of adjuvant chemotherapy can begin. It is not strictly "prophylactic" because to be effective and necessary, occult "picometastases" must already be present. The course lasting at least a year is arduous and necessitates admission for a day or so every three weeks.

The commonly used drugs are methotrexate, a folic acid antagonist, or doxorubicin, but others may be used either alone or in combination. The Medical Research Council are at present co-operating with clinicians throughout Britain in a national trial of two drug regimens. In the first trial a moderately high dose of methotrexate is used with vincristine. The patient's normal cellular activity (and incidentally, therefore, also his life) is subsequently rescued by taking a reduced form of folic acid known as citrovorum factor some hours later. In the second trial the same dose of methotrexate is alternated every three

FIG 6—The two regimens of adjuvant "prophylactic" chemotherapy used in the Medical Research Council's trial.

weeks with doxorubicin (fig 6). All these drugs are potentially dangerous and may have unpleasant side effects—for example, total but, fortunately, temporary alopecia is almost invariable with doxorubicin. Deaths may occur from renal or cardiac toxicity, and therefore these drugs are only given under the supervision of a medical oncologist.

It is too early to say whether chemotherapy used in this way will save lives. Quite certainly, though, it prevents many patients from the early development of metastases, and with increasing experience it is beginning to look as though many of these will be cured.

Looking to the future I think that better and possibly more selective chemotherapeutic agents will probably be developed, and hope that they will be sufficiently effective to act against bulk disease, possibly in combination with irradiation or even local resection without therefore the need for amputation. Already local resection is beginning to be advocated by some for osteosarcoma, but the wisdom of this has not yet been shown by long-term results. Various treatments based on enhancing active or passive immunity are under clinical trial—so-called immunotherapy. Results are awaited, but chemotherapy still appears to be the more effective.

Finally, in any consideration of the management of primary bone tumours one cannot ignore the proved value of resection from the lung of solitary metastases. Such single metastases are rare, but many lives have been saved by their resection and thus close radiographic surveillance during treatment is essential.

Recent developments in adjuvant treatment suggest that we are on the threshold of an important advance in the treatment of malignant bone tumours. However great such improvement may seem when compared with the 80% early death rate from osteosarcoma before such treatment, much more progress has to be made before most malignant tumours can even compare in terms of survival with most other tumours. We may now have reached that stage with the use of adjuvant chemotherapy, but it is still too early to be sure.

Aspects of Student Health

Health and safety in a university

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Accident statistics for universities show that, taken overall, students are less at risk than employees both in terms of the probability of being in an accident at the university and also in terms of accident severity. Accidents affecting students are relatively few, and they tend, generally, to be not too serious from the medical point of view.

This account is based largely on my experience of safety at the University of Birmingham, and it deals with legal aspects, hazards, safety organisation, typical accidents, medical treatment, and health surveillance.

Legal

Until 1 April 1975, when the Health and Safety at Work etc Act, 1974, came fully into operation, few university activities were controlled by safety legislation. One of the earlier pieces of legislation that did apply to limited parts of universities was the Offices, Shops, and Railway Premises Act 1963, which specified suitable and safe conditions for workers in offices. Another area covered by earlier legislation was the storage and use of certain highly flammable liquids under the Petroleum (Consolidation)

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Act 1928. The Health and Safety at Work etc Act, 1974, resulted from a nation-wide investigation into safety arrangements carried out on behalf of the Government by a committee on health and safety at work under the chairmanship of Lord Robens. The Robens Committee recommended that new safety legislation should be enacted so as to make provision for the safety of all people at work, and the resulting Act has now brought an estimated 8m additional employees within the scope of comprehensive safety legislation for the first time. Included in this total are the employees of educational establishments, including universities.

Although the Robens Committee considered safety in higher educational establishments, the Health and Safety at Work etc Act 1974 does not refer to such establishments and the special problems that they face. The Act is primarily concerned with the safety of employees, but educational establishments are unusual in that most of their occupants, namely students, are not their employees. Even so, it does also address itself to the safety of people, other than an employer's own employees, who might be affected by work activities. The employer or controller of the premises is under an obligation to consider the safety of such persons, and students obviously come within this category.

The Act is of a very general and non-specific nature. Essentially it requires an employer, or controller of premises, to make adequate provision for the health and safety of all persons who might be adversely affected by work activities. It also imposes duties on employees and other persons; in particular "no person shall intentionally or recklessly interfere with or misuse anything provided in the interests of health, safety, or welfare."

Hazards

Typical universities have total populations of several thousand people and are equivalent in size to a small town. About two-thirds of that population will be students. As well as facing such everyday hazards as fires in domestic buildings, gas, electricity, and traffic accidents, physical dangers, and injuries from sporting activities, the population of a university may also face several other rather more specialised dangers. Included among these dangers are additional hazards from highly flammable liquids, other dangerous gases, and electrical apparatus; ionising radiation from radioactive materials and x-ray generators; microwaves; ultraviolet light; pathogenic organisms and infectious materials; lasers; dangerous machinery; and carcinogens and other chemicals that can be dangerous if inhaled, ingested, or come into contact with the skin.

All of these additional potential hazards result from the teaching and research programmes carried out in modern universities. Each university must obviously be aware of these special dangers and take all reasonably practicable steps to minimise them and safeguard the health and safety of the student population from these and all other dangers. At the same time, the universities should educate the students on the nature of the hazards and the precautions to be taken, so that they will develop a safety-conscious outlook that they will take with them when they leave the university.

Safety organisation

There is a need for some form of safety organisation in a university to control these potential hazards adequately. The actual form and size of the safety organisation will vary greatly from one university to another, but it is not uncommon to find that safety officers, radiation protection officers, and fire prevention officers have been appointed. Sometimes these individuals act more or less independently of each other, although co-operation and liaison are obviously essential, whereas in other institutions they may all be part of an integrated safety organisation. In the larger universities most of these safety specialists

are usually employed specifically for safety duties, whereas in some of the smaller universities such safety duties may be undertaken by members of the academic or administrative staff on a part-time basis.

Another essential part of the safety organisation is a safety committee structure. Legally, the governing body of the university is responsible for ensuring that adequate arrangements are made for safety, but that body normally relies on specialist safety committees to formulate safety policies and to enforce them on its behalf. Again the committee structure varies considerably from one university to another; but committees dealing with such matters as fire protection, radiation, carcinogens, and biohazards are often found, and in some cases the work of these specialist committees is co-ordinated by a general safety committee. The membership of these various committees usually includes persons with expertise in the particular area of concern and also representatives of the students and employees. On a day-to-day basis the safety policies of the universities are implemented by the various officers mentioned earlier, and they report to their respective committees.

Some form of communication system must be established to keep individual students and employees adequately informed on safety matters. This usually takes the form of safety notes, codes of practice, information sheets etc, which most universities produce for themselves. In addition, the Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom has established a safety working party which has issued a code of practice indicating the type of safety organisation that universities should establish. This working party is also preparing further parts of the code of practice in which safety guidance will be given on specific technical matters. Other organisations in the university sphere that are concerned with safety are the Association of University Radiation Protection Officers and the Universities Safety Association. Both hold regular meetings at which representatives of the universities meet to discuss safety problems; news letters are also distributed and symposia organised on special safety topics.

This account has been concerned only with the central safety organisation for universities, but the real problems do of course arise within departments and similar areas. The head of a department is responsible for safety in his own area, and he may sometimes establish a departmental safety committee to assist him and to provide a forum for discussing local safety problems. Also to ensure day-to-day safety supervision of his department he will probably appoint a departmental safety officer and departmental radiation supervisor if appropriate.

Accidents

Despite such arrangements, together with safety training and exercises, accidents do happen to students at universities, but fortunately most of the accidents are not very serious.

For undergraduate students, laboratory experimental procedures should include references to the hazards associated with the experiment and give details of precautions to be taken, including the need to wear protective clothing if appropriate. For postgraduate students engaged in research work it will not generally, because of the very nature of the work, be possible to write down in advance full details of possible hazards and required precautions, but such students work under close supervision that should include safety as an integral part. This difference in the degree to which the hazards associated with undergraduate and postgraduate work can be written down in advance, and the precautions specified, is reflected in an accident frequency rate for postgraduates which is about four times greater than that for undergraduates.

Clearly, when an accident does happen to a student something has gone wrong in some way, either because an unforeseen event occurred or because of a failure to take adequate precautions. Typical of the more common accidents to students are cuts from

glassware, scalpels, and microtomes; splashes of chemical into the eyes and on to the skin; accidental ingestion of potentially hazardous chemicals; burns from hot or very cold objects; falls, including falls that are made worse by the student falling on to glassware being carried. Among the less common accidents are injuries from exploding glassware; electric shock; overexposure to ultraviolet radiation; contamination by radioactive material; inhalation of vapours of such materials as mercury and aniline; and infection by bacteria and viruses used in experiments, sometimes caused by mishandling of syringes.

These are fairly typical of the accidents reported in universities. Such accidents are investigated to establish the cause with a view to trying to prevent repetitions in the future.

Medical treatment and health surveillance

The facilities available for dealing with accidents and medical emergencies at a university are worked out in collaboration with the university medical officer who is invariably a member of the safety committees. Simple injuries may normally be dealt with

using first-aid materials held in departments. More severe cases that do not need hospital treatment will be treated by the university's health service.

A university's health service and medical officer will also have to arrange medical surveillance for certain members of the student population who may be subjected to particular risks. For example, students working with ionising radiation or lasers may need a pre-exposure medical examination; repeat examinations may also sometimes be necessary, especially if accidental high exposure has occurred or is suspected. Sometimes students may need to be immunised against certain diseases that could result from their work. Another example of the role of the university's health service in safety is arranging for the collection and analysis of urine samples in cases of suspected inhalation of mercury vapour and other hazardous materials.

A university's health service staff must always be on the lookout for possible "occupational" causes of diseases that their students develop, and close liaison with the university's safety personnel is most important. Also, general practitioners outside universities who have students as registered patients will need to remember a possible occupational cause of illnesses that their student patients might develop.

Occasional Review

Computerised tomography of acute traumatic intracranial haematoma: reliability of neurosurgeons' interpretations

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Summary

Two neurosurgeons concerned with the emergency management of patients with head injury correctly diagnosed the presence or absence of an acute intracranial haematoma in 97 scans that were presented to them without knowledge of the patients' clinical details. There were no false-positives or false-negatives, although identification of the type of haematoma was not always possible. The impact of the EMI scan on patient management demands new approaches to the care of head injuries.

Introduction

Detection of an intracranial haematoma may be crucial in the management of a patient with a head injury. Investigations

available previously, however, have disadvantages. Exploratory burr holes may fail to detect significant space-occupying lesions, particularly when these are in unusual sites.¹ The results of standard and computerised ultrasonic techniques may be unreliable in head injuries.^{2,3} Ventriculography may aggravate a tight brain and, like angiography, needs considerable skill to perform and interpret. Assessment of head injuries was one of the first areas in which the potential of computerised axial tomography (EMI scan) was recognised. The typical appearances of the various types of intracranial haematoma and the reduction in the use of alternative investigations that succeeded the introduction of EMI scanning have been described.⁴⁻⁶ Unfortunately, typical examples of the results of a new investigation sometimes prove in practice to be outnumbered by those that appear ambiguous to a clinician seeking guidance in a critical case. In view of the increasing importance of the EMI scanner we have investigated how reliably surgeons responsible for the emergency management of head-injured patients interpreted scans obtained in routine clinical practice.

Methods

One participating neurosurgeon reviewed the records of patients submitted to EMI scanning within two weeks of a head injury.⁷ He determined whether the patient had suffered an extradural, subdural or intracerebral lesion, or both—recording a "haematoma" if operation or necropsy had shown a focal traumatic space-occupying lesion of sufficient size to have been clinically relevant. "Smear" subdural haematomas were excluded. The scans of 100 patients were selected

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