Today's Treatment

Use of anaesthesia

Intensive care

A B M TELFER

Since the advent of intensive care units in the 1960s anaesthetists have played a major part in their organisation and development. Although these units, especially in district hospitals, are usually multidisciplinary, they all cater for critically ill patients, most of whom need some form of life support, either respiratory, cardiac, or renal. Anaesthetists, by virtue of their training in the use of mechanical ventilation, patient monitoring, and applied pharmacology, and the management of fluid balance, are particularly suited to this type of work, both from the clinical and administrative points of view.

One of the earliest publications on intensive care units¹ surveyed 17 units in the UK and reported that anaesthetists were in charge in seven of them, physicians in five, a surgeon in one, another was shared, and three were undecided who was in charge. Since that report was published 12 years have passed, and the frontiers of intensive care have expanded from the original units, which dealt solely with chronic respiratory failure—for example, in the Scandinavian poliomyelitis epidemic in 1952—to the present-day unit, which deals as much with circulatory and metabolic issues as it does with respiratory care.² Anaesthetists are in administrative charge of most units and also usually carry a considerable part of the clinical responsibility. Exactly how much depends very much on local arrangements and, perhaps most of all, on personalities. A prerequisite when in charge of an intensive care unit is an abundance of tact and diplomacy, since one is dealing with clinicians who have, to a greater or lesser degree, "handed over" their patient.

It may interest the general reader to have some idea of the nature of the wide variety of clinical problems dealt with in the present-day intensive care unit. The emphasis will vary in different locations, and for the purposes of this article I will exclude the special problems of the coronary care unit and of acute and chronic renal dialysis units, although many "general" intensive care units now have facilities for haemodialysis within the unit.

Postoperative patients

Some older hospitals may have few and inadequate recovery facilities and therefore several patients have to be accommodated in the intensive care units after operation. They have mostly undergone emergency abdominal surgery—for example, for a leaking aortic aneurysm. Several admissions are also to be expected after elective surgery, usually those needing planned postoperative ventilatory support—for example, in patients with chronic respiratory disease who have undergone major surgery. In such patients the avoidance of hypoxia and the provision of

adequate analgesia are of paramount importance in the immediate postoperative period. Techniques such as continuous epidural analgesia and the administration of intravenous narcotic analgesics—for instance morphine—by continuous infusion pump³ require a degree of supervision often to be found only in the intensive care unit.

Elective postoperative ventilation is also widely practised after cardiac surgery, especially when cardiopulmonary bypass has been undertaken and, again depending on the local circumstances, the intensive postoperative care that these patients require may be undertaken in the "general" intensive care unit or in a special unit devoted to the purpose. A strong case may be made for this latter arrangement, mainly on the grounds of infection. Thorp *et al*⁴ recently reported an overall infection rate of 36% in one "general" intensive care unit—an incidence that would clearly not be acceptable to cardiac surgeons.

Trauma

Trauma continues to provide a steady flow of patients to intensive care units. Road traffic accidents, especially with motorcycles, are a common cause of serious injury. Although seat belts, when worn, have undoubtedly reduced the severity of injuries, these still occur with distressing frequency. Industrial accidents and serious assaults are also common, at least in certain localities.

Head injuries are included in this series and will not be further discussed here, except to say that when associated with a chest injury their already high mortality is further increased.

Closed chest injuries

Closed chest injuries are usually sustained in road traffic accidents, often associated with violent deceleration, which may initiate a dissecting aneurysm of the thoracic aorta, while contact with the steering wheel may cause appreciable myocardial trauma. More commonly, contusion of the lung with multiple fractures of the ribs occurs, and the physiological lesion is usually more important than the anatomical injury. The functional disturbance may vary from pain on deep breathing and coughing to frank respiratory failure needing mechanical ventilation. Particular attention must be paid to the presence of chronic obstructive airways disease, and especially to an acute exacerbation, when even a minor chest injury can precipitate respiratory failure. When the chest is "flailing" and paradoxical movement is present, intermittent positive-pressure ventilation (the so-called internal pneumatic stabilisation) is widely regarded as the treatment of choice; this may be needed for many days, and the full facilities of a respiratory intensive care unit are necessary.

The primary first aid at the scene of any accident and the immediate management in the hospital casualty department before admission to the unit may have a profound effect not only on subsequent recovery but on the quality of that recovery.

Multiple injuries

Patients with multiple injuries present many problems, both immediate and delayed. There may, for example, be a need to anaesthetise for laparotomy a patient who has a major chest injury with serious loss of lung function. Pulmonary or coagulation problems may follow massive blood transfusion, or fat embolism may follow limb fractures.

All of these demand not only treatment but also the most careful monitoring. It is normal practice in major injuries to measure arterial blood pressure continuously⁵ as well as central venous pressure and, when indicated, pulmonary artery and pulmonary artery wedge pressure, using a Swan-Ganz flow-directed catheter.

In addition, comparison of central and peripheral temperatures and estimation of hourly urine output give further information about organ blood flow, the maintenance of which is obviously of fundamental importance. This emphasis on monitoring, while important in all critically ill patients, is especially important in the injured. Their condition may change suddenly and dramatically, and early warning must be available if episodes of hypotension or hypoxia are to be avoided.

Burns and thermal injury

Inhalation injuries to the respiratory tract after a burning accident are associated with a high mortality—about 80%.⁶ They may be present in the absence of obvious external burns and may be due to direct heat (from inhaling hot air) or to inhaling toxic and irritant smoke (especially if certain organic plastics are burning), and there may also be a blast effect if there has been an explosion in a confined space. In addition, particles of soot may be deposited in the respiratory tract, producing further local irritation, and the whole picture may be compounded by the effects of hypoxia.

Although they appear to be initially well, patients who may have been exposed to this type of trauma should always be admitted to hospital for observation since the toxic effects and physiological deterioration may appear later, and rapid intervention may be needed.

The fiberoptic bronchoscope has an important place in managing this type of lung injury, enabling particles of foreign material to be removed from the airways under direct vision.

Drug overdose

Patients who have taken a sufficient quantity of a drug or drugs (and alcohol is such a drug) to render themselves unconscious face two dangers—the toxicological effects of the drug and the risks of lying unconscious with an unprotected and perhaps obstructed airway. Since vomiting or regurgitation is common in these cases, aspiration of gastric contents with pulmonary soiling is often a sequel. Hypothermia may also develop if the victim has been lying unattended for many hours, especially if drugs of the phenothiazine group have been taken.

Adequate monitoring and basic supportive treatment are all that are usually required. In relatively few cases is specific drug treatment indicated—for example, the cardiovascular effects of the tricyclic antidepressants can be reversed with physostigmine, and naloxone will reverse the central respiratory depressant effect of narcotic overdosage (including Distalgesc overdose). Patients who have taken paracetamol should be transferred rapidly to hospital for the possible early administration of acetylcysteine to prevent subsequent liver damage.

Specific measures to accelerate excretion of drugs, such as peritoneal dialysis and haemodialysis, are now less often used than formerly, most workers believing that the safest method of excretion is by the patient's own urinary tract.

Chronic obstructive airways disease

When acute infection, either bacterial or viral, is added to chronic obstructive airways disease, respiratory failure may soon follow. Many of these patients may be managed in medical wards with conservative measures, but some also require active intervention to remove bronchial secretions, and may need mechanical ventilation. Careful selection is needed and full discussion between the anaesthetist in the intensive care unit and the referring physician should take place before ventilation starts.

Polyneuritis

Polyneuritis may lead to respiratory failure which may last for many weeks in a patient who may be fully conscious, totally paralysed, and with a tracheostomy, and who therefore has a major problem in communication. On the other hand, the lungs themselves are unaffected, and therefore the actual process of mechanical ventilation should not be difficult.

Tetanus

Tetanus is not common in Britain, only 16 cases being notified in England and Wales in 1977. If the disease is suspected at all the patient should be referred to a hospital with an intensive care unit able to offer full facilities for respiratory care. The experience of one such unit, at Leeds, with 100 cases has been well documented by Edmondson and Flowers,⁷ who reported a death rate of 10%.

Convulsive states

The management of severe convulsions also comes within the remit of the intensive care unit. By definition a patient who is having convulsions is apnoeic and may therefore become severely hypoxic. This is most commonly seen in severe epilepsy, but convulsions from other causes may on occasions be severe enough to warrant admission to an intensive care unit. Such patients are managed by neuromuscular paralysis, mechanical ventilation, and appropriate anticonvulsant treatment. In at least one unit in Britain automatic administration of the anticonvulsant is achieved by using a feed-back signal from the electroencephalogram (Price, personal communication, 1979).

Accidental hypothermia

Hypothermia may occur as part of a disease, such as myxoedema, or result from lying immobile after trauma—for instance, a fractured femur in the elderly. It has already been mentioned under drug overdose. Its occurrence is often overlooked and only a high index of suspicion and a low reading thermometer may detect it. Such patients should be admitted to an intensive care unit for careful supervision of active re-warming.

Near-drowning

Immersion incidents with hypothermia and "near-drowning" occur both in fresh water inland areas and in coastal areas. In both cases the immediate first aid on the spot and the

efficiency of transport to hospital have a major influence on the outcome. The delayed effects of near-drowning on the lungs, however, mean that, whenever possible, people who appear to have survived such an incident should be observed in hospital where full facilities for intensive care are available.⁸

There are many other conditions where respiratory support may be necessary—as in septic shock or when the lung lesion is secondary to other disease—for instance, pancreatitis—or is iatrogenic—for instance overtransfusion. It should not be assumed, however, that the average patient in an intensive care unit has only a respiratory problem: cardiovascular, metabolic, renal, infective, and nutritional problems are all interlinked,⁹ and attention to only one system is a sure recipe for disaster. In addition, there may be unique problems of communication with the patient and relatives, who may have to undergo a period of stress of a duration undreamt of 20 years ago.

Intensive care units are now a well-established and widely accepted part of the hospital scene. Over the years they have played a significant part in reducing mortality and morbidity in seriously ill patients by concentrating life-support equipment and skill and providing continuous monitoring of the patient's condition, both electronically and by the five (or six) senses of the attendant nurses. There is, however, an increasing need to know more about the patient and to know it continuously. Thus the future will see, in addition to developments in non-invasive monitoring, the increasing use of intravascular electrodes for continuous measurement of gas tensions and the more widespread use of pulmonary artery pressure measurements in assessing cardiac performance. The application of computing

and data storage techniques to these and other variables enables derived values to be obtained immediately, thus allowing treatment to be based on a much greater appreciation of the extent of the physiological derangement.

Perhaps, above all, the intensive care unit sees no interdisciplinary barriers in patient management. It can, and does, call on all specialties in the hospital when required, from the bacteriologist to the radiologist, and the biochemist to the pharmacist, as well as physicians, surgeons, and anaesthetists. In this way, through the organisation of the unit, the full resources of the hospital are brought to bear on the most critically ill patients.

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Contemporary Themes

Accidental poisoning deaths in British children 1958-77

NEIL C FRASER

Summary and conclusions

In the 20 years 1958-77 598 deaths were registered as due to accidental poisoning in British children under the age of 10—343 boys and 255 girls. Drugs caused 484 deaths, non-medicinal products 111, and plants three. The annual number of deaths reached a peak in 1964 but fell steadily thereafter; 16 deaths occurred in 1977. After 1970 tricyclic antidepressants replaced salicylates as the most commonly fatal poison. The next ten drugs most often recorded in 1970-7 were, in order, opiates (including diphenoxylate/atropine (Lomotil)), barbiturates, digoxin, orphenadrine (Disipal), quinine, potassium, iron, fenfluramine (Ponderax), antihistamines, and phenothiazines. In 20 years paracetamol caused one death, and before 1976 deaths caused by aspirin had fallen to fewer than two a year. Thus the introduction in 1976 and 1977 of safety packaging of these drugs can be expected to have little impact on the mortality from them in childhood.

Introduction

Poisoning is a common accident of childhood,¹ but the outcome is rarely fatal.² In many cases little of the substance is actually swallowed and there may be uncertainty whether it will prove to be harmless or whether the ingestion should at once be taken seriously. The poisons that can prove fatal are neither those most frequently ingested nor those most often responsible for adult deaths. Most deaths in childhood are caused by a limited number of poisons, some of which are not commonly recognised as dangerous, while the toxicity of other substances is over-estimated.

The number of deaths from accidental poisoning with solids or liquids has fluctuated considerably in the past 40 years (fig 1). The increase after 1935, which was attributed to changes in prescribing habits,³ accelerated after the introduction of the NHS to a total of over 50 deaths a year in 1951 and 1952, when the principal causes were iron, strychnine, and antihistamines.⁴ Strychnine was taken mainly in the form of Easton's syrup and tablets. A 60% reduction then occurred within five years but was followed by a further rise, to over 40 in 1964 and 1965. Since then numbers have again fallen considerably. In 1977 there were 16 deaths, the lowest figure since 1935. Deaths in this second "epidemic" from 1958 to 1977 have been analysed to identify the substances and trends. Some consequences of