produce antibody of lower affinity than nephritis-resistant strains when exposed to antigens. Thus both the *quantity* and the *quality* of antibody are important.

The possible role of chronic virus infection in the induction of chronic nephritis in animals has been extensively studied.³¹ Several species show naturally occurring disease, such as the Aleutian disease in mink,³² or experimental conditions can be induced by chronic viral infections. The best studied species is the mouse. In mice a variety of viruses may cause nephritis, such as the lymphocytic choriomeningitis virus.³¹ Viruses are especially apt to produce chronic antigen load since they are intracellular, long lived, and self-replicating.

Another important model of experimental nephritis is the renal disease developing in the crossed New Zealand Black/New Zealand White mice.³³ These animals develop a condition which has many resemblances to human systemic lupus erythematosus, including a glomerulonephritis responsible for the death of most of the animals. This nephritis seems to be initiated by DNA and anti-DNA soluble complexes. Talal and his colleagues^{34 35} obtained evidence that these mice have an inherited imbalance in their immune responses consisting of excessive antibody response to administered antigens at the same time as their T lymphocytes are resistant to the induction of tolerance.

Elution of the antibody from the glomeruli of these mice, presumed to be part of antigen-antibody complexes, showed that although 50% of the antibody was anti-DNA antibody, as expected, a major proportion of the other 50% reacted with the endemic Gross virus, which in normal mice does not evoke an antibody response.³⁶ The presence of the Gross virus in the mice, as with coincidental infection with polyoma and lymphocytic choriomeningitis viruses, appeared to enhance the appearance of anti-DNA antibody and renal disease. Even more interesting, however, was the observation that infection with the lactic dehydrogenase virus *protected* the animals against nephritis and anti-DNA antibody. Chronic virus infection in these animals can therefore modulate the disease arising in the setting of an inherited imbalance of the immune system. The implications of this work for human glomerulonephritis are considerable.

Even after considering all the variables that may determine whether potentially toxic soluble complexes appear in the circulation, there are a number of factors which may allow or deny them lodgement to the vessel or capillary walls.³⁷ Simple filtration will permit the rather small toxic complexes

to penetrate glomerular capillaries to some extent, but this is greatly increased if there is coincident inflammation and increased vascular permeability. This is the inevitable result of complement activation, which I shall discuss later, but it appears that in the acute soluble complex disease in rabbits injury can take place in the absence of complement.³⁸ Cochran³⁷ described in rabbits a cell-mediated pathway of increased capillary permeability involving IgE, basophil leucocytes, platelets, and the liberation of histamine, serotonin, and vasoactive amines. This leads to the localization of the otherwise non-toxic circulating complexes and consequent injury.

Finally, when soluble complexes are deposited within the glomerulus they generally become undetectable after a few weeks. The exact route of removal is not clear, but almost certainly the mesangial cells behave in some respects as reticuloendothelial cells and play a major part in the removal of complexes. Variations in the rate of this removal could be critical in the induction of disease.

Anti-kidney Antibody (Nephrotoxic Serum Nephritis)

This variety of glomerulonephritis was the earliest experimental model³⁹ and was extensively studied by Masugi and others. In various forms it has provided many data.²⁶ In this model the antibody is specifically directed against renal tissue. When an antibody raised in a foreign species to kidney extracts is reinjected into the original animal⁴⁰ combination of antibody with antigen in the glomerular capillary walls takes place. Another variation of greater relevance to man is the repeated injection of homologous or heterologous purified glomerular basement membrane into an animal.⁴¹ In either case the result is the same: antibody fixation with consequent immune injury, and, if the injections are repeated, renal failure and the death of the animal. In some animals an autonomous phase appears early in the course of the disease. This is characterized by the formation of antibody itself directed against the heterologous antibody already deposited in the kidney.⁴² This could provide one mechanism for initiating a chronic course in otherwise self-limiting disease. Antibodies against the damaged basement membrane itself have been sought but not found.⁴³

Part II of this lecture will appear in next week's issue. A list of references will be given in part III, to be published in our issue of 28 October.

Initial Intensive Care in an Accident and Emergency Department

R. N. BAIRD, J. NOBLE, D. McLEAN

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Summary

The work in the resuscitation room is initial intensive care. This must be always available independent of inpatient resources. This demands investment in adequate equipment and staffing. Much of the work is medical

rather than surgical and appropriate for physicians to treat. Our experience might help others to plan for the future.

Introduction

Probably a central emergency treatment area or resuscitation room will be provided in the new regional general hospitals. Such a service should be available 24 hours a day and adequately staffed. After the accident and emergency department of the Royal Infirmary of Edinburgh was modernized and reorganized in 1966 the work pattern of the resuscitation room was analysed.¹ Since then peripheral hospitals, local general practitioners, and

South-Eastern Region of Scotland Hospital Board

R. N. BAIRD, M.B., F.R.C.S., Rotating Registrar in General Surgery
J. NOBLE, M.B., F.R.C.S., formerly Rotating Registrar in General Surgery
D. McLEAN, M.B., F.R.C.S., formerly Rotating Registrar in General Surgery

the staff of this hospital have become more familiar with the facilities provided. Moreover, the department has also become the central receiving area for medical emergencies.

Despite the Breathyzer, the morbidity and mortality from road traffic accidents has abated little. Self-poisoning is still on the increase, and the value of prompt resuscitation in this condition² and in myocardial infarction³ has recently been emphasized. There are compelling arguments for bringing all severely ill and dying patients from outlying hospitals to a resuscitation area in large hospitals, where immediate intensive nursing and medical care is available together with radiographers, clerks, and porters. Initial assessment and therapy often cannot await the arrival of a specialist. Thus immediate facilities and staff must always be available. This is time-consuming but represents only a small proportion of the total number of patients treated by doctors. Initial intensive care in our department is provided in a large room which can accommodate up to three patients at a time and is generously supplied with strategically placed equipment.¹

Present Study

All the patients treated in the resuscitation room for a period identical to that of the previous survey have been included in this study. All non-routine admissions enter the hospital via the accident and emergency department, apart from obstetric emergencies. The hospital (1,000 beds) is the central accident unit for the South-eastern Region of Scotland (population 1,600,000), and contains units representing most of the surgical specialties for adults.

The number of patients requiring initial intensive care was correlated with the overall departmental turnover of patients. The disposal of 1,000 consecutive new cases was studied in an eight-day period during the survey and a comparable period in 1967.

FINDINGS

Distribution of Patients.—In 129 days 372 severely ill or moribund patients received intensive care (2.9 patients per 24 hours). They included some with cardiac arrest in whom resuscitation seemed possible. There were 142 trauma cases, 14 surgical and gynaecological emergencies, and 216 medical emergencies.

Surgical Patients.—Three of the trauma patients had had cardiac arrest in the ambulance. Nevertheless, resuscitation was attempted; hence their inclusion in the survey. Two others died in the resuscitation room. The results of inpatient treatment of the remaining 137 are shown in Table I. The proportion of patients admitted from the resuscitation room in relation to the total admissions is shown.

TABLE I—Inpatient Treatment in 137 Trauma Patients

Dominant Injury	No. of Patients	Died	Proportion of Total Admissions to Specialist Unit
Head and spinal	88	8	9.9%
Orthopaedic	32	1	3.9%
Chest and/or Abdominal	17	Nil	0.25%

Fourteen general surgical and gynaecological emergencies were treated, of whom five died subsequently in the wards, two of an aortic aneurysm, and three of burns.

Medical Patients.—The diagnostic grouping of all medical patients who received initial intensive care in the resuscitation room is shown in Table II. Of 45 patients suffering myocardial infarction four were moribund on arrival although resuscitation was attempted. Sixteen suffered cardiac arrest in the resuscita-

TABLE II—Distribution of the 216 Medical Patients by Diagnostic Group

	No. of Cases		No. of Cases
Poisoning	75	Gastrointestinal	12
Myocardial infarction	45	Respiratory	9
Cerebrovascular accident	34	Other	23
Heart failure	18		

tion room, 10 of whom died despite therapy. The remaining 31 patients amounted to 18% of all coronary-care-unit admissions during the period surveyed, as shown in Table III, and 22 of them left hospital alive. Thirty-four patients who had recently suffered a cerebrovascular accident were treated in the resuscitation room and their hospital mortality was 73%. The group denoted "other" included diabetic coma and status epilepticus. Overall 29 medical patients died in the resuscitation room, which compares with five surgical patients who died there. The percentages of patients with myocardial infarction and poisoning admitted to the Royal Infirmary who were initially treated in the resuscitation room during the survey are given in Table III. It also compares the inpatient mortality of these patients with the overall hospital mortality for these conditions.

TABLE III—Comparative Mortality

	Resuscitation Cases		Overall Hospital Mortality (%)
	Proportion of Total Admissions (%)	Hospital Mortality (%)	
Myocardial infarction	18	34	17.5
Poisoning	8.5	5.3	0.77

Poisoning.—Of the 75 poisoned patients four subsequently died, with an overall mortality for the group of 5.3%, which is seven times that for all poisoned patients during the year 1969 (H. Matthew, personal communication) (Table III). Fifty-four of the patients (72%) were in grade II, III, or IV coma² and thus presented an airway problem; 38 (51%) required immediate endotracheal intubation.

Intensive Care in Relation to Overall Work Load.—The 372 patients requiring initial intensive care constituted only 2% of the 18,970 new cases seen during the survey period. By extrapolation it may be estimated that in a year similar to 1970 about 1,050 patients would be treated in the resuscitation room. By comparing figures from the resuscitation room with those of the department as a whole over the past five years the rate of increase in resuscitation cases is found to be much higher than the overall departmental increase. The average annual increase of new patients from 1965 to 1970 was 7.5%, whereas that for resuscitation-room cases was 90%.

Hospital Admissions via the Department.—In both 1967 and 1970 25% of all patients seen in the accident and emergency department were admitted to hospital. In contrast, the number of medical admissions from the accident and emergency department in 1970 has doubled from that in 1967 and now exceeds the total surgical admissions. This is shown in the Chart. The number of surgical emergencies admitted to this hospital has decreased since the introduction of the waiting day system at two other Edinburgh hospitals.

Discussion

An accident and emergency unit is one always staffed and equipped to deal immediately with major injuries and other emergencies.⁴ In view of the serious cases treated in the resuscitation room this work might be termed initial intensive care. This consists in immediate remedial therapy and assessment of the patient before the participation of inpatient specialists. Naylor⁵ suggested that medical emergencies be hived

Comparison of admissions via the resuscitation room for the month of April in 1967 and 1970.

off to a separate reception area staffed by the consultant of the day and his juniors. To build two sets of emergency premises when one room has sufficed us for five years seems uneconomical. Wainwright⁷ emphasized the impracticality of a separate department for non-traumatic emergencies.

Moreover, it is generally agreed that the first five minutes count most when treating the critically ill.⁸ Jenkins¹ showed that the average time for specialist staff to arrive after being called to the resuscitation room was 5.3 minutes. Even if this state of readiness could be improved it might be at the expense of other hospital duties. As the incidence of resuscitation cases per specialty in a year is small it appears impractical to develop within the specialties the perpetual state of readiness necessary for effective initial intensive care. This is the function of the accident and emergency team, who are in continual proximity to the resuscitation room and in sufficient numbers. Furthermore, concentration of experience and materials improves expertise. The staffing and equipping of an accident and emergency department require much capital investment, and its worth must be shown in improved service to the community. Our mortality and survival figures do show this return.

Sixty per cent. of the resuscitation room cases belong to the sphere of the physician. Moreover, in this survey the mortality of medical patients is greater than that of surgical cases. Other recent reports on accident and emergency services⁹⁻¹² seem to have focused their attention on accidents with little apparent attention to other emergencies, though Fairley and Hewett¹³ reporting on casualty departments in Greater London stated that a high proportion of medical emergencies came through

them. In a recent Belfast survey¹⁴ 14.8% of all patients treated in the main accident and emergency department were medical, and in the "ambulance area" the proportion was 44.2%. It was also stressed that the accident and emergency department staff are always responsible for the resuscitation and "sorting" of patients, and there is a medical registrar in the accident and emergency team. Thus there are good reasons for the participation of physicians in the administration and daily duties of the accident and emergency department.

The number of ambulant minor cases of medical nature has increased, possibly because of the introduction of an appointments system by many general practitioners. Thus it seems reasonable that physicians should participate with surgeons in their management. This may be in keeping with Elson's views⁸ on training and staffing in accident and emergency units. Watts¹⁵ writing from Bedford found that 35% of the patient turnover in his accident and emergency department consisted of general-practitioner cases.

An accident and emergency department and its resuscitation room, however, will attract more work because of its existence, as is seen by comparing the 1966 experience with the nearly four-fold increase in 1970. That the annual increase in the resuscitation patients far outstrips that for the rest of the department may reflect the pooling of patients appropriate to a centralization and improvement of facilities. Still greater demands on accident and emergency departments and resuscitation facilities must be expected and should be planned for.

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References

- ¹ Jenkins, A. McL., McQuillan, W. M., and McNair, T. J., *Scottish Medical Journal*, 1969, 14, 29.
- ² Matthew, H., and Lawson, A. A. H., *Treatment of Common Acute Poisonings*, 2nd edn. Edinburgh, Livingstone, 1970.
- ³ Lawrie, D. M., et al., *Lancet*, 1967, 2, 109.
- ⁴ National Health Services Accident and Emergency Services, Circular (68) 63. London, H.M.S.O., 1968.
- ⁵ Naylor, A. J., *Journal of the Royal College of Surgeons of Edinburgh*, 1967, 12, 264.
- ⁶ Naylor, A. J., *Injury*, 1972, 3, 148.
- ⁷ Wainwright, D., and Rutherford, W. H., *Injury*, 1972, 3, 158.
- ⁸ Elson, R. A., *British Journal of Hospital Medicine*, 1971, 6, 161.
- ⁹ London, P. S., *British Journal of Hospital Medicine*, 1970, 4, 460.
- ¹⁰ Scott, J. C., *British Medical Journal*, 1967, 2, 632.
- ¹¹ *British Medical Journal*, 1970, 4, 68.
- ¹² Edwards, D. H., and Scott, J. C., *Injury*, 1971, 2, 199.
- ¹³ Fairley, J., and Hewett, W. C., *British Medical Journal*, 1969, 2, 375.
- ¹⁴ Wilson, R. I., and Rutherford, W. H., *Injury*, 1972, 3, 169.
- ¹⁵ Watts, J. C., *Injury*, 1972, 3, 165.