health teams comprising secretarial and nursing staff as well as health visitors and social workers—all led by the practitioner—it is evident that practitioners will need to have some flair for, and basic training in, management. Through the more efficient use of their time, practitioners could thus foreseeably care for many more patients than they do now, and the present average of 2,500 patients could perhaps be boosted to 6,000 or even 10,000 as in some areas in Sweden. The report also suggests that in the future there could be a move away from the concept of the practitioner being available on demand to his being available instead only according to need as decided by a delegated auxiliary.

It is encouraging that the number of practitioners attending postgraduate courses has increased considerably from 5 per cent in 1952 to 56 per cent in 1967, and so is the indication that their connexion with hospitals is not so remote as most people might think. For example, in 1966 about 6,582 practitioners held part-time hospital appointments, examined 57,000 new patients at out-patient departments, and dealt with nearly half a million attendances. Indeed, the indication is that practitioners desire a greater degree of integration with the hospital services as well as with local health authorities, although this is not by any means always the case.

What seems to be just around the corner is the integration of health services into a unified whole. This has already started in practice and the Minister of Health has proposed that it should be given statutory recognition.

OCCUPATIONAL HEALTH

Asbestos in the Lungs

from our Social Medicine Correspondent

WORKERS who are continuously exposed to asbestos run a real risk of developing pleural and pulmonary fibrosis and even malignant diseases, according to a report in the current issue of the *British Medical Journal*. Based on a large-scale survey—using radiographic techniques—of 15,000 men employed at the Royal Dockyard, Devonport, Dr Geoffrey Sheers, consultant physician at Plymouth General Hospital, and Dr Ann R. Templeton, medical director of the Mass Radiography Centre, Plymouth, have calculated that about 600 of the dockyard employees probably have various types of abnormalities attributable to asbestos and that many more may be at risk (*British Medical Journal*, iii, 574; 1968).

The study which has been undertaken covers 1,504 men, representing a one-in-ten sample. The most striking finding was the much higher prevalence of abnormalities in men experiencing continuous occupational exposure. Thus three of the four men who developed pulmonary fibrosis were in constant contact with asbestos, as were eleven who developed thickening of the pleura. Ten continuously exposed men were found to have limited areas of pleural thickening. In the whole sample, the prevalence of pleural fibrosis varied from 28 per cent in the continuously exposed workers to 1.9 per cent in those who were least exposed. A total of sixty-three cases of abnormalities in 1,414 men were attributed to asbestos, and the prevalence of all types of abnormality was related to the time that had elapsed since the men were first exposed.

A further cause of anxiety arising from these studies is the possibility of a relationship between pleural fibrosis and malignancy. The first confirmed case of mesothelioma of the pleura occurred in 1964 in a man who had been a boilermaker for 31 years. Since then, three cases were confirmed in 1965, two in 1966 and five in 1967. In every case there had been intermittent exposure to asbestos in the course of long periods of employment in the dockyard.

In view of the seriousness of these findings, the draft of the new asbestos regulations published last month will be widely welcomed. In essence, all processes in which asbestos dust is likely to be released in dangerous amounts will, in future, have to be carried out under exhaust draught and the equipment for this will have to be inspected at least once every 7 days. Should it be impracticable to comply with this requirement, workers will have to be provided with respiratory protective equipment and protective clothing. In addition, wherever possible, cleaning should be carried out by means of vacuum cleaning or similar equipment so that asbestos dust is not discharged into the air and, as far as storage and distribution are concerned, all loose asbestos will have to be kept in receptacles when not in use. A particularly cautious note is that any person undertaking a process involving blue asbestos will be obliged to inform the inspector of the district in advance. (*Draft Asbestos Regulations*, 1968, HMSO, 1s. 3d.)

NUCLEAR ENGINEERING

Stresses and Strains at Berkeley

THE Berkeley Nuclear Laboratories were established in 1961 by the Central Electricity Generating Board to conduct some of the basic research then needed for the British nuclear power programme. The annual budget of the laboratories is some £2 million—a sum which their director estimates is saved several times over depending on how the value of the laboratories' largely preventive research is calculated.

A principal research project concerns the integrity of high pressure components of nuclear reactors. The subject is being tackled from several angles, and one programme includes a high pressure test vessel for investigating the behaviour of intersections between cylinders and spheres. Tests can be conducted at temperatures up to 500° C while an array of electrical resistance strain gauges measures the deformations. Models of the components under study are welded into a test plate which can be removed from the pressure vessel and replaced at the end of each experiment, thus allowing the vessel to be re-used.

Structural analysis has been revolutionized by computer techniques which have made possible the analysis of shapes and loading conditions previously insoluble by conventional mathematics. In the finite element method, which has been widely used at the Berkeley laboratories, a structure is considered as a number of small standard elements, such as triangles, cubes or tetrahedra, whose aggregate behaviour under load deformation can be calculated by computer. The mesh of elements which defines a structure is read into the computer with the aid of a coordinate digitizing table, a device whereby the coordinates of each point on the diagram of the mesh are read off onto a set of punched cards.