Previous experimental work has shown the unsuitability of unperforated drums (Hayes, 1937) as containers for sterile dressings even when conditions were favourable. The above experiments are too few to enable one to dogmatize, but, taken in conjunction with previous experiments, they indicate that an unperforated drum is dangerous.

Group C Experiments

These experiments were conducted under correct conditions—i.e., air was evacuated from the sterilizer by first creating a vacuum of 10 inches, after which the steam-and-air-escape cock situated at the bottom of the sterilizer was opened. Steam, plus air, escaped, and the pressure fell to zero. The cock was then closed and the pressure raised to that required for sterilization. The cock was now slightly opened so as to allow the discharge of a feathery stream of steam.

Exp. No.	Steam Pressure per sq. in.	Duration of Sterilization	Contents (Large Drum)	Position of Spores in Sterilizer	Result
1	10 lb. 115° C.	20 min.	Sheets	Upper	—
2			Cotton-wool	"	—
3	15 lb. 121° C.	"	Sheets	"	—
4			Cotton-wool	"	—
5	20 lb. 126° C.	"	Sheets	"	—
6	" "	"	Cotton-wool	"	—

In Group C experiments the drums were tightly packed and of the largest size. The sterilizer was worked on correct principles. Spores were killed at as low a pressure as 10 lb., maintained for twenty minutes.

Although not exhaustive the experiments as a whole are striking and, it is hoped, will serve as a stimulus to others to work on similar lines and as a warning to those who use unsuitable types of sterilizers.

Summary

Experiments have been conducted to show that tetanus spores inserted into dressings are not killed when the technique of sterilization is imperfect.

As tetanus spores are present everywhere there is ample opportunity for dressings to become infected.

Many small sterilizers are not efficiently constructed, and from personal observation it can be stated that in many instances the methods used in preparing dressings for sterilization and the technique leave much to be desired.

Bacteriologists have shown that cotton-wool may contain tetanus spores.

It is reasonable to accept that post-operative tetanus may be caused through using dressings that are infected with tetanus spores and have been imperfectly sterilized.

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C. Petrillo (*J. Pediat.*, 1940, 17, 378) places on record the case of a female infant in whom a piece of wire was retained in the heart for at least twenty-nine months and in the lung for at least four more months, and then was coughed up in a blood clot. The symptoms were those of post-pneumonic myocarditis with cardiac failure and passive congestion. The portal of entry was probably the oesophagus.

LACTATION AND BREAST FEEDING*

BY

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Breast milk is the most suitable food for the infant, and natural feeding, from the viewpoint of both mother and child, is the best method of administration. The chief advantages of natural over artificial feeding depend upon the facts that human milk has a composition and a physical character which are best suited to the needs of the infant, it is easily digested, it contains vitamins and immune bodies, and, being taken direct from its source, it is practically sterile and at the proper temperature for drinking. The breast-fed child therefore thrives better, is less likely to have digestive upsets, and is more resistant and less often exposed to infection than the bottle-fed. Further, breast feeding is simpler and cheaper than feeding by substitutes, and, involution of the maternal pelvic organs being assisted by suckling and mammary function being normal, the mother may be expected to have a more straightforward period of convalescence from her confinement when she feeds her baby in the natural way.

In spite of the many advantages of breast feeding it is occasionally found to be inadvisable or impossible, as when any of the undermentioned conditions exist:

1. Severe maternal illness, as puerperal sepsis, active tuberculosis, or pneumonia, during lactation.
2. Breast infection, as mastitis or severely fissured nipple. In the latter case weaning should be temporary, the baby being put back to the breast as soon as the nipple recovers.
3. Puerperal insanity. As an insane woman may attempt to harm her child she cannot be trusted to nurse it.
4. Pregnancy starting during lactation.
5. Absence of milk, which precludes the possibility of breast feeding.

Mechanism of Lactation

In order that efforts to control lactation may be placed on a rational basis it is necessary that the more important factors concerned with breast development and function should be understood.

The ovarian hormone, oestrin, which passes into the blood stream in large quantities throughout pregnancy, is responsible for increased vascularity and hypertrophy of the breast, its milk ducts, and its glandular tissue. The corpus luteum hormone, progesterin, secreted during the same period, brings about further differentiation of the glandular structure, with acinar formation (Folley, Guthkelch, and Zuckerman, 1938). Both of these hormones, and more especially oestrin, have a powerful inhibitory effect on lactation, probably acting chiefly through the anterior pituitary gland (Wenner and Joël, 1939). Thus during pregnancy the breasts are hypertrophied and their specialized glandular tissue is developed, but milk is not secreted.

After the child and secundines have been expelled from the uterus oestrin and progesterin are withdrawn, the blood hormone level falls rapidly, and the inhibitory action of these hormones on the anterior pituitary gland and on the breasts is removed. Prolactin, the lactotrophic fraction of the anterior pituitary secretion, is now passed into the blood stream and the breasts are stimulated by this hormone to produce true milk. In this action it may be

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assisted by the so-called thyrotrophic fraction of the same secretion, which may also have lactogenic properties (Folley and Young, 1938), and by vitamin E, which probably has an effect on the anterior pituitary gland antagonistic to oestrin and therefore favourable to lactation. Lactation is maintained by the continued action of prolactin aided by the sucking reflex. The latter is of considerable importance, and milk production may be expected to diminish, and ultimately to cease, unless the breasts are frequently and completely exhausted.

Finally, good general health has a favourable effect on the secretion of breast milk; acute pyrexial illnesses, general ill health, and malnutrition have an adverse effect.

Ante-natal Routine

Efficient ante-natal care will do much to minimize the difficulties and increase the likelihood of breast feeding, and the mental attitude of the mother towards her child has a considerable influence upon the result obtained. It is the woman who is confidently determined to feed her baby from the breast and to continue her efforts until a satisfactory natural feeding routine is established, even at the expense of temporary discomfort or a curtailment of her freedom, who almost invariably makes the best mother, and this attitude should be supported with enthusiasm. The general health should be raised to the highest possible level by regular exercise in the open air, avoidance of fatigue or worry, sufficient sleep in a well-ventilated room, and a simple, mixed, and easily assimilated diet, including salads, green vegetables, pulses, fruit, wholemeal bread, milk, and dairy produce. Mixed vitamin preparations—of which *pregnavite* (Vitamins, Ltd.) is a suitable example—may be given with advantage as dietetic supplements, and if vitamin E is included lactation is more likely to be satisfactory (Shute, 1938).

A light uplifting adjustable brassière should be worn, but this must not constrict the breasts or compress the nipples. As the nipples are normally sensitive and this sensitivity is increased during pregnancy, discomfort may be experienced during the early days of suckling if they have not been prepared during the ante-natal period. They should be thoroughly washed twice daily and scales or encrustations around the orifices of the milk ducts carefully removed. After drying they should be briskly rubbed with a clean towel to toughen the skin, then smeared with lanolin or Nivea crème and gently manipulated by the fingers to stimulate their erectile tissue and counteract any tendency to depression. It is rarely necessary to draw out depressed nipples with a breast pump; this must be looked upon only as a temporary measure, to be discontinued as soon as digital manipulation is practicable. Neither methylated spirit nor eau-de-Cologne should be applied to the nipples under any circumstances, as these tend to produce a parchment-like surface skin which is liable to fissure during suckling.

Feeding Routine

After the confinement the breasts should be supported by a waterproof uplifting brassière and the nipples swabbed with boiled water or weak boric lotion before and after each feed. After drying they may be smeared with lanolin or Nivea crème to prevent adhesion to the dressing and to avoid softening and chafing due to contact with material moistened by the overflow of milk. They should then be covered by a dressing consisting of a small pad of cotton-wool wrapped in a piece of clean, soft, non-fluffy material such as lawn before the brassière is reapplied. So far as is possible the mother should avoid handling soiled napkins before feeding and should, of course, wash her hands before each feed is begun.

The baby may be put to the breast for the first time when the mother has rested after the delivery, and feeds may be offered six-hourly for the first two days and four-hourly on the third and subsequent days. On each of the first three days feeds should last approximately ten minutes, five minutes being allowed on each side and alternate breasts being used for the first part of each feed. After the third day, when secretion of true milk usually starts, they should be offered from alternate breasts, and should last from fifteen to thirty minutes each, an average time being twenty minutes. Sometimes the secretion of true milk may be delayed for several days, and when this occurs the child should be put to the breast at regular intervals until the supply is established. If the child is normal in size, obtains enough milk, and has an intelligent mother who may be relied upon to carry out a proper feeding routine and to report difficulties when not under the direct supervision of the doctor or nurse, continued four-hourly feeding is the method of choice, five feeds being offered daily. This gives greater freedom to the mother, more rest for mother and child, and a longer time for digestion of the feeds, with consequent increase of hunger and sucking power. If the child is small, has difficulty in getting enough milk, and has a less reliable mother, three-hourly feeding with six feeds daily is recommended until the weight of 10 lb. is attained. Night feeds are unnecessary for all but premature and certain ill babies, and the only supplements that may be required by the breast-fed baby are unsweetened boiled water (which should not be given during the hour preceding a feed), a vitamin A and D preparation, and diluted fruit juice rich in vitamin C.

The baby should be held in a convenient and comfortable position during suckling, care being taken to avoid nasal obstruction by the breast, and no feed should exceed forty minutes in duration. It should be encouraged to eructate wind during and after the feed, and should not be allowed to feed too quickly, to swallow air, or to sleep while on the breast. The mother should devote herself exclusively to the child, and should not attempt to sleep, read, or otherwise allow her attention to be diverted. Nothing should be permitted to distract the child at feed-times, and feeding should be carried out in a quiet room in the presence of the mother and nurse only.

After seven to ten days the child should be receiving $2\frac{1}{2}$ oz. of breast milk, equivalent to about 50 calories, per pound of body weight and approximately one-sixth of its weight of fluid, including milk, daily. The intake of breast milk may be measured by weighing the child before and after a feed without change of clothing, the difference between the two weights representing the amount of milk imbibed. It is advisable to accept only figures obtained from test feeds over a period of twenty-four hours, as the quantity of milk taken may vary from feed to feed.

Underfeeding

Difficulty with breast feeding, causing underfeeding of the infant with dehydration, constipation, fretfulness, crying between feeds, voracious appetite at feed-times, and failure to put on weight, may result from any of the undermentioned conditions:

(A) Causes primarily affecting the Mother.—(1) Depressed nipples; (2) sore or fissured nipples; (3) inadequate secretion of milk; (4) improper feeding, the child being held in an unnatural attitude or its nose being obstructed by breast tissue.

(B) Causes primarily affecting the Child.—(1) Feebleness, as in prematurity; (2) mouth soreness, as in thrush or, less commonly, early teething; (3) sucking difficulties due to hare-lip, cleft palate, or tongue-tie; (4) nasal obstruction due to rhinitis.

If insufficient milk is being formed to meet the requirements of the child certain steps may be taken to encourage the breasts to secrete more (Hunter, 1936). It must first be confirmed by test weighing, followed by expression and measurement of the residual milk after each feed, that the fault is inadequate milk production and not incomplete emptying of the breasts. Milk may be most satisfactorily removed by supporting the breast, grasping the tissues behind and deep to the areola with the finger and thumb, and massaging the ampullae of the milk ducts towards the nipple. All milk obtained by breast massage should be given to the infant, and a "lazy" child may be encouraged to suck more vigorously by allowing more fresh air, handling correctly during feeding, keeping awake by gentle stimulation when necessary, touching the region of the hyoid bone occasionally to encourage swallowing, and giving half an ounce of half-normal saline solution half an hour before feeds two or, at most, three times daily to create thirst.

If the milk is deficient in quantity the health of the patient should be improved by fresh air, exercise, and general tonic treatment. The diet should be liberal, mixed, and easily digestible, and should include pulses, eggs, and dairy produce of all kinds; nuts, whole or ground, may be added if they do not cause indigestion (Hoobler, 1917). Enough rest should be insisted upon and every effort made to alleviate worry and pain. Excitement should be avoided, few visitors permitted, smoking forbidden, and dehydrating aperients replaced by mild laxatives. Sufficient fluid is allowed to prevent dehydration; but milk is a true secretion, not a transudate or filtrate, and will not be proportionately increased in amount when large quantities of fluid are imbibed. It is therefore sufficient to give a glass of water to the mother half an hour before each feed-time and one to one and a half pints of milk extra daily. A preparation of cotton-seed protein sold under the name of "lactagol" and shown to be a galactagogue (Harris, 1932) may be added to the milk, and malt extract may also be given with a view to improving the milk supply. Vitamin E has been found to have a beneficial effect upon lactation, and if it has not been taken during the later months of pregnancy a large initial dose of wheat-germ oil concentrate containing 30 mg. α -tocopherol (5 capsules viteolin) should be administered, followed by 12 mg. (2 capsules) daily until the milk supply improves, and then 6 mg. (1 capsule) every second day throughout the period of lactation. Commercial preparations of prolactin are now available and, although they must still be looked upon as immature products, may be injected with advantage when the milk supply begins to fail. It is possible that their efficiency might be enhanced by inclusion of the thyrotrophic fraction of the anterior pituitary secretion. Intramuscular injections of prolactin are given into the thigh on successive days, as follows: First and second days, 300 Riddle units (5 c.cm.) each; third and fourth days, 120 R. units (2 c.cm.) each; fifth day, 60 R. units (1 c.cm.) to complete the course.

Finally, the nurse and medical attendant should try to inculcate into their patient the desire to feed her baby on the breast and the determination to persevere in the effort. It is only when all attempts to obtain an adequate supply of breast milk fail that complementary feeding should be employed to compensate for the deficiency shown by test feeding. Supplementary feeding or complete replacement of certain breast feeds by artificial food is only permissible at the time of weaning, as it will certainly tend to reduce the supply of natural milk; and breast feeding should not be discontinued during the early weeks so long as a few ounces of milk can be obtained each day.

Inhibition of Lactation

Steps may be taken to stop the breast function after stillbirth or neonatal death, or when breast feeding is definitely contraindicated. The fluid intake by the mouth is temporarily reduced and a mild saline aperient is given to cause partial dehydration of the tissues, while the breasts are washed, carefully dried, powdered, padded with cotton-wool, and firmly bound, excessive constriction being avoided. Mild sedatives, such as bromides, aspirin, or phenacetin, may be given to ease mammary discomfort. If, however, this is so severe as to cause distress, the binder may be temporarily removed to allow part of the accumulated milk to be expressed; but complete exhaustion of the glands is to be avoided, as this might encourage further secretion. Fomentation and application of antiphlogistic preparations may increase milk secretion, oedema, and the risk of mastitis, especially if the nipple is softened by a slipped dressing, and therefore should be avoided. Oestrin, 3,000 units four times daily, or stilboestrol, 1 mg. three times daily, given by mouth for three to five days, has a powerful inhibitory effect on lactation and should be used in all cases in which the suppression of lactation is desired.

Summary

Breast feeding offers the child the best chances of survival and good health, and contraindications to natural feeding are few.

Breast development is brought about by the action of oestrin and progestin, and secretion of milk follows withdrawal of the ovarian hormones, the secretion of prolactin, and breast stimulation by the sucking reflex.

The general care of the patient and proper management of the breasts are of considerable importance during the ante-natal period as well as during suckling. Regular feeding and complete emptying of the breasts are essential, and test feeding is the most reliable index of breast function.

Deficiency of breast secretion should be treated by instituting a suitable feeding routine, improving the general health of the mother, and preventing excitement and worry so far as is possible. Smoking is prohibited, dehydrating aperients are avoided, and an adequate fluid intake is given. Both breasts may be used for each feed, and vitamin E and prolactin may be administered with advantage.

The mental attitude of the mother towards breast-feeding is most important, and she should be given every encouragement in her efforts to feed the child.

When suppression of lactation is desired the mother's fluid intake is reduced, the breasts are bound, and oestrin is given. Breast discomfort may be relieved by mild sedatives or partial emptying of the glands when necessary.

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A. R. Thompson (*Brit. J. Child. Dis.*, 1940, **37**, 166), who records an illustrative case, states that repeated tracheotomy for laryngeal diphtheria is exceedingly rare, as is shown by the fact that of eight cases recorded during the last sixty years only one, reported by J. D. Rolleston in 1931, has been fully authenticated. Thompson's case was that of a boy aged 2 in whom tracheotomy for purely laryngeal diphtheria was performed in November, 1937, and again in February, 1939. Cultures from the nose and throat on the first occasion and from the nose and tracheotomy wound on the second were positive. No complications occurred in either attack.