Middle Articles

A General Intensive Therapy Unit

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Brit. med. J., 1966, 1, 39-41

Intensive therapy units are usually thought of in terms of respiratory units in which the *sine qua non* for entry is tracheostomy and positive pressure respiration. This concept has been extended to post-operative recovery units, especially those dealing with open heart surgery; more recently special units for the management of myocardial infarction have been established. The present paper describes our experience in setting up an intensive therapy unit (I.T.U.) specially designed for acute medical and surgical cases.

The Team

The medical staffing of the unit is based on certain principles. An adequate amount of specialized and experienced medical manpower must be brought to bear on any acute problem soon after admission. The time of day or night should not influence the available manpower. The management of an acute emergency may demand the resources of several specialties.

We believe that the unit must be run by a team with full clinical responsibility for all cases admitted. The team will then rapidly gather experience in managing acute cases, and its members will become used to working together. It is our experience that the effectiveness of the unit rests not in the amount or the complexity of the equipment available but in the composite ability of the clinical team. It is felt that the

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management of severely ill patients by such a team significantly improves the standards of diagnosis and treatment.

The unit is under the general supervision of a consultant physician, a consultant anaesthetist, and a consultant pathologist. The team comprises the senior registrars in medicine, surgery, and anaesthesia, together with a senior house officer in medicine. When a patient is admitted from a particular firm the consultant, registrar, and house officer concerned automatically become members of the team.

Admission Procedure

Most cases are admitted from the casualty department. The house officer on duty is the first to see the case and will decide whether to contact the I.T.U. team. In order to make this decision he is given a set of rules. Certain types of case, such as drug-induced coma, severe haematemesis, myocardial infarction, respiratory failure, and multiple injuries, must always be considered for admission to the I.T.U. Apart from these specific categories, the general rule is to admit all severely ill cases with potentially reversible lesions.

The extent to which the team is then mobilized depends on the severity of the problem. A complicated case, such as a severe haematemesis possibly requiring emergency gastrectomy, will call for mobilization of the full team, covering medical, surgical, and anaesthetic specialties. A case conference will then take place and a decision about management will be made.

Patients may also be transferred to the unit from the general wards, usually for such specialized procedures as peritoneal dialysis or positive pressure ventilation. The unit is also used for patients requiring post-operative resuscitation. The case is brought in by the anaesthetic member of the team, who, if necessary, will enlist the help of his surgical and medical colleagues.

Structure of Unit

The unit was constructed from part of a general ward. Three beds are available (one in a cubicle), and there is ample space between the beds (see Fig.). Adequate space is essential, as much equipment may be needed. Each bed is supplied with its own wash-basin, piped oxygen, nitrous oxide and suction, high light intensity, and adequate overhead electrical power sockets. The beds are mobile, the heads being removable to facilitate intubation. The patient lies on a rubber mattress superimposed on a wooden board to enable external cardiac massage to be carried out. Facilities are available for continuous E.C.G. and E.E.G. recording, together with

pulse, blood-pressure, and temperature monitoring. There are three respirators, a Boyle's machine, and a portable x-ray apparatus available on the unit. The respirators are sterilized with ethylene oxide. A suitable room for this purpose has been set aside in the basement of the hospital. The unit does not possess its own laboratory, as the hospital laboratory is close by and provides all services, including estimation of pH, PCO₂, and PO₂. A large room attached to the unit is used by the medical staff for case conferences and clinical meetings.

Nursing Staff

The unit is run by a senior sister supported by two junior sisters. The nurses work three shifts, each shift consisting of one permanent staff nurse and one student nurse. Though student nurses rotate through the unit, it is considered important that there should be a permanent core of trained nursing staff, at staff nurse level, in addition to the sisters. The reason is the complexity of the techniques and equipment used. It need hardly be mentioned that the efficiency of the unit depends greatly on the nursing staff. The nurses find that close contact with ill patients is stimulating. The only criticism is that the work load tends to be very uneven. This, we feel, is an inherent fault of our small unit; with larger units the work load should even out.

Because of the large amount of technical equipment, such as respirators which need repair and maintenance, a technician is essential. There is not enough work to employ him fully, so he spends some of his time helping in the operating theatre.

Recording of Data

The accurate recording of data is essential in intensive therapy and necessitates special charts. Ours is a modified version of that described from King's College Hospital (Cam *et al.*, 1964). We have a special case record, a cardboard folder divided into four parts. The first two panels are used for the standard temperature, blood-pressure, pulse, and instruction sheets, together with a fluid balance chart and drug table. The third panel can be used for a respirator chart. The fourth panel is for clinical notes. The doctors' and nurses' notes run concurrently and are distinguished by the use of different coloured ink. The I.T.U. notes are kept in the unit, a summary being inserted into the hospital case sheet when the patient returns to the general ward.

Case Material

The first 80 patients dealt with on the unit are shown in the Table. It will be seen that 46 (58%) of the cases fell into four categories—overdoses, myocardial infarction, immediate

Case Material

Diagnosis	No. of Cases	Deaths
Acute myocardial infarction	13	
Overdose	13	
Post-operative complications	11	1
Haematemesis	9	
Renal failure	5	2
Respiratory failure	5	
Accident cases	5	2
Acute pulmonary oedema	2	
Tension pneumothorax	2	
Septic abortion	2	1
Cerebral thrombosis	2	2
Pulmonary artery thrombosis	2	
Popliteal	1	
Mesenteric embolus	1	
Subarachnoid haemorrhage	1	1
Status epilepticus	1	
Acute pancreatitis	1	
Tuberculous bronchopneumonia	1	
Acute pericarditis	1	
Anaphylactic shock	1	
Metabolic balance study	1	
Total	80	10

post-operative complications, and haematemesis. This group of patients, therefore, forms the main work load of the unit. Renal failure, respiratory failure, and accident cases (mainly chest and head injuries) accounted for a further 19% (15 cases). The remaining 19 patients were widely distributed. The total mortality was 12.5% (10 cases). Of these patients two had a cerebral thrombosis and were over 70 years old. One case of renal failure had associated hepatic failure; the other was associated with advanced malignant hypertension. The two deaths in the accident group were due to extensive head injuries.

This type of unit is eminently suitable for carrying out metabolic balance studies; one patient with Conn's syndrome was studied.

Illustrative Cases

The following cases illustrate in more detail some of the advantages of an intensive therapy unit.

Acute Myocardial Infarction—Cardiac Arrest

A male, W. P., aged 70, had several episodes of hypotension during a routine herniorrhaphy. He was therefore transferred to the I.T.U. after operation. The E.C.G. showed a posterior infarct pattern. Ten minutes later he became pulseless and the heart sounds were inaudible. External cardiac massage was instituted, and he developed a nodal tachycardia. Several hours later he reverted to sinus rhythm and the E.C.G. changes of infarction resolved. Recovery was uneventful.

Comment.—The one clear-cut statistic concerning cardiac arrest is that when it occurs in the operating theatre the results are excellent, but external cardiac massage in the general wards is rarely successful. The probable reason is that cardiac massage must be started within seconds of arrest in order to succeed in most cases. In the general ward it may be a minute or so, even at the best, before the arrest is noted and action taken. In the I.T.U. each patient is continuously watched by a nurse who with monitoring aid will note the arrest within seconds. Two nurses are always on duty and they are trained to begin immediate external cardiac massage and artificial ventilation. We believe that the prompt initiation of external cardiac massage probably contributed to recovery in this case. It is partly this line of reasoning which has led to the setting up of intensive care units for myocardial infarction. We keep our cases of acute myocardial infarction for 48 hours, which is considered to be the period of maximal risk.

Pneumonia Associated with Hypothermia

A male, J. M., aged 47, was admitted with pneumonia complicated by severe hypothermia. His temperature was 83° F. (28° C.). Respiration was shallow, the blood-pressure was unrecordable, and the electrocardiogram showed a slow auricular fibrillation with "J" waves. Respiration was maintained artificially and a profound hypoglycaemia (blood glucose of 20 mg.%) was corrected. The temperature rose slowly, without active rewarming, and he then became severely acidotic (pH=7.04, base=minus 13). Correction of the acidosis with 150 mEq of intravenous sodium bicarbonate was followed by the rapid return of consciousness, restoration of blood-pressure, and reversion to sinus rhythm.

Comment.—After the correction of the hypoglycaemia and the institution of adequate ventilation his general condition remained unchanged. At this stage an anaesthetic colleague suggested that the patient might be developing a "rewarming acidosis." Blood gas analysis was carried out followed by correction of the acidosis. The effect was dramatic. We feel that group discussion greatly facilitated the management of this complicated case.

Haematemesis—Duodenal Tumour

A male, W. R., aged 44 years, with a vague history of indigestion for several years, was admitted after a severe haematemesis. His condition rapidly improved after blood-transfusion. About six hours later the blood-pressure fell to 90/50 mm. Hg, and the E.C.G.

monitor showed the sudden onset of sinus tachycardia and right axis deviation. Gastric aspirate at this time showed no blood. Despite the normal aspirate it was considered that he was bleeding again and laparotomy was performed. A duodenal tumour (a benign haemangioma) was found and removed after a long and difficult dissection. The small bowel was full of blood. Recovery was uneventful.

Comment.—The cause of the electrocardiographic change is not obvious, but it may have been due to pulmonary vasoconstriction in the face of a falling blood volume. The close monitoring by the nursing staff enabled us to diagnose further bleeding at a very early stage. He was therefore operated on while his general condition was still good and before a profound acidosis had been induced by multiple transfusions of stored blood. He was thus well able to stand an extensive operative procedure.

Cor Pulmonale with Resistant Oedema

A female, A.S., aged 43 years, with long-standing chronic bronchitis, was admitted to the general ward in severe congestive cardiac failure. The oedema was resistant to all diuretic therapy and she gradually deteriorated, at the same time becoming drowsy with a raised PCO_2 (150 mm. Hg). She was transferred to the I.T.U. and tracheostomy was performed. Positive pressure ventilation was instituted and continued for one week. The massive oedema resolved completely and the PCO_2 fell to 65 mm. Hg (her average level during the previous two years). She subsequently made a satisfactory recovery and was discharged home.

Comment.—This patient fits into the group of chronic bronchitics known as "blue bloaters" in whom there is a noticeable absence of dyspnoea associated with cyanosis and recurrent congestive cardiac failure. Before admission to the I.T.U. she was thought to be in terminal cardiac failure with total resistance to diuretic therapy. The resolution of the massive oedema and her subsequent recovery with assisted ventilation was impressive. Long-continued controlled ventilation of this type would have been extremely difficult to carry out on a general ward.

Conclusions

There are several reasons why intensive therapy units of this type should be considered by others—the more economic use of trained nursing staff, in increasingly short supply; the needless expenditure in duplicating very expensive equipment throughout the hospital; and the building up of a team trained in the use of complicated monitoring and therapeutic equipment.

It is our experience that one intensive care bed is required for every hundred acute beds. Thus if the district hospitals of the future are large enough to carry all necessary services, they will need possibly 1,000 beds and a 10-bedded I.T.U. Assuming an average stay of three days, which has been our experience, this unit could admit approximately 1,000 patients a year. It would of course have to carry a permanent staff and we would suggest at least three registrars, one of whom would do night duty every third week and be relieved of day duties. The setting up of such units would be expensive in both manpower and money, but we believe that they will prove indispensable in future hospital services.

We would like to thank the Matron of the Royal Southern Hospital, Miss A. M. W. White, and also Sisters J. Owen and A. Percival and their nursing staff; Dr. C. M. Ogilvie, Dr. C. A. St. Hill, and Dr. J. E. Riding, the consultants in charge of the unit, for their advice and criticism of this paper; and the staffs of the intensive care units at Whiston and Broadgreen Hospitals for advice in the early stages of the unit. Dr. R. W. Brookfield, Dr. E. Sherwood Jones, and Dr. J. T. Robinson also advised in the planning of the unit. We would also like to thank the United Liverpool Hospitals for generous financial support.

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Advisory Service for Parents of Mentally Handicapped Children*

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Brit. med. J., 1966, 1, 41-44

There has been a reversal of attitude in regard to mental handicap. Previously institutional care was recommended and was looked upon as almost inevitable. The emphasis now is on integration into the community rather than on segregation in special colonies or hospitals. It should only be necessary to provide residential care in those cases where the parent is unable to cope. The great majority of the mentally retarded in the feeble-minded or subnormal range should, in any event, be included within the educational system and should go on to independent employment.

It should, however, be frankly recognized that the care of severely mentally handicapped children does place a heavy additional burden upon parents. The problems of such families have been set out by Tizard and Grad (1961). They have also been expressed by parents themselves through their organizations such as the National Society for Mentally Handicapped Children (formerly the National Association of Parents of Backward Children), and in the United States by the National Association for Retarded Children.

* Paper read at a meeting of the Paediatric Section of the Royal Society of Medicine at Queen Mary's Hospital for Children, Carshalton, on 29 May 1965.

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Some of the difficulties which the parents of a backward child have to face may be material; some are psychological; in others there is a combination of adverse circumstances in which the handicapped child occupies a central position. One mother who came for advice has a malformed, crippled, mentally retarded child. During her pregnancy she had a loss of blood, which was thought to be aetiological related to the abnormality in the child. She is now pregnant again. She has again had a loss of blood. She has been advised to rest, but the care of her handicapped child involves carrying it up 60 steps to her home. This is an example of an obvious physical difficulty. In other cases with professional parents it may be difficult for them to reconcile themselves to the fact that their child is intellectually limited, and they may reject him. A mother with a child of low imbecile level may find that each step in development takes him some five times as long as the normal child. She will be washing napkins for a very long time, and may despair of progress.

Parents of backward children need help in two ways. First, they need material help in the way of training centres, day nursery accommodation, rehousing, and, in some cases, financial assistance. Secondly, they need advice and understanding. To some extent this can be provided by the organ-