facilitated if the public were educated to believe that not all medical care needs to be given by doctors. It was a fairly common finding that patients who expressed dissatisfaction with the visiting nurse were those who had in the past also expressed dissatisfaction with the visiting doctor.

The Future

In April 1968 the county borough of Teesside came into being when several smaller boroughs were fused. Attachment schemes were then adopted as local authority policy and towards the end of 1968 were being implemented.

Up to that time it had been practice policy that where the local authority district nurse was already visiting the home, then the visiting nurse was not used. In this way she did not tread on the toes of the local authority nurse, though in fact the job she was doing was quite different and one with which the local authority nurse was unfamiliar. Nevertheless, when attachment schemes came into operation the visiting nurse, trained by the practice, was taken over by the local authority, since her work was accepted by it as being part of the "new-style" district nurse duties. Undoubtedly the other attachments are affecting her work. The follow-up of illness detected during pregnancy and the puerperium has now been passed to the "attached" midwife. For example, it is she who follows up cases of pyelitis of pregnancy being treated at home. Similarly, the health visitor now follows up some of the acute illnesses in childhood; this brings her into the family when they are troubled, and at this time they are not only appreciative

of her clinical skill in relation to the illness but probably also more willing to accept her health counselling then and later. At times the health visitor visits elderly chronic sick when they have some particular problem for which special knowledge of welfare facilities is needed. Patients suffering from psychiatric illness are visited at home by the attached mental welfare officer rather than the nurse. Lastly, of course, the traditional district nurse doing her "normal" nursing duties has been acquainted with and now undertakes the newer type of district "nursing" described in this paper.

How the division of labour takes place is not of great importance, and at this stage there is ample room for experiment not only in this practice but in others also. The doctor's prime role is to co-ordinate the activities of his team and reserve this expertise for when it is really needed.

Without the skill and understanding of Mrs. Irene Mole, S.R.N., this experiment in medical care would not have achieved such undoubted success. Drs. K. G. Wilmot, W. C. Moonie, A. C. MacDonald, R. G. P. Hall, and I myself are extremely grateful to her.

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NEW APPLIANCES

Stereotactic Recording from the Spinal Cord of Man

Mr. EDWARD HITCHCOCK and Mr. MARCIAL LEWIN, Western General Hospital and Royal Infirmary, Edinburgh, write: Since the advent of stereotactic surgery human thalamic activity has been extensively investigated and recorded (Guiot *et al.*, 1962; Gaze *et al.*, 1964; and many others). Such recordings, obtained during operations for the relief of extrapyramidal disorders and to a lesser extent during pain-relieving procedures, have been possible only through the development of stereotactic instrumentation, permitting rigid electrode fixation and thus facilitating recording procedures.

In contrast to the enormous amount of investigation on intracerebral recordings, comparatively little appears to have been published on more caudal regions in man.

In 1920 Clarke devised a stereotactic instrument to investigate cord function in animals, but until recently little attention had been paid to the possibilities of spinal stereotaxis in man.

Electrophysiological investigations of spinal cord function in man have been hampered by the absence of any stereotactic device permitting accurate target-siting and lesion-making.

Rand *et al.* (1965) used a conventional stereotactic apparatus to place a cryoprobe

alongside the cord, and Gildenberg *et al.* (1967) suggested improvements in the procedure of percutaneous cordotomy by simple radiographic aiming techniques. Puletti and Blomquist (1967) described a microelectrode holder permitting observation of single neurone potentials in the human spinal cord exposed to laminectomy, the electrode being placed under direct vision. They illustrated their paper with two examples.

The recent development of a stereotactic apparatus specially designed for percutaneous spinal cord stereotaxy (Hitchcock, 1969) has permitted electrophysiological investigations which would appear to have potential in basic investigations of cord function and be a practical aid in determining target sites for a variety of surgical lesions.

INSTRUMENT AND METHODS

The stereotactic instrument is a hollow square of aluminium alloy rigidly fixed to the skull by three-point fixation (Fig. 1). The target is related to measurements on two bars, one vertical and one horizontal, and the electrode length and laterality are thereby determined. The electrode is inserted towards

the target site by a direct or oblique track within a rigid steel tube (Fig. 2). The electrode is a 22-gauge stainless steel tube 30 cm. long, completely insulated (Insulex) and fitting snugly within a shorter outer shell. A diamel-coated gold wire 0.009 in. (0.23 mm.) in diameter passes through the inner tube and protrudes 1.5 mm., the tip being bared to 1 mm. The upper end of the gold wire extends beyond the tube and is connected to a preamplifier. Activity is then monitored with an audiometer and a Tektronix 502 oscilloscope.

RESULTS

Recordings were made in three patients treated for intractable pain by tractotomy at the first cervical segment.

In the first patient, apart from non-specific activity, increases in electrical activity were obtained from the cuneate fasciculus by movements of the ipsilateral wrist, and from the spinal trigeminal nucleus by tactile stimulation of the ipsilateral face.

In the second patient the electrode track traversed the left gracile fasciculus, increased electrical activity being obtained by move-

ment of the left great toe and ankle. Responses were also obtained from the left spinal trigeminal nucleus by tactile stimulation of the mandibular division.

In the third patient the electrode track penetrated the right cuneate fasciculus, right spinal trigeminal nucleus, and right spinothalamic track, from which recordings were made (Figs. 3, 4, 5, 6, and 7).

COMMENT

These recording methods are being developed into a less complex and more sophisticated procedure, and it is hoped that further research will provide a useful method of target and track identification to aid therapy, and provide a unique opportunity for electrophysiological and anatomical studies of the human spinal cord.

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FIG. 1

FIG. 2

FIG. 1. — Stereotactic apparatus.

FIG. 2. — Lateral radiograph of apparatus and electrode in situ.

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 3.—Spontaneous activity from cuneate fasciculus (depth 1 mm.). Calibration 1 msec./cm. and 250 μ V/1.5 cm. (1-cm. graticule).

FIG. 4.—Spontaneous activity from right spinal trigeminal nucleus (5-mm. depth). Calibration as in Fig. 3.

FIG. 5.—Increased amplitude and frequency of the activity seen in Fig. 3 during tactile stimulation of right face. Calibration as in Fig. 3.

FIG. 6.—Spontaneous activity from right spinothalamic pathways (10-mm. depth). Calibration as in Fig. 3.

FIG. 7.—Increased amplitude and frequency of the activity seen in Fig. 6 during painful stimulation. Calibration as in Fig. 3.