With these two inherent difficulties dealt with in this way, and construction in accordance with to-and-fro breathing, the machine becomes remarkably simple, light, and compact, with essential parts similar to those of other instruments. In addition, however, there is a level and levelling screws; for it is essential that the machine be level when in use for the proper absorption of the CO₂. The supply of gases is by simple fine adjustment valves through ordinary sight-feeds. There are no special mixing arrangements required, as the nitrous oxide atmosphere in the machine is absolute, just as is the nitrogen of the air which it replaces. Oxygen is added at the metabolic rate, and delivered almost at the patient's mouth, producing immediate effect.

ADVANTAGES

In practice the "anaesthetor" is simple to work, is most satisfactory from the clinical standpoint, and operates with the highest degree of economy—three gallons or less of anaesthetic gas per individual case, irrespective of duration. Owing to its simplicity of construction, complete dismantling for purposes of cleaning and sterilizing is a matter of only a few minutes' work, and there is no part which cannot be completely sterilized, even to the rubber throat tubes. The rubber of these tubes is of such make that it can be judiciously boiled without damage. Such are the chief advantages that the recovery principle has to offer through "anaesthetor M 7." Space forbids an extended account of its performances, which may be summed up as showing great progress in (1) the management of general anaesthesia; (2) the provision of surgical anaesthetic conditions; (3) the recovery of the patient from the anaesthetic; and (4)—not unimportant—working costs of a previously unheard-of low degree. The apparatus is arranged as a unit suitable for hospital conditions, carrying one 40 cubic foot (or smaller size) cylinder of oxygen and two angle-valved cylinders of nitrous oxide, either 100 or 200 gallon size. The unit is also fitted with "Tycos" blood-pressure-registering equipment. The machine is also arranged as a portable apparatus weighing, with metal case, about twenty-eight pounds. A separate cylinder carrier may be used in conjunction with the machine, and it accommodates very compactly three angle-valve cylinders of any capacity up to the 100 gallon (N₂O) size. Cylinder weight will be reducible in the future when the firms who fill them are in a position to accept the light-weight cylinders unconditionally.

In the tenth annual report of the Ella Sachs Plotz Foundation for the Advancement of Scientific Investigation it is announced that twenty-one grants were made in 1933, one being a continued annual grant. Twelve of the new grants were made to scientists outside the United States, among whom was Dr. H. A. Krebs of Cambridge, who received assistance for the continuation of studies on the breakdown of protein in animals and of the metabolism involved in the action of insulin. Another beneficiary was the Academic Assistance Council of London. In the ten years of its existence the Foundation has made 200 grants, researches being favoured which were directed towards the solution of problems in medicine or surgery, or in branches of science relating thereto. Applications for grants to be held during the year 1934-5 must be forwarded to Dr. J. C. Aub, Collis P. Huntington Memorial Hospital, 695, Huntington Avenue, Boston, Massachusetts, to reach him before the end of April. They must state definitely the qualifications of the investigator, the character of the proposed research, the amount of the grant requested, and the specific way in which the money would be expended. It is advised also that letters of recommendation from the directors of laboratories or clinics where the work is being done should accompany the applications. The maximum size of the grants will usually be less than 500 dollars.

THE MANAGEMENT OF BREAST-FEEDING IN GENERAL PRACTICE*

BY

H. R. YOUNGMAN, M.D.CAMB.

Failure to feed at the breast is still only too common. It will be so as long as this subject is enveloped in the public mind by a cloud of ignorance, evil tradition, and old wives' tales. It is the duty of the general practitioner to lose no opportunity of dispelling this cloud. This paper is limited to the management of breast-feeding in normal cases and slight variations from the normal. Since at least 95 per cent. of cases start normal, it should not be difficult to keep them within these limits.

ANTE-NATAL CARE

It has been stated that a woman's confidence in her natural power to nurse a baby can be inspired "by an exaggerated air of optimism on the part of those about her." Personally I can imagine nothing more calculated to put her off. Rather, the power to give confidence depends on one's gifts of sympathy and tact. But most of all, on one's own confidence that if difficulties do arise one will be able to put them right. The breasts should be examined when the patient is first seen. She should be instructed to brush the nipples with a soft brush and toilet soap daily when washing for the last two months, and to sponge the breasts with cold water before drying them. A warning should be given against any application containing spirit. If there is any retraction of the nipples she should be shown how to draw them out daily and roll them between the finger and thumb with a little oil as lubricant. In extreme retraction it may be necessary to apply a breast pump daily for a time.

PHYSIOLOGY AND ITS APPLICATIONS

The normal stimulus which maintains the secretion of the breast is regular sucking. The response varies with the degree and, up to a point, the frequency of emptying. The normal gain in weight is shown by the dotted curve in Fig. 1. A weight curve on this chart is much more useful than a written record of ages and weights. Every normal child will be found to keep very nearly parallel to this average curve, above or below it according to its weight at birth. A child whose curve does not ascend as steeply as the average for its age is to be regarded as "underweight," and will soon show signs of malnutrition if left alone. The weight at any age taken by itself is no guide to the child's condition. To take an extreme example, in Fig. 1 the child A is normal at ten weeks while the heavier child B is obviously "underweight." In each of these curves it should be noted that the infant gained weight faster than normal for a time after a set-back, tending to regain its former relation to the average. In treating underweight babies one has to aim at this result. For further examples see Fig. 2.

The quantity of milk required for normal progress is indicated in the following table:

Breast-milk Requirements: Normal Infants

Age in Months	Normal Weekly Gain of Weight in Ounces	Milk required Daily per 11b. Body Weight in Ounces
0	7	2½
4	5½	2¼
8	4	2

Underweight infants require up to half as much again as normal infants of the same weight and age.

* Part of a paper read to the Cambridge Medical Society.

The figure of $2\frac{1}{2}$ ounces per pound is rapidly approached in normal cases during the first two or three weeks, and from a month onwards the figures given are seldom varied from with healthy infants by as much as a quarter of an ounce per pound. Underweight babies, as stated before, are not contented until they are gaining weight faster than normal. Accordingly, during the period of rapid gain they require more food than a normal baby of the same age and weight.

THE FIRST WEEK

As soon as the mother and child have had their first rest, within eight hours of birth, the child should be put to *both* breasts, for two or three minutes only. It is no use tiring it and giving it wind with sucking empty breasts for long, but the earlier regular stimulation of the breasts begins the better they will respond. If the

FIG. 1.

nipples are retracted, they begin to get drawn out before the breasts become engorged and tender. The child gets the colostrum, and has learned to suck well by the time the milk comes in.

On the first day short feeds like this should be given every six hours, and on the second every three or four hours. Until lactation is established, up to an ounce of warm boiled water should be offered at the end of each feed. As the milk comes in the length of the feeds is gradually increased, remembering what was said above about sucking empty breasts. Both breasts are given at each feed for equal times by the clock, and alternate sides used first. Infants vary in the amount of time they need. A maximum of ten minutes a side should be approached unless signs of over-feeding appear. Babies over seven pounds in weight usually do well on four-hourly feeds. Four-hourly feeds should be given at 6, 10, 2, 6, and 10 o'clock, and three-hourly feeds at 6, 9, 12, 3, 6, and 10 o'clock, leaving in either case an eight-hour night. When lactation is fully established the length of feeds in minutes should be fixed. I am convinced by experience that it makes an enormous difference if one can persuade the nurse or mother to keep rigidly to the prescribed times, not allowing haphazard variations of half, or a quarter, of an hour, and

to time the feeds themselves with a watch. The infant develops a responding rhythm at once. Control of the length of feeds is necessary for the very reason that alterations may have to be made. It is most unsatisfactory to rely on the infant's judgement of when it has had enough, or to trust it to reject any excess. Some do not take enough food for a normal rate of growth unless persuaded; others consistently overload themselves if allowed. In either case the result is a fractious, restless child.

NIGHT TRAINING

For the first few days the evening and morning feeds should be given at exactly 10 and 6, whatever happens. If the child cries at night it must be changed and made comfortable, but on no account should it be lifted up or taken into somebody's bed. A drink of plain water may be given with a spoon. One must, of course, avoid

FIG. 2.

certain things that might make anyone sleep badly. Lack of fresh air and the use of too many bedclothes are common ones.

If there is difficulty after the establishment of lactation, one can shorten the nights temporarily by giving the last feed at 11 or the first at 5, or both, without altering the times of the other feeds. It often happens that a baby that cries in the early morning has to be woken up for its 10 o'clock feed at night, and does not take much because it is sleepy. The remedy is obvious—leave it till it wakes for its last feed. It will be hungry, there will be more milk, and it will have a good meal and sleep later in the morning. One should, however, work back to the proper times. A baby, like anyone else, has a better temper and digestion if it gets eight hours' sleep at night. Under the above regime a few babies sleep all night from birth, and the majority by the end of a week. Some take longer to "settle," but nothing can be gained by allowing them night feeds. When restlessness by night or by day persists into the second week, it is necessary to make sure the child is getting enough milk. Especially is this imperative if it does not begin to regain weight after the usual initial loss. On the other hand, over-feeding is occasionally met with as early as the second week.

OVER-FEEDING AND UNDER-FEEDING

It is very easy to confuse over-feeding and under-feeding. This mistake is constantly being made, with disastrous results, where the obvious diagnostic test of weighing the feeds is neglected. (It appears that infant welfare centres are often managed without any use of test-weighing. This provides the general practitioner with a wonderful opportunity to compete successfully with one of the much-discussed encroachments on private practice.) The following table serves chiefly to show how difficult diagnosis by symptoms may be:

	Over-feeding	Under-feeding
Sleep	Usually disturbed	May sleep well if well trained
Crying	Caused by colic, and by hunger if much vomiting	Caused by hunger — only towards feeding-time in slight cases
Vomiting	Usual	Often present, due to swallowing air when sucking empty breasts
Stools	Copious, frequent, often loose, curdy, and green; or constipated if much vomiting	At first constipated, brown; later, small frequent, loose, curdy, and green. "A little whenever changed"
Weight	Poor gain or loss. (May be early excessive gain.)	Poor gain or loss

The mother's feelings and the appearance of the breasts are no guide whatever.

In case of doubt, however, the question can be settled for certain by test-weighing. The ideal is to weigh all the feeds for twenty-four hours, but a fair estimate can be made on three, or even two. In estimating, assume the 6 a.m. feed to be $1\frac{1}{2}$ times, and the others not weighed equal to the 12 or 2 o'clock feed. In interpreting results one must remember the increased requirements of under-weight infants.

In most cases of under-feeding there is no need to resort to artificial food. When the test feeds yield three-quarters or more of the theoretical requirements, the supply of natural food can usually be quickly brought up to normal. It may be advisable to change from four-hourly to three-hourly feeds, especially if the child is crying much and, tired out by this, sucking feebly. The other ways of applying extra stimulation to the breasts, which should always be used, are sponging, massage, and expression. Sponging and massage should be done twice a day between feeds; the breasts are sponged with alternate hot and cold water for ten minutes, and then dried and stroked firmly all round from the periphery towards the nipple for another few minutes. After each feed any remaining milk is expressed or withdrawn with a breast pump and given to the child with a spoon. The only things the mother can take which have any effect are good food and more fluid, and extra rest; all the evidence seems to be against so-called galactagogues having any action. In more severe cases of under-feeding it is necessary to complement the breast-feeds with artificial food, temporarily, until the supply of breast milk has been worked up. These cases are outside the scope of this paper.

Over-feeding can often be corrected by simply giving a tablespoonful or two of water before each feed. This should be done first, and then the length of some or all of the day's feeds cut down if necessary.

USE OF BOTH BREASTS AT EACH FEED

Giving only one breast at each feed is the commonest cause of under-feeding and premature weaning. Using both sides at each feed from the start gives a better establishment of lactation, and indeed may lead to over-feeding occasionally. This is much easier to treat than the opposite.

The baby C in Fig. 2 at the age of 9 weeks only weighed two ounces more than at birth, and looked very thin and feeble. The mother said that it slept well and sucked well.

She was feeding it for about twenty-five minutes at one breast, every four hours. It was passing from three to six frothy yellow motions daily, and vomiting a little after feeds—signs of over-feeding at first sight. Test-weighing showed that it was getting about twelve ounces of milk in the twenty-four hours—far below what it needed. I told the mother to feed it at each breast for ten minutes every three hours, and also wrote her a recipe for complementary feeds of modified cow's milk. Three days later she came back and said the baby was "much better, but wouldn't touch the bottles." It never did touch the bottles. So the only change made at X on the chart was from one breast four-hourly to both breasts three-hourly.

Curve D represents a similar, less extreme case. At 13 weeks the mother complained that her milk was not satisfying the baby, that it cried a lot, and had diarrhoea. There were four or five greenish watery motions a day. It was having four-hourly feeds, on one breast each time. It was gaining weight steadily, but only four ounces a week. Test feeds yielded $21\frac{1}{2}$ ounces of milk in twenty-four hours—6 to 8 ounces short of what this underweight baby now needed. The only change made at X was to give both breasts at each feed. The rate of gain was immediately doubled and the symptoms disappeared.

When the first few weeks of breast-feeding have been safely navigated it is much plainer sailing. There must be many more babies unnecessarily weaned in the first and second months than in the third and fourth. I am sure it pays not to part finally from mother or baby until two months after attending a confinement. From the selfish point of view, though the extra attendances may have to be gratuitous in some cases, they bring in a lot of good will. From the professional point of view, the preservation of breast-feeding is first-class preventive medicine, and preventive medicine is the subject in which general practitioners are specialists.

In place of a complete bibliography, which the writer is not competent to give, he would mention the following:

Jewesbury's *Mothercraft*.

Paterson and Forest-Smith's *Modern Methods of Infant Feeding*.

The excellent series of penny pamphlets published by the Mothercraft Training Society, Cromwell House, Highgate, both for distribution to patients and for the edification of the distributor.

Clinical Memoranda

MALARIA IN A EUROPEAN TREATED BY ATEBRIN BY MOUTH AND INTRAMUSCULARLY

In the Third General Report of the Malaria Commission of the League of Nations' stress was laid on the value of atebirin in malignant tertian cases, especially the primary type. The following case may therefore be of interest.

HISTORY OF CASE

On December 27th, 1933, a ship's officer, aged 44, consulted me on account of constant pain in the epigastrium, which proved later to be due to a duodenal ulcer. He stated that he had a slight temperature that morning, but except for the pain, which was severe, did not feel ill. His temperature was found to be 103° , and he was admitted into hospital the same afternoon. A blood smear (thick film) revealed malignant tertian (M.T.) rings, forty to a field, but no crescents. He was given atebirin 0.1 gram t.d.s., by mouth.

On December 28th, 6 a.m., the temperature was 100.6° . The patient's general condition was bad; he was lying on his side hunched up in bed, with flushed and somewhat cyanosed face, foul tongue, weak pulse. He complained of an intense headache at the back of the neck and right side of the occiput. Atebrin was given as before. At 12 a.m. the temperature was 103.4° , remaining up during the day. Urine: albumin, a trace; granular casts.

On December 29th the general condition was as before. At 8 a.m. blood showed thirty-five M.T. rings per field,

¹ *Quart. Bull. Health Organization*, July, 1933, ii, No. 2.