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METHODS USED IN A CLASS FOR UNDERNOURISHED CHILDREN *

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During the past few years attention has been repeatedly called to the fact that a large number of children in this country are undernourished. That this is true has been shown by the reports of school inspectors and by several different surveys made by other agencies. These have been summarized recently by Baker¹ and by the report of the Public Health Committee of the New York Academy of Medicine.² The exact amount of this malnutrition is estimated differently by various observers, and this is partly due to the fact that there is no accurate or standard scale by which to measure the nutrition of the child. In some of the surveys no weights were taken, but the nutrition was merely left to the judgment of the observer. Nevertheless, there is no doubt that the amount of malnutrition is not inconsiderable, and that it promises to mount to an alarming degree unless its existence is recognized and measures are taken to combat it. The various estimates range from 10 to 30 per cent. of distinctly undernourished children in the public schools of New York City. Even at the lowest figure this means 100,000 children.

Any physician who has worked in a children's outpatient department will readily grant that this problem has not been recognized or met in the past. The undernourished child who has no interesting signs of organic disease has had scant attention. He has been put aside with a diagnosis of "anemia" or "malnutrition" or perhaps has been called "pretuberculous." He may have been given an iron tonic or cod liver oil at his first visit, but in the vast majority of cases no effort has been made to ascertain the underlying reason for his undernourished condition, or to induce him to return for subsequent observation or treatment.

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* Presented before the Pediatric Section of the New York Academy of Medicine, March 14, 1918.

1. Baker, S. J.: New York Med. Jour., Feb. 16, 1918, p. 289.

2. Report of the Public Health Committee, Med. Rec., New York, Feb. 23, 1918, p. 311.

Nov. 1, 1916, a Nutrition Class was started in the Outpatient Department of Bellevue Hospital as an experiment to determine how much could be done to improve the nutrition of undernourished children when handled in large numbers. It is well known that much can be done for individual children who are under-weight if their lives can be properly regulated, and that groups of children can be made to gain at much more than the average rate in institutions, camps and so forth. It is a comparatively easy matter to make any group of children gain rapidly when their diet and habits can be completely controlled. But controlled groups in institutions are of necessity small, and the children who are made to gain while under control are very apt to lose much of the accumulated weight when they return to their homes and to the former insufficient diet and unhygienic mode of life. Some plan must be devised by which the malnutrition problem can be attacked on a large scale, and which will strike at the very root of the trouble, that is, the daily life of the child in his own home.

The class system offers one of the ways in which this may be done. It has long been used for tuberculosis in adults and children and has given admirable results. The class plan as applied to undernourished children, to patients with heart disease, and to other groups, has nothing new in principle. Each group of patients studied has its own problems, however, and new methods must be worked out for each.

The nutrition class was planned as one of a number of classes for the treatment and study of special conditions at the time of the reorganization of the Children's Medical Division. The Health Department loaned one of its school nurses through the association for the Improvement of the Condition of the Poor, and this nurse has acted as social worker for the class since its beginning. The Association for the Improvement of the Condition of the Poor through its Bureau of Child Welfare, also rendered assistance in compiling and studying the statistics obtained during the first months of the work.

The methods which are used in this class have been worked out in the children's tuberculosis class and other classes at the Vanderbilt Clinic, to which have been added valuable methods obtained from the papers of Emerson³ of Boston and from other sources. To Emerson must be given great credit, since he has been the pioneer in calling attention to the existence of large numbers of delicate children, and also to the value of the class method in treating them. The conditions of the work in the Bellevue Hospital Class under which one physician is compelled to take care of from forty to sixty children in an afternoon have necessitated the adoption of a great many short-cuts and time-

3. Emerson, W. R. P.: *Boston Med. and Surg. Jour.*, 1910, **163**, 326; *Ibid.*, *Pediatrics*, 1910, **22**, No. 9.

saving methods which are absolutely essential when large numbers must be handled by one man. It was planned originally to have several physicians at work in the class, but the entrance of this country into the war so reduced the staff that the work has been done by one or two men.⁴ Volunteer women workers have assisted much in the conduct of the class. Without their aid it would be impossible to handle the large numbers who have attended.

The patients in the nutrition class have come from several sources. The markedly undernourished children who apply to the outpatient department for treatment for any condition whatever, and also the undernourished children discharged from the wards, are referred to the nutrition class. The school nurses from the neighboring schools have sent a large number of children and they have also come from agencies all over the city.

Every child who has applied for admission to the class has been accepted if he has been 5 pounds or more *underweight for his age*. A large number of patients have been referred who were actually overweight, simply because they looked a little pale or thin. These children have all been examined and advised, but have not been enrolled in the class.

There have been enrolled as members of the class.....	290 children
Discharged on account of refusal to attend.....	77
Moved away	14
Not found	6
Transferred to tuberculosis class.....	3
Working	2
	— 102 children
Remaining regular in attendance.....	188 children

The children return at varying intervals, from once a week to once a month. The average attendance is from thirty-five to forty, and since the class is held twice a week about one third of the children are seen each week. The follow up work has all been done by one social worker, and it is manifestly impossible properly to follow every case as fully as is desirable. At least one visit has been made to each home, and the subsequent visits have been made on families where the need seemed greatest. A follow up card index is used, and postals are sent to ask mothers to return, when their visits are irregular. The postal is followed by a visit if it brings no response.

4. Dr. H. L. Bibby, who is now in France, and Dr. L. C. Schroeder have assisted during part of the past year.

We have made it a rule that the parent or some adult member of the family must come to the class for the first few visits so that advice and instructions can be given to a responsible person. After the first visit most of the children have come alone, because it does not seem fair to exclude a child simply because his mother is unable to come every week. It would be much better, of course, to have the parents attend regularly, and many of them have done so from choice, but so many of the mothers are kept at home by the other children, by housework or by actual employment, that the percentage of attendance of mothers has to be necessarily quite low. In this regard, as in many others, we have deliberately fitted the plan of the class to the conditions which exist and have not laid down any hard and fast rule which would exclude many children who need treatment. The children whose parents have attended regularly have naturally done better than those who have come alone, as the advice given to a child who comes alone may or may not be transmitted to the parent in the form in which it is given. It is also perfectly futile to tell a child he must not drink coffee and must take milk and cereal when his answer is that his mother gives him only coffee and buns, but in many instances by repeatedly urging the child to ask his mother for the right food we have attained the end for which we have aimed, even though the mother was not able to come to the class.

The Routine.—Each child has had a fairly complete history on admission to the class on the printed history form used in the department. This includes a careful family history, past history, and analysis of the child's daily habits: time of going to bed, getting up, sleep, open window at night, amount of time outdoors, number of hours in school, bowel habits, quality and quantity of food taken at each meal and between meals, the amount of tea, coffee, beer, candy, etc. The present history is added, including the source from which the patient is sent, and the reason for which the child is admitted to the class, and any symptoms which he may present at the time. A complete physical examination is made of every child, including his weight and height. A von Pirquet test is made at the first or subsequent visit. The blood and urine are examined when possible. The social worker gets the social service facts either at the first visit, or at her first visit to the patient's home, and these facts are entered on the medical history by means of a rubber stamp. Everything of importance from the physical and economic standpoints is thus noted on the medical history. It has too long been the custom to have social service data carefully

filed on a separate card in another cabinet and often in another building from the medical record where they are absolutely unavailable for the doctor's use.

The rubber stamp used for the social data bears the following:

SOCIAL SERVICE. FIRST REPORT, BY				
Living, Health, Alcoholic, Working, Occupation, Wages,				
FATHER.				Family Income
MOTHER.				{ Intelligent? Responsive? Clean?
CHILDREN.	Number	Ages		Number Working
HOME.	Number Rooms		Number Dark	Rent
Sanitary Condition				
FOOD.	Sufficient	Yes	No	Cooking, Good, Fair, Bad
NEEDS				
ADVICE AND ASSISTANCE				

Besides the foregoing the worker adds any other facts of interest which she collects. After later visits she makes brief notes or fills out the later report stamp:

SOCIAL SERVICE LATER REPORT, BY				
HOME, Improved, Unimproved				
FOOD, Sufficient				
Yes	No	Cooking,	Good	Fair
			Bad	
PATIENT	T.	P.	R.	
SYMPTOMS				
TREATMENT AND ADVICE				

The *general plan* which has been kept in mind has been to make a careful diagnosis, to correct remediable physical defects, to determine and correct any economic factors that have a bearing on the case, and to try to improve the hygiene and diet of the child by every possible means.

At the first visit an attempt is made to pick out the important elements which bear on the child's malnutrition. A short talk is given to each mother and child on the errors of hygiene of which that child is guilty. The child's daily life is gone over carefully; the importance of early hours, sufficient sleep, cleanliness, regular bowel movement, eating slowly, and above all of eating the proper kind and sufficient amount of food, is emphasized as strongly as possible. If there are any decayed teeth the child is referred to the dentist, or taken to him by the nurse. If the tonsils or adenoids are giving symptoms or if they are much enlarged, operation is advised provided the child's

general condition warrants it. When the nutrition and general condition are extremely bad it is often better to wait a few months and try to make the child more fit for an operation. There is nearly always a loss of weight after a tonsillectomy and if a child is operated on when he is in very bad condition the recovery of the additional loss in weight is very slow. It is also important to keep the child in bed for at least five days after tonsillectomy, or the loss in weight may be excessive.

CHILDREN'S MEDICAL DIVISION		BELLEVUE HOSPITAL		OUT PATIENT DEPARTMENT	
		PROPER FOOD FOR CHILDREN OF SCHOOL AGE			
BREAKFAST		CHEAPER		MORE EXPENSIVE	
1. CEREAL	2 to 6 tablespoonfuls	Cook 2 hours night before, in double boiler, or fireless cooker		Dry Cereals	
		Oatmeal, Cornmeal, Hominy, Rice, Farina,		Shredded Wheat, Force, Corn Flakes, Puffed Rice	
2. MILK or COCOA	1 cup	(Milk gives the most food for the money even when very high priced)			
3. BREAD AND BUTTER	1 to 2 slices	Whole Wheat, Graham or Corn Bread		White Bread	
4. EGG		Nut Margarine or Oleomargarine are just as nourishing as Butter which costs about twice as much			
5. FRUIT		Cooked Apples, Stewed Prunes, Stewed Dried Peaches, Stewed Dried Apples		Orange or Grapefruit	
DINNER					
1. SOUP or CEREAL or EGG	1 bowl	Vegetable soup - made from Peas, Split Peas, Beans, Lentils (from list given above)		Meat Soups if given should be thickened with rice or barley.	
2. MILK	1 to 2 cups	(milk boiled or poached or scrambled with milk)			
3. BREAD AND BUTTER	1 to 2 slices	(stale or toasted)		Whole Wheat, Graham or Corn	
4. COOKED FRUIT	2 to 3 tablespoonfuls	Apple Sauce, Baked or Stewed Apples, Stewed Prunes, Stewed Dried Peaches		Stewed Dried Apricots, Baked Bananas	
SUPPER					
1. MEAT or VEGETABLE SOUP	a small piece about 2 ounces	Steak, boil, roast or broil Do Not Fry!		Lamb Stew, Beef Stew, Fish, Cod, Flounder, Haddock, fresh Halibut made from Peas, Split Peas, Beans, Lentils or any of fresh vegetables	
2. VEGETABLES				Chopped Beef, Chicken	
Fresh Vegetables	2 to 4 tablespoonfuls	Put into small amount of boiling salted water cook until tender, drain off all the water.		Roast Beef, Beefsteak, Roast Lamb, Lamb Chop	
Starchy Vegetables	2 tablespoonfuls	boiled, baked, mashed Do Not Fry!		Broth or Meat Soup with rice or barley	
3. BREAD AND BUTTER	1 to 2 slices	(stale or toasted)		Spinach, Chard, Beet Tops, Greens, Carrots, Beets, Boiled Onions, Lima Beans, (cook 3 hours)	
4. DESSERT	1 to 2 tablespoonfuls	Rice, Tapioca or Bread Pudding, Cornmeal or Cereal puddings, Cooked fruit, (from list given above)		Potatoes, Sweet Potatoes, Cornmeal or Spaghetti, Macaroni	
DO NOT GIVE				RULES FOR EATING.	
1. TEA, COFFEE, soda water, beer, wine, whiskey, cider.				Give no food between meals unless ordered by doctor. If a child is very hungry after school give him a piece of bread and butter, NOT cake or fruit.	
2. Fried food of any kind.				Make every child eat slowly and chew his food well and not wash it down with water or milk.	
3. Pork, veal, kidneys, greasy stews, gravy made from drippings or grease.				Allow child to drink only one glass of water with each meal.	
4. Corn, cabbage, cucumbers.				Uge children to drink water between meals but not at bedtime.	
5. Fresh breads, buns, cake, pie, fried cakes, rich puddings.				Make every child wash his face and hands before meals.	
6. Nuts, raisins, berries, cherries.				SERVE FOOD WARM and WELL COOKED on clean dishes and a clean table.	
7. Candy, jelly, sweet preserves.				KEEP FLIES AWAY FROM FOOD. One fly can give typhoid or summer complaint.	
8. Too much milk: one quart a day at most is enough for any child				BUY ONLY BOTTLED MILK, and ALWAYS KEEP ON THE ICE.	
Every child needs at least one pint a day.					

Fig. 1.—Reproduction of diet list (reduced).

A printed slip with directions as to the general care of the child and a diet list (Fig. 1) are given to every mother, and these are explained carefully in an effort to prevent her from thinking them unimportant pieces of paper. The diet list has been rewritten several times in collaboration with the director and the attending physicians of the Children's Medical Division, and with the dietitian of the Association for Improving the Condition of the Poor. The first lists used were simply an ideal diet for a child, but it was found that the expensive foods which occupied the most prominent place on the lists dis-

couraged the mothers from trying to pick out a dietary within their means. In the revised lists the various foods are sorted according to their relative cheapness. In the first column (Fig. 1) appear the articles of food to be taken at each meal; in the second the amounts of each; the third column gives some simple cooking directions. The various articles of food are then arranged in order of their cheapness and importance. Thus, it is seen that milk is put in the fourth column, not because it is a cheap food, but because it really gives more food for the money than many apparently cheaper foods. White bread is put among the more expensive foods because it has less of the desirable elements than whole wheat and graham, although it costs about the same. Since this diet list has been in use it has been found that the parents respond to it much more readily than to the earlier one.

Fig. 2.—Exhibit of artificial foods, showing the way in which three meals are placed on the table. This arrangement is varied each day.

At the first visit the attention of the mother and child is called to the *food exhibit*, as an aid to impressing on their minds the elements of a proper diet. This exhibit differs in important respects from those in common use. Most of these have been composed of quantities of food which represent hundred calory portions, or other units, and merely show the relative value of the various foods from the energy standpoint. They do not show the relative desirability of foods from other than this point of view. For example, a plate containing three or four large tablespoonfuls of vegetable shows that vegetables are relatively poor in energy-yielding substances, but there is danger that an ignorant mother may think a child should eat four or five large table-spoons of a green vegetable and only a comparatively small quantity of cereals or other food high in caloric value.

The food exhibit which we use is based on the day's total ration. Three meals are laid out each day: breakfast, dinner and supper. The mother and the child can both then see at a glance the total amount of food needed in the day, and also the exact composition of each meal. These meals are laid out as if ready to serve, with dishes, knife, fork and spoon, and each meal is properly labeled (Fig. 2). The breakfast usually consists of a dish of cereal with milk or a cup of cocoa, two slices of bread and a pat of butter, and sometimes an egg or fruit. The midday meal is varied according to the age of the child, and is also changed from time to time as it is placed on the table. A dish of thick vegetable puree, a glass of milk, two slices of bread, a pat of butter and a baked apple form the average midday meal. The main part of the evening meal is shown on a plate containing one kind of meat or fish, potato, macaroni or rice, a green vegetable, two slices of bread, a pat of butter, a glass of water and some stewed fruit.⁵ The exhibit is rearranged every day. There are several plates which can be interchanged so as to give variety to the meals. When the exhibit is being explained to a mother, these are changed rapidly so as to impress on her the fact that the diet is not too hard and fast, but at all times the table presents to her eyes a picture of three meals which are well balanced, well cooked, well served and at the same time not beyond the means of the average family.

This exhibit has great educational value. The visual impression made on the mother and child adds tremendously to the significance of the printed list of foods given out on the diet list. In the case of people who do not speak English this is practically the only way in which they can be reached. A list of the units used in the exhibit is as follows:

1 dish of oatmeal with milk	1 plate with a poached egg on toast
1 dish of cornmeal with milk	1 plate thick vegetable soup
1 dish of wheatena with milk	1 plate puree of peas
3 plates with two slices bread on each	1 plate Irish stew
1 plate with one slice brown bread	1 plate with chop, baked potato, spinach
1 plate with two or three pieces of Zwieback	1 plate with fish (boiled halibut), rice, string beans
3 butter dishes with one pat of butter	1 plate with meat ball, macaroni and carrots
2 glasses of milk (8 ounces)	1 baked apple
1 cup cocoa	1 plate apple sauce
1 orange	1 dish prunes
1 cookie	

5. The exhibit was made up in large part by Yaeger & Co., 1495 Third Avenue, to which were added foods obtained from other sources. The imitations are so real in appearance that nearly every one is deceived at first glance. They are durable and not expensive. The food exhibit is also of great value in teaching students. The hearty evening meal may meet with some objections. This has been advised for schoolchildren because of the short noon hour and because it saves the mother from cooking two dinners, since the father must have his main meal at night. For younger children the hearty meal is at noon.

It is very simple to calculate the food value of the day's total from the portions comprising the various meals. Nearly all of the foods are arranged in portions approximating 100 calories each and the total calories a day can be rapidly reckoned with a reasonable degree of accuracy.

Besides the three-meal food exhibit we also use a certain number of hundred calory portions to compare foods of low and high energy content. Thus, a half ounce of olive oil, 5 ounces of milk and a quart of soup placed in a row make an impression which is of no small value. In the class of society with which we have to deal, however, it is futile to attempt to spend much time in educating ignorant mothers as to accurate hundred calory portions. It seems to me that the food value is the thing which the physician should constantly carry in his own mind in prescribing diets, but the less the patient is confused by extra and somewhat artificial factors, the better. Among the better classes, with people of intelligence, the study of food values is useful, and even children can be easily taught to count the calories in their meals; but when it takes every persuasive power which the physician has at his command to induce a mother to cook cereal, and to give the child cereal and milk instead of coffee and a roll, it is absurd to distract the mother with the discussion of the amount of a hundred calory portion. If children can be taught to take a bowl of cereal and a portion of vegetable and cooked fruit, the battle is half won.

Class talks are given frequently to groups of mothers for the purpose of saving time, and the effort is made to include in these the mothers who are newest in the class. From time to time talks or lectures are given to the entire class, and the whole matter of the daily régime and the diet from every possible angle gone over again and again in the hope that reiteration will drive home the things we are trying to teach. Wall charts have been very useful, one showing what makes a child gain, and another what makes a child lose. (Figs. 3 and 4.) A great many of the children have memorized these charts and recite them off in chorus like children in school.

Return Visits.—At the first visit the children and mothers are urged to return once a week. On account of the large number of patients under observation this interval has been increased to two or three weeks as soon as the child has begun to do well, but if the gain stops he is again asked to come each week. At the return visit the children are seen in groups, but each child is given individual attention. Twenty or thirty children stand around the physician's desk while he talks to each in turn, reads the notes made by the social worker or volunteer assistants, and the home record made by the child, and makes additional notes on the patient's progress. A rubber stamp is used for

noting the principal facts of the child's hygiene and diet, and this is filled in whenever a child fails to gain a satisfactory amount.⁶ This insures more or less parallel series of records on the return visits.

WHAT MAKES A CHILD LOSE

FOOD - TOO LITTLE

WRONG KIND

TEA COFFEE
FRIED FOOD

EATING TOO FAST

SLEEPING TOO LITTLE

RESTING TOO LITTLE

STALE AIR - CLOSED WINDOWS

CONSTIPATION OR IRREGULAR BOWELS

DIRTY HANDS FACE BODY CLOTHES

BAD TEETH

Figure 3

WHAT MAKES A CHILD GAIN

FOOD - RIGHT AMOUNT

RIGHT KIND

EATING SLOWLY

SLEEPING ENOUGH - 7 TO 7

RESTING 1 HOUR AFTER DINNER

FRESH AIR OPEN WINDOWS

BOWEL MOVEMENT AFTER BREAKFAST

CLEANLINESS

GOOD TEETH

Figure 4

Figs. 3 and 4.—Large wall charts which are used as texts on which to base class talks. Charts of this kind may be easily made by the use of gummed letters.

The questions can be asked and the blanks filled out by a volunteer lay worker after comparatively little training. By this group method every child hears the correction of the mistakes of every other child

6. Breakfast
Dinner
Supper
Bed at Up at

**Bowels move at
School hours
Out doors
Reason for loss**

and each child gets a maximum number of impressions as to the desirability of regular habits and diet. The children are asked to correct each others' faults also. It is most interesting to see how well some of the children pick out the reasons for the failure of a given child to gain.

Fig. 5.—J. W., boy, aged 13 years 3 months. This boy was of average height (56½ inches) and nearly 6 pounds under weight. When he first came he had been taking the usual insufficient and improper diet, his bowels were irregular, he rarely went to bed before 10 or 11. Teeth, six cavities; von Pirquet positive. He responded to the suggestions given at the class and gained well at first, but after a time became "weary of well doing" and began to sit up late again, with the loss to be expected. In the first four weeks in July he was at a camp in the country but made no gain. Later he spent two weeks at another camp and gained 4½ pounds. In late September the father deserted the family. This affected the boy greatly, he slept little and "grieved for his father." The family income also dropped, but after a few months the mother began to earn enough to buy more food, and the boy rallied from his grief. He has gained 11 pounds in a year, while the expected gain is 10 pounds. The broken line shows the average weight for his age.

The children who have gained well are praised and held up as examples to be followed by the class. If they have gained regularly for several weeks they are told to come less often. Children who have not gained satisfactorily or who have lost are turned over to the social worker or volunteer for careful questioning. The temperature

is taken at each visit in all cases in which a child has failed to gain under apparently good care. After the careful questioning of the child, a second physical examination is made in children who are doing badly, and much of the time is spent in trying to find a correct cause of failure to gain.

Some children are stimulated greatly by pasting a gold star on the chart when the gain has been large. This seems almost too

Fig. 6.—A. F., girl, admitted to general clinic for a cold at X. Admitted to nutrition class at arrow. Note difference in rate of gain thereafter. Loss caused by tonsillitis followed by quick recovery. Sat up late two or three nights and lost $1\frac{1}{2}$ pounds, but regained this in the next few weeks when she went to bed early.

On Admission to General Clinic		15 Months Later	
Age.....	11 years 10 months	Age	13 years 1 month
Weight	67¾ lb. Average 73 lb.	Weight	81 lb. Average 84 lb.
Height	56½ in. Average 54½ in.	Height	57 in. Average 57 in.
Average weight for height....	81 lb.	Average weight for height	84 lb.

Broken line is average weight for age.

trivial to be of consequence, but the gold star has certainly encouraged a great many children to keep on trying. Prizes have even more value. A monthly prize is given for the greatest gain for each boy or girl. The children are asked to pick out their own prizes to a certain extent; that is, the children are asked to suggest prizes which they

would think worth trying for. Pencil boxes, boy scout suits, skates, toys and dolls are not very expensive and are effective.

Children have not been sent away from home unless it has been proved by a thorough test that they cannot be made to do well in their homes. If the test at home is a failure, a month or two away in a good institution or camp often starts a gain and establishes a habit of growth which continues after the child's return. Short stays in fresh

Fig. 7.—M. P., girl, aged 11 years 4 months, shows the effect of school attendance. When this child first came to the class she was taken out of school, made to rest every afternoon, and kept out of doors the rest of the day. She gained a pound a week for three weeks. She was then allowed to go back to school in the morning. The rate of gain at once fell off. After three weeks more she was allowed to return to school all day, and she lost. The weight remained stationary until the middle of the summer vacation. During the fall months after school reopened especial attention was paid to this child and she began to gain, but only at the average rate. Broken line is average weight for age.

air camps are rarely of value, and the children who have been away for a few weeks for trips of this kind have been benefited little as a rule. Indeed, many have lost weight, and have reported that they have received tea, coffee, and other food which has been manifestly improper.

The influence of school is often marked. Certain children will not gain as long as they are subject to the nervous stress and confining hours of the public school. A large number begin to gain as soon as

vacation commences, and this has been true in some cases even when the child has gone to work during the summer. As a routine procedure, if a child does not gain in school, he is taken out. He is allowed to be out of doors in the morning, one or two hours rest are insisted on after the midday meal in a room with wide open windows, and he is allowed to be out the remainder of the afternoon.

Fig. 8.—A. H., girl. On admission, weight, 72 pounds; average, 78½; height, 57½ inches; average, 56; average weight for height, 85 pounds. This child is over height and under weight, tall, thin, pale. Teeth, three decayed; von Pirquet, 4 plus; otherwise normal; father alcoholic; mother never attends class. Income of family, \$46 a month for six persons, or \$7.57 per person. If only 50 per cent. of this is spent for food, as economists say is proper, it means that less than 80 cents may be spent per week per person for food. It is easy to see why this child received no milk at home. When she was first admitted she was given a quart of milk a day by a charitable agency and gained 5 pounds in eight weeks. The milk was stopped, she did not attend the class and gained no weight for seven months. Milk was again furnished and she gained 7½ pounds in three months.

In extreme cases, especially when there is marked anorexia, a complete rest cure is given. The child is kept in bed all day in a room with the windows wide open. A laxative is given each night, since constipation often results from the inactivity. The response to the rest cure is rarely delayed more than a week. The appetite invariably comes back, and a gain in weight begins. The child may then be allowed up a

few hours a day and the rest reduced to the afternoon nap. After a gain of several pounds is obtained these children are allowed to return to school in the morning, and later on for the whole day. Too often the return to school marks a cessation of the gain (Fig. 7).

Weight Charts.—Weight charts are used for every child. These are of two types: The *individual weight chart* is printed on a stiff card the same size as the history folder. It is ruled off in pounds and half pounds, covers 25 pounds in a vertical direction, and fifty-two weeks in a horizontal. Each vertical line is dated so that the weight can be charted on the actual day of the month. This makes the charting much more rapid and simple than attempting to calculate the age of the child in years and months, weeks and days; and since we merely desire to show gains and losses it enables us to have a much larger chart and make the gains and losses relatively larger than is possible on a chart based on the child's age. If desired, the average line can be plotted so that the child can see how far below average his weight actually lies. These charts can be used for more than one year, as a rule, the line simply beginning over again at January when December is finished.

Important facts, such as tonsillectomy, acute illness, etc., may be noted to account for great variations in weight. The children learn to interpret the charts and can readily tell good from bad. There is no question that they are valuable in stimulating the child to try to gain weight. Several examples are reproduced to show the manner in which they are used (Figs. 5, 6, 7 and 8).

The second might be called the *collective charts*. These are large wall charts printed on a heavy coated cloth (size 22 by 30 inches). The weights of the entire class are plotted on these as well as the average normal weight line. Each one covers a period of three years by months, each square representing a pound in the vertical direction and a month in the horizontal. Each child's curve is plotted according to his weight and age. The girls and boys are charted separately. In cases in which the curves lie too near together, half the curves are transferred to another sheet.

Figures 9, 10 and 11 illustrate the use of the collective weight charts. In the first place, they show how much below the average weight for age the children have been. It is apparent that the children fall into two rough groups: those only moderately under weight (about 1 year or 5 to 10 pounds), and those much under weight (more than 1 year or over 10 pounds). These correspond in a general way to Groups III and IV of the Dunfermline scale.

It is evident that the younger children (and this is true for both boys and girls) are less under weight than the older. The reason for this may be that since they are younger they have had less time to fall behind. In the case of the older children the causes of the mal-

Figs. 9 and 10.—Collective weight charts of children in the Nutrition Class. Each irregular line represents the weight curve of a single child. Figures at the bottom indicate years, each square one month in a horizontal direction. Figures at the left indicate pounds, each square one pound vertically. Average weight line for age plotted on each chart.

nutrition have operated for a longer time and there is a greater weight deficit. The gain in weight has been much less at the younger ages, and it may be noted that only a few have gained at more than the average rate. This may be explained by the fact that it is more difficult to appeal to children under 9 years. They are not so much interested in trying to gain, as a rule, while the response is easier to obtain from older children. Perhaps an additional factor is that the tendency to gain weight is greater as puberty is approached, and this natural stimulus to growth exerts its force if the opportunity is given by any improvement of the diet and hygiene of the child.

In general, the weight curves which lie near the average line show a larger gain than those much below the average. This is probably because the children who are most underweight are most difficult to help. The causes of their malnutrition must be more serious and more difficult to remove than the causes which have affected the children only slightly underweight.

By means of the collective weight charts it is simple to compare with the average line the progress of the individual children and of the class as a whole. A general view of the charts gives an impression as to how the children are doing. By measuring the vertical and horizontal extent of any one of the curves, the weight gained and the time under observation are obtained. The average line may be measured for the corresponding length of time and the result compared with the first measurement. For example, a weight curve covers six and one-half months from left to right and 9 pounds from below up. The average line covers $4\frac{1}{2}$ pounds in the same length of time so that the child has gained at twice the average rate. A piece of cardboard ruled on the top to correspond to the months, and on the left to correspond to pounds makes this measurement of the curves rapid and simple.

A *photograph* is taken of every child in the class, and is pasted on the back of the weight chart. This is done very inexpensively by taking three or four children at once and cutting up the finished prints. The photographs have value in helping the physician and nurse to recall to mind any child who has been absent for a long time. They also arouse the interest of the children in the class and later photographs are useful in showing improvement. It is easy to take fairly good pictures with an inexpensive camera, by taking time exposures, and by using one of the newer high powered nitrogen lamps if necessary.

Home Records.—Sheets⁷ are used for the purpose of having the child or mother record what happens to the child each day. In many

7. This form was devised by Dr. H. L. Dowd for use in the Huddleston Memorial Class for Cardiac Children.

Fig. 11.—Collective weight chart of older boys in the Nutrition Class.

Fig. 12.—Collective weight chart of children with heart disease who have been under control. Continuous portions of each curve represent time spent at home; broken portions the time spent at Pelham Home.

instances this home record has enabled us to pick out the reason for failure to gain when the verbal report had given us no clue (Fig. 13).

Large wall charts of coated cloth are used for summarizing facts of importance. These are ruled horizontally to hold fifty names and vertically into columns in which are entered all the data which are of interest. It is much quicker to get statistics from these sheets than from the individual charts, since all the facts of one kind appear in the same vertical column. Corresponding numbers make it easy to find the names on these sheets.

Milton S.
Mar 4 - 11

HOME RECORD CHART
Fill this out each week and bring to the Clinic

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
What time did you get up?	7:30	7:30	7:30	7:30	7:30	9	10
BREAKFAST	8:30	8:30	8:30	8:30	8:30	9	10:30
At what time?	Natural	Natural	Cup corn	1 glass milk	1 glass milk	Cake	Natural
What did you eat?	1 bowl	1 bowl	1 slice bread	2 pieces bread	2 pieces bread	Corn 1 cup	Bread 1 slice
How much of each thing?							
At what time did the bowel move?	8:40	8:30	8:45	8:30	8:15	9:10	10:30
SCHOOL HOURS	9-12	9 to 12	9 to 12	9-12	9-12	No school	
DINNER	12	12	12	12	12	12	1
At what time?	Chicken	Meat	Soup	Soup	Baloney	Chicken	Soup
What did you eat?	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl
How much of each thing?	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl
SCHOOL HOURS	1-3	1-3	1-3	1-3	1-3	No	No
REST HOURS	None						
OUT DOORS	None	2 hours	2 hours	1 hour	2 hours	10 library	No
Hours		watched	watched	watched	watched	1 hour	
What did you do?		playing marbles	playing marbles	playing marbles	playing marbles	reading	
SUPPER	6:30	6:30	7:00	6:30	6:30	6:30	6
At what time?	2 eggs	2 eggs	1 egg	1 egg	1 egg	2 eggs	1 egg
What did you eat?	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl	1 bowl
How much of each thing?	4 pieces	2 pieces	2 pieces	2 pieces	2 pieces	2 pieces	2 pieces
What did you eat between meals?	An apple	An apple	An apple	An apple	An apple	An apple	An apple
What time did you go to bed?	9	9:11	9	9:15	9:20	9:30	9:14
Did you sleep well?	yes	yes	yes	yes	yes	yes	yes
REMARKS							

Fig. 13.—Home record chart as filled out by the child.

Causative Factors.—Although this article deals with methods in the main, a brief summary of the causative factors which we have found may be here included.

The causes which seem to be most prominent may be divided into two main groups:

1. Malnutrition due to real disease or abnormal condition.
(a) Tuberculosis is the most common real pathologic condition which gives rise to malnutrition without giving marked symptoms or signs. This tuberculosis is not pulmonary, but usually in the lymph nodes in the mediastinum or elsewhere. It may be latent or active at the time the

patient comes under observation, and the malnutrition may be the only sign, aside from the positive skin reaction. The diagnosis is difficult, since the physical signs of diseased bronchial nodes are so slight as to be easily overlooked. D'Espine's sign and the roentgen ray at times are of service in clearing up the diagnosis. An irregular fever is the most suggestive sign of active tuberculosis.

(b). Chronic absorption from decayed teeth, diseased tonsils, chronic otitis, ozena or any other local focus of infection is quite sufficient to cause malnutrition.

(c). Defective nasal breathing due to enlarged adenoids or obstructed nasal passages is a common condition found among these children and must be corrected before the nutrition can be improved.

(d). Prematurity, small size at birth, or difficult feeding in the first year may place on a child a handicap which may not be outgrown.

(e). Severe or repeated gastro-intestinal attacks in the first few years, chronic indigestion especially of the intestinal type, and frequent attacks of cyclic vomiting are among the less common causes for undernutrition in older children.

(f). Serious illness (as typhoid or severe pertussis) or a combination of several acute infectious diseases within a few months may cause a loss of weight from which it sometimes takes years to recover.

Syphilis, diabetes, chronic nephritis, malaria, intestinal parasites and all other wasting diseases must be ruled out before a case can be considered simple malnutrition. There is also a small number of children in whom there is a change or deficiency in some of the internal secretions which is responsible for the small size. These cases are not easy to recognize when they are not of the typical varieties.

2. Malnutrition due to faulty hygiene and diet. It is important to bear in mind that bad habits of living are due to two main fundamental causes — poverty and ignorance. When the former is the main cause, it is of course more difficult to improve a child's condition. Educational efforts directed at the ignorance of the parents, when well received, offer the greatest hope of success. Bad racial habits of living may be added to the foregoing (as in Italians).

The bad habits of living include every phase of the daily life of the child. They may be briefly summarized as follows:

(a). Insufficient food. A very large proportion of the children of the poor receive too little to eat. A breakfast of coffee and a roll, lunch of tea or weak soup and bread, and a supper of meat and potatoes, or of a dish of macaroni, is a diet which furnishes one third to one half the necessary number of calories for proper growth. This is a sample of a day's dietary which appears again and again on our history sheets. In many cases children go to school with no breakfast,

or have no lunch at all, especially when the mother goes out to work. Even in families in which the income is adequate the food taken by the child may be insufficient in amount on account of ignorance of the parent or some whim of appetite of the child.

(b). Improper food is also commonly taken. Tea and coffee, fried food of all kinds, pies and pastries, cakes and sweets, raw fruit in excess, too much meat (twice or three times a day) are only a few of the errors in this direction.

(c). Bad habits of eating, such as eating too fast, washing down food with copious draughts of water, and eating at very irregular hours all tend to cause indigestion and to prevent the proper utilization of the food taken.

(d). Constipation or irregular bowel habit have been almost the rule among the children when they have first come to the class. It has been a rare exception to find a child whose bowels have moved regularly at the normal time, after breakfast and before school. Unless this normal habit can be established, it is practically impossible to make a child gain in weight.

(e). Insufficient sleep. Most children in the tenements sit up late and as a consequence get up late. The result is too little sleep, and too little time before school in the morning, so that the child must rush off to school without breakfast or movement of the bowels. The afternoon rest or nap is abandoned as soon as a child is old enough to struggle through the day without it, which may be as young as two years.

(f). Insufficient fresh air by day and by night. Long school hours and short days mean that no school child can be out more than an hour after school through the winter months. Windows are rarely opened at night. The crowded flat is lighted by gas, with a stove keeping the temperature of the kitchen well above 80, while the bedrooms are unheated and unaired. This makes a combination which predisposes to respiratory infections and results in general ill health.

(g). Insufficient exercise in the fresh air, or too much exercise with insufficient food and rest.

(h). Uncleanliness of body and clothing. Dirty mouths and noses have a more direct influence on the general health than dirty skins, perhaps, but there can be little question that bathing predisposes to health.

Results.—An analysis of 110 cases has been made to determine the results of the class experiment. Children have been selected who have been under observation from six to fifteen months, because it is only by taking such cases that the results can be fairly estimated. A great many children gain very rapidly in the first few weeks of their atten-

dance, but do not continue to do well for long. The shorter cases have therefore been excluded. In none of the 110 children has there been found any organic disease of importance. There are in attendance at the class a number of children who have more or less active tuberculosis (not pulmonary, but probably of the bronchial lymph nodes). These children are not included in the summary. They are allowed to attend the class because they need exactly the same attention as the malnutrition cases, and it may be said that their response to the class treatment has corresponded in general to that of the other children, except when they have had fever. They have not been transferred to the children's tuberculosis class because they have not pulmonary disease, and it is extremely undesirable to put on a child the stigma of tuberculosis unless there is some good reason for it. Under the present rules of most institutions, it is not possible to send such children to a preventorium unless there is another case of tuberculosis in the family, so the nutrition class seems to be the best place for them. There are, of course, a large number of children who have latent tuberculosis who are included in the 110 summarized, since many of them have strongly positive von Pirquet reactions.⁷

Of the 110 children, fifty-nine were girls, fifty-one boys. This whole group has gained at about one and one quarter times the expected rate for their ages. Sixty-three children (57 per cent.) have done better than the average and have gained at 1.7 times the expected rate. Of the remainder, twenty-four (22 per cent.) have gained at the average rate, and twenty-three (21 per cent.) at less than the average rate.

There is some question as to whether the children who have gained at the average rate should be included among those who have done well or among those who have done badly. There are two ways of looking at the matter. It may well be said that a child who gains at no more than the average rate is no better off at the end of the year than he was at the beginning, since he is just as much underweight. On the other hand, it is something to get any gain at all among these children, for we know that many of them have a stationary weight for months at a time, as may be seen from the weight curves of some of the children who have done badly. It is to be hoped that a start in gaining, even if only at the average rate, may be followed by a more rapid gain later on.

The best single gain was that of a boy who gained 12.5 pounds in six months, which was at five times the average rate. The worst two boys gained at only six tenths the average rate.

7. Of 152 children in which the von Pirquet was accurately observed, the reaction was positive in 82 cases, or 54 per cent.; negative in 70 cases, or 46 per cent.

The results in a class of this kind may be compared with that of a controlled group of children. The Huddleston Memorial Cardiac Class has had the privilege of sending children to the Pelham Manor Summer Home for the past year. Children with heart disease have been sent there for rest and care. Of thirty-two girls with organic heart disease who were at Pelham for an average of three and one-half months the gain was at $3\frac{1}{4}$ times the average rate. Several of them gained 15 to 18 pounds in three to four months. The lives of these girls were under careful supervision, their daily régime was properly regulated, and they had enough to eat. This shows how easy it is to obtain large gains with classes under complete control. Figure 12 shows one of the weight charts of these children and includes the girls from 12 to 15 years. The portions of the curves which are solid represent the weights while the children were at home, the broken lines are while they were at Pelham.

The class is composed of children of many races; about one third are Italians, one third Jews, one fifth Irish. They come in large part from one of the poorest sections of New York City. The average income per month for the family, divided by the number in the family, gives an estimate of the income per person per month. This income per person for the 110 children included in the summary has been \$12.40 per month. This is not an accurate measure, because children are not supposed to have as much money spent for their food as adults. It gives a rough measure of income, however, and has the advantage of simplicity. The sixty-three children who have gained at more than the average rate have had an income per person per month of \$12, or a little less than the class average, showing that it has not been entirely a question of having more money to spend. The children in Group III have averaged \$12, those in Group IV, \$13. Here again poverty does not seem to have been a factor.

Of the twenty-three children who have done least well—that is, who have gained at less than the expected rate—the following facts are significant:

The incomes of the families of 17 of the children average only \$9.50 per person per month.

The mothers of 15 children never attend the class.

The von Pirquet reaction is 2 to 4 plus in 13.

The races are, Italian 9, Irish 7, Jews 3, miscellaneous 4. This is a higher percentage of Italians and Irish and lower of Jews than the distribution in the entire class. Many of the Italian mothers speak no English, and it is to be expected that the proportion of children who have done badly would be higher in this race.

Relief.—The usual charitable agencies have been appealed to in most cases needing relief. There have been no funds at the disposal

of the class, but the Bellevue Social Service Department has been most kind in giving emergency aid when it has been needed. Small sums have also been given for milk or other food and for clothing by some of the volunteers interested in the work. This experiment has not been one in relief work primarily, but in educating the mothers and the children in matters of every day life.

The results obtained are far from ideal. It must be remembered, however, that we have been dealing with the poorest class of dispensary patients; that the first months of such work must be largely spent in obtaining equipment and devising methods; that the numbers treated are so large that the amount of individual attention given to each child has been reduced to a minimum; and that the past year has been the worst year in the history of the country as far as the rise in price of food and the disproportionate rise in wages. Under these circumstances it is remarkable that even these results have been obtained.

CONCLUSIONS

By the use of the class methods described it has been possible to make 57 per cent. of the children gain at 1.7 times the average rate for their ages, and 22 per cent. at about the average rate, or a total of 79 per cent. who have gained at or better than the average rate. Of the remaining 21 per cent., there is one or more easily ascertained reasons for the failure in every case. These results have been obtained under the most adverse circumstances.

It seems fair to conclude that the class method is of value in the treatment of undernourished children, even when they must be handled in large numbers. The establishment of such classes in all out patient departments, and perhaps in many of the schools, would be of great service to every community, not only by the good done the children treated, but also by the education of the public in matters of hygiene. Parents must be made to realize that a thin child is not a healthy child, and that he needs medical supervision.

The problem of infant mortality has been solved in large part by means of classes for teaching mothers the care and feeding of infants. If the malnutrition problem can be attacked on a large scale by similar means, there is little doubt that comparable results will be obtained.

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