available both indoors and outdoors in the grounds. A records, revision, and clerical section will be used to assess the aptitude of those patients wishing to do clerical work in the future or who need a short period of revision before taking pre-entry tests required for some courses of vocational training. The staff of the unit will include workshop supervisors, an occupational psychologist, a social worker, a full-time D.R.O., and a chief occupational supervisor in charge of the workshops. A staff and organization chart is shown in Fig. 3.

FIG. 3.—Staff and organization chart.

Discussion

We hope that the siting of an industrial rehabilitation unit alongside an existing medical rehabilitation centre will facilitate

the process of rehabilitation by which a patient can return to a full life at home and at work. Patients must be weaned from medical treatment before they can be discharged from medical care. As they get fitter, or their disability becomes stabilized, they require less physical treatment. Active use supercedes active exercise. But at this stage they are often not yet fit enough to go to a conventional industrial rehabilitation unit, to work an eight-hour day, and to travel daily by public transport. In any case, transfer from one unit to another often results in delay and lack of continuity in care as one team hands the patient over to another, possibly in another part of the country. For efficient rehabilitation speed is the key to success, particularly when dealing with patients injured at work.

In the past we have attempted to eliminate delay by "work therapy" at Garston Manor, assessing the patient's aptitudes and skills in our own workshops as he progressed from medical treatment to a full day's work. But we have not been able to provide production work at an industrial tempo and our workshops have been inadequate in size and scope. The new industrial rehabilitation unit will provide a more realistic working environment, as well as the incentives of increased allowances as the patient is transferred progressively from one unit to the other. The success of the combined centre will depend, however, not only on close liaison between the staff of the two units but also on a steady supply of patients referred from outside sources who are likely to benefit from their services.

Lip-service is often paid to the concept that rehabilitation is, and should be, a continuous process from the ambulance to the work-bench. It will remain an ideal so long as present divisions exist between medical and industrial rehabilitation, and until the medical profession makes full use of the facilities provided for its patients by the Department of Employment and Productivity.

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OUTSIDE EUROPE

Ethiopian Cardiovascular Studies: II Treatment of Pulmonary Oedema in Outpatients

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Brit. med. J., 1968, 3, 49-51

It has been shown that lobar pneumonia in Africa can be managed efficiently and economically from the outpatient clinic except in cases with serious complications (Sibellas, 1966). This method of treatment is thoroughly relevant to the developing countries, where it is very expensive to admit patients to hospital. In these countries people often do not go to hospital until they are very ill, and those with heart disease may first be seen with pulmonary oedema. It is conventional for such patients to be admitted, but is this necessary? Is it possible to treat pulmonary oedema successfully in outpatient clinics? The results of the studies reported below suggest that such treatment is indeed possible, and is also safe and effective.

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Patients Studied

A weekly cardiac clinic is held at the Tuberculosis Centre, Addis Ababa. Patients are referred when their miniature radiograph shows an abnormal cardiac shadow (Parry and Gordon, 1968). Since March 1967 34 patients with pulmonary oedema have been treated by the method described. The criteria for this diagnosis have been both radiological and clinical. The following signs have been used: tachypnoea (about 30 a minute or more), cough, inability to lie flat, crepitations in the lungs, tachycardia, and evidence of an abnormal heart—for example, a gallop rhythm, a murmur, an enlarged left ventricle, and an abnormal blood pressure. Signs of systemic venous congestion have been found in some cases, but patients have been included in this report only when pulmonary oedema has overshadowed all other signs. None of the patients were coughing up the

classical pink frothy sputum, but all were very breathless. The primary cardiac diseases are shown in the Table.

Method of Treatment

Every patient is examined first and then has a chest radiograph taken; the wet film is seen, and if this confirms pulmonary oedema an intravenous injection of digoxin 1 mg. and of frusemide 80 mg. is given. At the same time digoxin 0.5 mg. is given by mouth. The patient and anyone who is with him are then told that no salt must be put in any of his food, and that he should rest at home. He is then given two small polyethylene bags (the discarded bags from disposable 10-ml. syringes are admirable): one contains 18 0.25-mg. digoxin tablets and the other contains 14 tablets, each composed of hydrochlorothiazide 25 mg. with potassium chloride 600 mg. He is told to take four digoxin tablets—that is, 1 mg.—that same evening, and then two tablets from each bag together every morning. His daily dose of digoxin is therefore 0.5 mg. and of hydrochlorothiazide 50 mg. This dose of digoxin is used whether there is atrial fibrillation or sinus rhythm. He is given only the exact number of tablets which he will need until he returns to the clinic a week later. At this visit a second chest radiograph is taken, and appropriate maintenance treatment is prescribed.

Results of Treatment

Only four of the 34 patients failed to come back for follow-up. Twenty were seen after one week, and four after two weeks. Those who returned have been divided into those who were much better, both clinically and radiologically, those who were better, and those who were unchanged. One patient was better after one week, but became steadily worse later. The differing results in each disease are shown in the Table. Those with primary myocardial disease have done much better than those with significant valvular disease. It is not surprising that patients with critically stenosed or freely incompetent aortic or mitral valves should not have done well.

Chest radiograph before and one week after outpatient treatment of a 60-year-old woman with aortic valvular incompetence.

In four patients a large pleural effusion disappeared in one week; in another the cardiac shadow shrunk so remarkably that a pericardial effusion associated with the patient's cardiomyopathy may have been dispersed too. The illustrations show that this simple treatment was remarkably effective. The patients

Diseases and Results of Treatment

Diagnosis	No. of Cases	Results of Initial Treatment			Follow-up: None or Inadequate
		Much Better	Better	Unchanged	
Cardiomyopathy ..	14	10	2	—	2
Hypertension ..	4	3	1	—	—
Rheumatic mitral or aortic valvular disease	12	1	5	3	3
Aortic incompetence (probably syphilitic)	3	1	1	—	1
Constrictive pericarditis	1	—	1	—	—

who improved often said things like "Now I can walk," or "I have not been able to sleep or to lie down for three months till this week." Nothing is known of those who did not come back. Symptoms of digitalis intoxication with bradycardia or ventricular ectopic beats were seen in five patients who were treated early in the study, when hydrochlorothiazide without added potassium was used.

Discussion

The cough and breathlessness of pulmonary oedema make many people think that their lungs are diseased. In Addis Ababa some of these come to the Tuberculosis Centre, where an efficient and free service is available. Many of the patients live in the country (Parry, 1968); they are poor farmers who cannot afford to pay for medical care, and whose admission to hospital would quickly overload the free beds available in the city's hospitals. The principles of treatment are to promote a diuresis, and to get the full benefit from digitalis as quickly as possible. Frusemide acts almost immediately when given intravenously (McKenzie *et al.*, 1966), and it has been found very valuable in the treatment of pulmonary oedema in hospital (Stokes and Nunn, 1964). A dose of 80 mg. is large, but a swift and substantial effect is needed, particularly as the patient may not be able to get home without a stiff walk uphill, and this could raise his pulmonary venous pressure disastrously. A daily dose of hydrochlorothiazide, 50 mg. for the first week, may not be necessary, but again treatment is made as vigorous as possible. Potassium depletion can occur when diuretics are used as often as they are in this method of treatment, and though the tablets of hydrochlorothiazide and potassium are relatively expensive they make treatment for the first week safer, as there is little risk of digitalis intoxication and potassium depletion, and simpler, because no separate potassium supplement is needed.

The method of treatment is deliberately simple. The entire daily dose of digoxin and of the diuretic is taken in the morning; the patient has then only to remember to take his tablets once a day. Restriction of salt is urged on the patient because the commonly eaten peppery stew—"wot"—is liberally flavoured with salt. As the life of the peasant of the Ethiopian highlands is rich in its proverbial sayings, a "new" proverb is taught to all these patients with pulmonary oedema: "Life is better than salt."

If pulmonary oedema is to be treated successfully its diagnosis must be accurate. The clinical criteria for the diagnosis have been very valuable, and they can be used by doctors who have to work at clinics or hospitals where it may be difficult or impossible to get a chest radiograph. The problems of the differential diagnosis in such patients have been discussed before (Parry, 1966). If a chest radiograph is available the typical signs of pulmonary oedema (Gleason and Steiner, 1966) should be sought. No one would pretend that the outpatient treatment of pulmonary oedema is ideal, but it is relevant to countries where medical care is expensive, doctors are few, and patients often do not reach a clinic till they are very ill. The mystique of admission to hospital is a luxury practice which developing countries should not be made to adopt, either by foreigners or by their own nationals who help to train their doctors or to organize their health services. Rather, it would be refreshing to hear that diseases for which people are commonly admitted to hospital were being studied critically in an attempt to develop effective and safe methods of outpatient treatment (*Brit. med. J.*, 1967).

Summary and Conclusions

Thirty-four patients with pulmonary oedema due to various heart diseases have been seen at a cardiovascular clinic held

at the Addis Ababa Tuberculosis Centre. They have been treated as outpatients by a simple and effective method, the results of which are analysed.

Medical treatment in hospital in developing countries is expensive; therefore methods of outpatient treatment should be studied and used whenever possible.

It is a pleasure to record my thanks to Professor Charles Leithead for encouragement and help; to the physicians of the Tuberculosis Centre, Addis Ababa, who referred patients; to Sister Marmiti, who gave skilled help throughout; to Professor R. E. Steiner, who kindly reviewed some of the radiographs; and to Messrs. Burroughs Wellcome Ltd., Ciba Ltd., and Hoechst

(Ethiopia) for generous supplies of Lanoxin, Esidrex and Esidrex-K, and Lasix.

The continued support of the Wellcome Trust throughout this work is gratefully acknowledged.

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MEDICINE AND THE COMPUTER

II—Running a Mental Health Service *

[FROM A SPECIAL CORRESPONDENT]

Several features make the North-east Region of Scotland a fruitful field for psychiatric research on a population. The latter of $\frac{1}{2}$ million is balanced in composition, being half urban and half rural. Moreover, it is a self-contained, almost captive, one since there is relatively little movement either way across its borders. The area is also served by one integrated mental health service—administered by the North-east Regional Board—with a centralized records system in Aberdeen. Hence it is relatively easy to arrange for the systematic collection of data on almost everybody who is referred to the psychiatric service. Such comprehensive data is just what is needed for long-term longitudinal research into the epidemiology, natural history, and varying social context of mental illness. Nevertheless, it would be impossible to cope adequately with such a rapidly accumulating mass of data using conventional means of data processing, and the help of the computer has therefore been enlisted.

The Psychiatric Register

A psychiatric case register was started by the region's Mental Health Research Unit in 1963. The register accumulates data in personal files about the course of each patient's illness. Typically every patient with mental illness undergoes several complicated sequences of treatment in a number of different treatment units. It is the tracing of this experience to which the register method is particularly suited.

Many of the problems of collecting data for the register have been minimized by the Research Unit. Firstly, the patients' case records have been standardized throughout the region, and they have been designed so that copies of them can be used independently as source documents for punching cards for entry on the computer register. Secondly, four trained interviewers collect most of the patient's details, thereby ensuring that the data are both consistent and reliable. A third feature is the extensiveness of the data collected about each person, particularly about his social background.

When a patient is referred for psychiatric help the medical records office opens a record by entering brief personal details on a contact summary form. Before the patient's first

psychiatric consultation he is seen by one of the special interviewers, who inquires into his personal, social, and previous and current medical and psychiatric history. So far only about 1 in 1,000 patients have been found to refuse this preliminary interview, which benefits both the patient (who is often much more relaxed by the time he sees the psychiatrist) and the psychiatrist (who with the patient's basic information in front of him can often shorten the initial interview by half).

The social and medical data from a patient's forms are punched into a set of cards, each of which is "labelled" with his personal identifying details. These punched cards used to be filed manually and processed by sorter, tabulator, and hand calculator, but now they are dealt with by a computer in Edinburgh, where the register is kept on reels of magnetic film.

The records are stored in sequence according to the patient's registration number, each record being headed by personal identification details. Every month or so the new punched cards produced are sent to Edinburgh and fed into the computer, which brings the register up to date. It does this by matching up the identification details on the incoming cards with those on the register. If a match is found the new details are added to the patient's existing record; if no match is found the data obviously concern a new patient and a new record is set up. Throughout this "updating" extensive error checking is carried out to further ensure reliability.

How the Register Helps

So far the register has been used in three main ways: help for management, help for clinicians, and in research projects. A good example of the first was whether a particular hospital should have a new psychiatric consultant post. The computer was used to answer the question whether, if all the patients who were currently shared between this and another hospital were transferred to the one hospital, it would become overloaded. Another management problem under study is the future demand for mental hospital accommodation. Studies made in the early 1960s in Britain indicated a considerable drop in future demand for beds. Nevertheless, a preliminary study made by Dr. J. A. Baldwin in the North-east Region of

* Part I, "Managing a County Health Service," was printed last week (p. 823).