54	0.90	—	2.53	0.84	0.44	0.57	1.97	10.42
Average	0.68	0.64	0.94		2.10	0.78	0.57		1.80	10.63
Percentage	6.4	6.1	8.3		19.8	7.3	5.4		1.7	

by the hospital diets are shown in Tables VII and VIII. The supreme importance of milk as a source of calcium is shown in Table VI; the value of liver, eggs, national bread, and potatoes as sources of iron is shown in Table VIII. It is worthy of note that milk, in adequate amount, cannot be ignored as a source of iron: two pints of milk (1,150 g.) will give 1.15 mg. of iron. The best source of iron is national bread. The value of a combination of milk and cocoa should be noted.

Vitamins.—**Vitamin A.**—The target for vitamin A is 3,429 I.U. per head per day. The average amount of vitamin A supplied in hospital diets was 2,266 I.U. per head per day; the range was 1,621 to 3,212 I.U. No hospital reached the target, the largest intake in any one day being 3,313 I.U., the lowest 1,232 I.U. The greatest deficiencies were in the large city hospitals, in two of which 1,711 and 1,621 I.U. per head per day were supplied. The chief sources of this vitamin as supplied in

hospital diets are milk, butter, margarine, and carrots (Table XI). The deficiency in vitamin A indicates the need for more milk, fats, and vegetables, particularly carrots. The value of sheep's liver as a source is so important that every effort should be made to increase the amount of liver in the diets of nursing mothers.

Vitamin B₁.—With an average intake of 1.25 mg., vitamin B₁ was satisfactory.

TABLE IX
CHIEF SOURCES OF VITAMIN A (I.U.) IN DIETS SUPPLIED BY HOSPITALS
Target=3,429 I.U.

No.	Milk	Margarine	Butter	Eggs	Cheese	Liver	Cabbage	Carrots	Soups and broths	Miscellaneous	Total
1	565	256	160	123	91	750	78	—	39	84	2,146
2	813	208	100	123	39	—	60	—	233	179	1,755
3	554	384	—	118	78	—	75	1,133	210	73	2,635
4	360	288	160	261	—	—	—	363	53	226	1,711
5	840	304	120	280	—	—	—	800	103	279	2,726
6	678	—	—	62	—	—	48	533	147	53	1,621
7	742	208	140	529	39	—	81	—	48	371	2,158
8	1,004	288	160	116	78	1,050	—	—	142	374	3,212
9	413	297	160	266	52	—	45	—	176	243	1,652
10	612	240	—	263	26	—	42	—	190	507	1,881
11	1,112	224	80	264	65	—	33	—	167	227	2,172
12	787	240	100	62	—	1,200	21	107	160	139	2,836
13	474	208	200	62	117	900	45	—	281	822	2,914
14	494	528	240	75	—	—	—	—	140	456	1,863
15	976	324	260	159	39	—	51	—	121	784	2,714
Average	694.9	266.5	125.3	184.2	41.6	—	38.6	195.8	147.3	—	2,266
Percentage	30.7	11.8	5.5	8.1	1.8	—	1.7	8.6	6.5	—	—

NOTE.—The larger variations in the vitamin A content of milk are due to the difference between summer and winter supply.

Vitamin C.—With 23.5 mg. per head per day as the average intake, vitamin C was far short of the target requirement of 36 mg. per head per day. The amount of vitamin C in hospital diets was, even in terms of the target, far too low in the majority of the hospital diets examined (Table X). Two hospitals passed the target figure, one by 2 mg. the other by 17 mg. That with a ration of oranges two hospitals—and the only two which were in receipt of this ration at the time of survey—should fail to reach the target is comment enough on the need for dietetic advice and supervision of hospital diets. The aim must be to increase the supply of milk, green vegetables, potatoes and fruit, particularly oranges.

FOOD CONTRIBUTED BY PATIENTS' RELATIVES AND FRIENDS

While relatives and friends of the patients contributed little protein, they did supply a considerable percentage of the total fat and carbohydrate consumed: this was particularly true of the large city hospitals (see Table VI). Table VI

TABLE X

CHIEF SOURCES OF VITAMIN C (mg.) IN DIETS SUPPLIED BY HOSPITALS

Target=36 mg./head/day.

No.	Milk	Potato	Cabbage	Green Vegetable	Broths and soups	Oranges	Total
1	5	3	2	2	3	—	15
2	7	21	6	2.5	1.5	—	38
3	9	3	—	—	4	—	16
4	4.5	1	1	1.5	2	—	10
5	5	2.5	0.5	2.5	0.5	—	11
6	10	2.5	—	2	1.5	—	16
7	7.5	2	6	3.5	1	—	20
8	6	4	0.5	2	0.5	5	18
9	13	3	2	1.5	0.5	5	25
10	18.5	3.5	4.5	6.5	2	—	35
11	6	2	8	1	3	—	20
12	14.5	28	2.5	5	3	—	53
13	11.8	8	1	1.4	3.8	—	26
14	10	8	—	—	4	—	22
15	10.5	4.5	4	6	3	—	28
Average	9.2	6.4	2.5	2.5	2.2		23.5
Percentage	39.1	27.2	10.6	10.6	9.4		

TABLE XI

MILK IN PINTS PER HEAD PER DAY IN MATERNITY HOSPITALS

Priority: nursing mothers=1 pint per head per day. Non-priority ration=0.5 pint per head per day. 1 pint=568 c.cm.

No.	Large cities	No.	Small towns
1	1.42	7	0.94
2	1.02	8	1.25
3	1.40	12	1.00
4	0.89	13	1.22
5	1.04		
6	1.19		
9	1.08		
10	1.40	14	Rural areas 1.24
11	1.40	15	1.23

shows that the patients supply 16% of the total intake of fat and 18% of carbohydrate. In terms of calories this extraneous supply varied greatly, ranging from 32 to 862 Calories per head per day, with an average of 370.3 Calories per head

per day. With the exception of vitamin C, which depends so much on the availability of fruit, the supply of other nutrients was of no significance. The only source of animal protein supplied by friends was eggs, 0.36 egg per head per day, equal to 2.16 g. protein.

THE CHIEF DEFICIENCIES AND THE MEANS FOR THEIR IMPROVEMENT

Milk

The outstanding contribution which milk makes in supplying animal protein, calcium, and vitamins A, B₁, and riboflavin has been emphasized. Most hospitals supply one pint of milk per head per day, and it would appear from Table XI that, in respect of milk, the location of the hospital plays no very significant part:

TABLE XII

A COMPARISON OF THE CALORIES AND NUTRIENTS IN HOSPITAL DIETS: IN ONE PINT OF MILK: AND IN THE SUGGESTED DIET

	Calories	Total protein g.	Animal protein g.	Fat g.	Calcium g.	Vitamin A I.U.
Hospital diet average per day	1,914	75.1	42.1	75.7	1.23	2,096
1 pint of milk (extra) ..	360	19.0	19.0	21.0	0.68	800
Total	2,274	94.1	61.1	96.7	1.91	2,896
The Target	2,500	99	60	108	1.70	3,429

four out of nine large city hospitals gave more than the rural and small town hospitals. The average amount of milk in the hospital diets was 1.18 pints of milk per head per day. In view of the serious deficiency of animal protein, fat and vitamin A, it is evident that nursing mothers should have, *in whatever form it may be most acceptable to them*, two pints of milk per day: this ought to be a dietetic axiom for maternity hospitals. This requires that hospital staffs and the patients should be informed of the value of milk and nursing mothers should be encouraged to take the full amount.

In Table XII, the calories, total and animal protein, fat, calcium and vitamin A of the hospital diet are compared with the content of these nutrients in one pint of milk, the diet, to which one pint of milk has been added, and the target. The means of further increasing the calories, minerals and vitamins will readily come to mind: for example, butter, eggs, cheese, liver, potatoes, etc. The data in Tables VII to XI, showing the chief sources of minerals and vitamins in hospital diets, indicate those foodstuffs the increased use of which will make for dietary improvements. It is hoped that the serious protein and vitamin A deficiencies will be reduced in the near future by a greater supply of milk, bacon, eggs and liver.

Until then, and even then, concentrates of vitamins A and D, as cod liver oil, vitamin C—in the form of orange juice—and extract of rose hips must be given to all nursing mothers. This is not said without some knowledge of the difficulties in persuading not a few to take capsules of vitamin A and D and orange juice. There is no reason why orange juice should be presented in any but an attractive form. The serious deficiency of vitamin C can be partly made good by a greater use of green vegetables and potatoes properly cooked and speedily served. The value of fish, particularly fatty fish, as a source of animal protein and vitamins should not be overlooked. A greater variation in the design and presentation of diets would do much to increase the amount of nutrients and, stimulating appetite, encourage a greater intake of food.

While criticism of not a few hospital dietaries cannot be evaded, the main import of such an investigation is to indicate the deficiencies and the means for their relief. In the unprecedented difficulties which have dogged the steps of all who cater, be it for large or small groups, it is remarkable that the deficiencies have not been much greater. To maintain a satisfactory dietary for patients in maternity wards of hospitals it is necessary to have dietitians responsible for ordering foodstuffs, framing menus, management and control of kitchens, and for the supervision of all diets—general and special. Only by the appointment of dietitians in all large hospitals, as also for groups of smaller hospitals, can the principles of nutrition be adequately translated into the practice of hospital dietetics.

We should like to take this opportunity to thank Miss Adamson for the excellent manner in which she carried out the dietary surveys in the maternity wards of the fifteen hospitals investigated, and also the Medical Officers of Health, Medical Superintendents, Matrons, and Ward Sisters for their interest and helpful co-operation in the work. We wish, too, to thank the Scientific Advisory Committee and Sir Andrew Davidson, Chief Medical Officer of the Department of Health for Scotland, for permission to publish the results of this survey.