Certain principles concerning the training of troops were again emphasised by the Malta experience. The use of deep shelters, "shelteritis" as the troops called it, is to be deprecated and long fighting training, teaching how to make open slit trenches which should be drills in dispersal and lying flat. There were very few casualties among the troops working on the airfields withadequate sheltering, and despite constant exposure to heavy raiding. From the standpoint of morale, frequent raids at irregular intervals, with the heavy attacks indiscriminately interspersed among nuisance raids, are more deleterious than heavy raiding at regular and long intervals.

There is no evidence to show that bombing introduced any new factor in the production of psychiatric casualties; rather it aggravated or precipitated existing psycho-neurotic dysfunction, although in certain exceptional cases it may be capable of precipitating an acute anxiety state in a previously balanced individual.

The detection and primary treatment of the minor psychiatric disorders should be the responsibility of the regimental medical officer. Any effective treatment undertaken by the medical specialist or psychiatrist is of limited value without their understanding cooperation. In the high proportion of psychiatric disorders in the Mediterranean theatre, should all these cases be referred to a psychiatrist if available? The answer is definitely in the negative. The border-line in physical and psychiatric medicine is difficult, and the frequent super-imposing of the psychomatic disorders upon physical disease, complicates the diagnosis. The medical specialist is prepared to diagnose and treat the minor psychoneurotic disorders. He may do untold harm to a patient by referring the case back to the regimental medical officer with a curt note, "no organic disease," without furnishing any data to enable the specialist to assess the patient, time-consuming though this may be. On the other hand, he must realise which cases are beyond his experience to treat and refer them back to the psychiatrist without delay.

**SUMMARY**

Primary psychiatric diagnoses constituted over 40% of the medical outpatient consultations in Malta during the period September, 1941, to June, 1943.

Conditions in Malta were not exceptional save for the intensity of recognised environmental etiological factors, due to the constant exposure to bombing.

Evidence is submitted that during the height of the blitz period 25% of thearrison showed a pathological reaction to bombing, but that the general quality of the garrison troops was in no way inferior.

I wish to express my thanks to all the medical colleagues, besides the medical specialists named, who served in Malta during the period under review, to Brigadier J. R. Rees, consulting psychiatrist to the Army, and to Brigadier R. F. Barbour, recently consulting psychiatrist, MEF, for their help and encouragement; and to Brigadier W. K. Morrison, R.A.M.C., Malta, for permission to publish this paper and for his personal interest in the problems raised and in the welfare of the men.

**SCOTTISH COUNCIL FOR HEALTH EDUCATION.**—Reporting to the Council on his tour of the rural and Highland areas of Scotland, Dr. J. N. Greene Nolan said that, accompanied by a Ministry of Information mobile film unit and operator, he has so far visited 20 counties, addressing 222 meetings in schools, factories, and public halls, with an aggregate attendance of nearly 20,000 persons, of whom 18,000 were senior-school pupils. Remarkably few were "against it" without frowning, and nearly all said that they were surprised that he had had such appreciative audiences almost everywhere he went. There could be no doubt that there was a stirring of public interest in health problems, and it was the Council's duty to respond to the demand for good advice. He deplored in the Ministry of Health report on the breast feeding of infants (1943). The part played by suction was well described by Deluze (1850) and has also been referred to by Bumm (1912) and Russell (1924). Other suggested causes are local insufficiency of vitamin A (Balachovski 1934, Kunz 1936), the detachment of crusts (Tarnier and Chantreuil 1888), and the fullness of the breasts (Moises 1852, Waller 1948). Any effective treatment of the petechial lesion has been recognised at least since Mauriceau's time and has been found by Kisiya (1941) relatively late in lactation. This one paper by Kisiya is the only account found of experimental work relating to causes of soreness of the nipple.

**Investigation**

The following investigation consisted of a preliminary observation of some 400 women and a more detailed study of 114. It has become evident that there are two common kinds of lesion differing in nature, position, and time of incidence: the erosive or petechial, and the ulcerative or fissure (fig. 2). The erosive or petechial lesion manifested itself most simply as swelling of the papille, usually at the centre of the nipple. Sometimes soreness was present without visible alteration; in other cases the erosive or petechial areas and later petechiae. In some instances the petechiae appeared without preceding oedema. In their most extensive form the petechiae merged to form a red crescent transversely across the nipple (fig. 1). Sometimes the superficial layers of epithelium were eroded as a ruptured blister. Pain at the time of...
nursing was common to all stages, which, because they frequently succeeded one another, was considered to be parts of one process. The lesion was commonly bilateral. This type was found most often during the first days of nursing and seldom started after the first week (table I). The position of the line of merged petechiae across the nipple was remarkably constant, and, since the women under observation all nursed while lying down, bore a constant relation to the baby's mouth.

To find out whether soreness was produced by rubbing or suction a finger was put into some babies' mouths. One could feel the rhythmical action of the jaws and cheeks, the tongue lashing the underside of the finger strongly and frequently, and the area of maximal suction in the crescent-shaped space between the tongue and palate. There could be little doubt that the petechial area on the nipple corresponded to this area of maximal suction. If repeated frictional trauma were the cause, the lesion would presumably be in that part of the nipple worked on by the tongue and gums. No evidence was found of biting causing the soreness. It is known that the pain is felt most often and intensely in the first moments after the child has been put to the breast and gives the subjective impression that the nipple has been bitten. This fact is commonly mentioned by patients. They also recognise that the sensation of being bitten is felt only on the affected side, although the baby apparently takes each side with equal vigour. The pain is sometimes experienced in an affected nipple during a "draught" sensation felt apart from sucking. It seems probable that, although sucking and therefore presumably its mechanical effects are necessary for the development of sore nipples, actual aggressive biting in early infancy is not an essential factor, if it occurs at all.

MEASUREMENT OF SUCTION

The next step was to investigate the pressure-changes within babies' mouths during sucking. This was done by direct measurement with a mercury manometer recording by its float on a smoked drum and connected by a hypodermic needle to a no. 14 soft catheter, which was passed beside the nipple into the baby's mouth. The hypodermic needle served both to lengthen the connexion without noticeably increasing capacity and to damp the swing of the mercury column. The momentum of the moving mercury column exaggerated the excursion when suction and swallowing produced quick large oscillations, but this exaggeration did not modify the reading when the negative pressure was steadily maintained. The catheter was apt to cause an air-leak between lip and breast or to interrupt the child's hold; hence recording was only possible where the areola was soft enough to accommodate the catheter, where the mother was not put off by the apparatus, and where the child took a good hold.

As might be expected, the occurrence or non-occurrence of swallowing determined the type of record. When the child could be heard swallowing milk or air, a characteristic tracing was obtained like that illustrated (fig. 3), which was made on her eleventh day by a vigorous baby girl, who weighed at birth 7 lb. 1 oz. She was taking leisurely from a full breast and obtained 1 oz. of milk from that breast at that feeding. The negative pressure was rhythmically produced and released with each act of swallowing, but a moderate negative pressure existed momentarily before the next jaw action.

When, however, a hungry child was obtaining no milk and there was no air-leak between lip and areola, a negative pressure was liable to be produced, and to be continuously maintained at a high level even for minutes within the mouth until the nipple was withdrawn. Fig. 4 shows a record made the day after birth from a second child, a boy, who weighed at birth 7 lb. There was a period of vigorous sucking interrupted by a rest; then, between the arrows, the baby could be heard to swallow. After that, swallowing could not be heard and the baby was almost asleep, with occasional movements of the jaws. The ready response of the mercury to small nibbling movements showed that the catheter was open during this period. After a period of less suction a negative pressure was held for 2½ min. at approximately 70 mm. Hg. Greater negative pressures were recorded in other instances, and one two-day-old baby exerted a suction of 200 mm. Hg for 2 min. until she was removed from the breast. The outward appearance of the baby gave no indication of the strength of negative pressure obtaining; indeed the contrast was striking.
between the peaceful child apparently at rest on the breast while the high level of negative pressure produced by the instrument. An increase of negative pressure was repeatedly observed when the baby felt the nipple going from him.

The easiest way to understand the meaning of these figures is to measure one's own suction capacity. A suction-pressure of 100 mm. Hg is an ordinary maximal reading by adults can exert a suction-pressure of 350 mm. Hg and a few a considerably higher pressure (Auerbach 1888). Mouth-action suction can be maintained for some minutes, although to exert a pressure of even 200 mm. Hg demands a great effort and soon produces tensive flushed areas on the buccal mucosa, much resembling the soggy early nipple. This experiment might well be included in the students' obstetric or pediatric training.

CAPILLARY RESISTANCE AND VITAMIN-C SUPPLEMENT

The strength and duration of suction revealed by these records being sufficient by itself to produce petechiae in the body of the breast, to which the mother was exposed, was adduced whether sore nipples were in part due to reduced capillary resistance in the mothers and, if so, whether the resistance could be restored. Preliminary tests made by applying negative pressure to the skin of the arm showed that in average, petechiae were more readily produced in newly delivered women than in other women. Thus a survey was undertaken to determine if lowered capillary resistance were related to the incidence of sore nipples; it was thought that by means of vitamin-C the capillaries would leak, or it may not have been related to capillary resistance in nipples. Or the capillary resistance of the nipple may have been such as to allow formation of petechiae in all or almost all the women if the baby exerted a strong and long suction, especially if venous obstruction was also present. This last explanation is thought to be valid. A suction of 5 mm. Hg for 2 min. and 200 mm. Hg for 2 min. exerted on the areola might be a considerable change, whereas a suction of 350 mm. Hg for 2 min. would be far more telling.

The absence of correlation between mean capillary resistance and incidence of soreness has several possible explanations. The test of resistance if the petechiae in the skin of the arm may not have been an adequate measure of the critical negative pressure at which the capillaries would leak, or it may not have been related to capillary resistance in nipples. Or the capillary resistance of the nipple may have been such as to allow formation of petechiae in all or almost all the women if the baby exerted a strong and long suction, especially if venous obstruction was also present. This last explanation is thought to be valid. A suction of 5 mm. Hg for 2 min. and 200 mm. Hg for 2 min. exerted on the areola might be a considerable change, whereas a suction of 350 mm. Hg for 2 min. would be far more telling.

In the incidence of soreness. The weight of the baby, and the duration of delivery and the secretion of milk is longer on average in primiparae than in multiparae, the longer interval the baby's grasp and the milking action of the tongue might, in conjunction with strong suction, raise the tension beyond the leak point in nearly all women. It is interesting that petechiae in the babies' tongues were only observed twice and then were at the margin; venous obstruction as well as suction presumably assisted in causing them here and may have done so on the nipple.

Judging by the rough-and-ready method of manual compression, obstruction is made well on the areola rather than at the base of the nipple. This is a very practical point. To reduce the risk of the petechial type of soreness, one should ensure that the baby takes a hold of the nipple and as much of the areola as possible. This not only reduces venous obstruction but also helps to avoid the increase in negative pressure when the child's hold is insecure. Further, this position is the best for the milking action of the jaws and tongue, as showed by ho (1928) who showed that venous obstruction may explain the fact that the mothers on whom the records of strong suction were made developed soreness and edema but no immediate expression. It is possible only if the baby took a good hold of the areola.

The number of women given ascorbic-acid supplement was unfortunately small. Even so the absence of significant correlation between the receipt of supplement and soreness shows that it was here no specific remedy. The regression coefficients confirm the uselessness of the capillary-resistance test as a measure of ascorbic-acid level in women.

The regression coefficients were applied to the findings of other workers there was no relation between parity and soreness in the survey. This finding was unexpected, since the interval between delivery and the secretion of milk is longer on average in primiparae than in multiparae, the longer interval.
increasing the risk of exposure to strong negative pressure. This would be offset if the inexperienced mother were less often successful in getting the child to take the breast in the first days. The greater incidence in primiparae found by others may have been due to the recording of the rate of complaint rather than the incidence found on close examination. Multiparae are rather apt to take soreness for granted.

In table I the day of first occurrence of petechiae is set out as an indication of the time-incidence of the erosive lesion, this measure being taken as the most definite sign available in the lesion and the time of the strong suction exerted before the milk secretion is free, and yet in 6 cases petechiae first developed, and in another 3 fresh ones appeared, after the fifth day. In 5 of these 9 there was no obvious explanation, but in 4 the breast had been held firm to the breast before soreness, but the milk had not been withdrawn and secretion had become scanty.

ULCERATIVE OR FISSURE TYPE OF LESION

Of the women in the survey 5 had fissure of the nipple, and, extending the series, there were 10 cases in 176 women. The fissure (fig. 2) is an ulcer, a break in the epithelium in the depth of the lines of the skin, usually at the side of the nipple. It appears to be commoner among multiparae, but it was not met with before the fifth day. Since it does not resemble, have the same time-incidence as, or necessarily succeed the erosive lesion it is thought to be distinct. It is suggested that the ulcerative lesion is the result of mechanical trauma acting on an area in which the capillaries and the subjacent connective tissue have been already weakened by a sudden withdrawal of oestrogen. Allen (1927), Allen et al. (1937), Chamberlin et al. (1941), and Aberle (1934) have shown that the thickness of the nipple epithelium in monkeys and other mammals is increased by oestrogenic effect. M. O. Barrie Sweeten by three -daily injections of 0.5 c.cm. of tinct. benzoin. co. BP might be shown to be successful.

Summary

Two common types of sore nipple have been distinguished: the erosive or petechial and the ulcerative or fissure.

The position of the petechial lesion and the strong sustained suction found to be exerted by the baby are taken to indicate that suction unrelied by swallowing is the main cause of the petechial type. Venous congestion and lower capillary resistance may contribute to their causation.

To prevent the petechial type the child should not be left on the breast for more than 2 min. when it is obtaining nothing. To the child should take as much of the areola as possible into its mouth.

Ascorbic-acid supplement was without effect on soreness and capillary resistance.

It is suggested that fissure of the nipple is due to reduction in capillary resistance.

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