

rate perceptibly goes up above that for the rest of the community. The physically disabled seem to have achieved some stability, but the incompletely controlled epileptic, the partially blinded, and those that have acquired deafness all appear in the notes with multiple injuries. The inherently nervous and distracted person is a real menace.

In the 45 to 64 age group, the number of accidents among women shows an increase; the reckless and harum-scarum are less conspicuous, but the nervous, apprehensive person, particularly female, accounts for a considerable total. The sprains and strains seem to occur among those who try to indulge in active sport and in unaccustomed exercise. Disabled persons, such as the arthritic, the partially blind, the uncontrolled diabetic and the asthmatic, all seem to be more prone to multiple accidents.

In the 65 and over group the accident rate among women is greater than among men, the nervous, apprehensive person is less in evidence, but among men the sprains and strains from doing exercise or work for which they are no longer able is a considerable cause. The blame lies more frequently, however, in some form of disablement; those who have had a cardiac or a cerebrovascular lesion are much more prone to multiple accidents than any others. Vertigo is the next most common cause and this is to be seen more frequently in women. The combination of vertigo and osteoporosis seen more frequently in women is the precursor of fracture of the neck of the femur. Blindness, alcoholism, chronic bronchitis, and arthritis are other disabilities which play a part in the causation of multiple injuries in the aged.

REFERENCE

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THE SURGEON'S VIEWPOINT

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The accident problem may be described as the first epidemic in the history of surgery; it is man-made, world-wide, continuous, and is a direct consequence of the age of power and speed in which we live, work, and play.

The motor car, which was in my youth a luxury, is now an essential amenity to the present and perhaps all future generations. Every

car-owning father will know this, either to his own considerable inconvenience or his considerable cost, as soon as his sons are old enough to hold a driving licence. I have had no experience of daughters, but I have heard it said that when a family loses a daughter in marriage it gains a motor car and a bath room. Yet there is a grim side to this demand for easy, quick transport. The United States has already lost more of its people from road accidents than in all the wars in its history. Each year in Britain accidents alone account for one third of all male deaths in the years of promise, that is the 17 to 24 age group, mostly as a result of motor cycle accidents.

The existing accident problem goes, I think, beyond the province of surgery. It must be approached by medicine as a whole, as medicine has successfully handled all other epidemics, not only by the most efficient treatment of the victims, but by prevention of the spread of this accident disease, and prevention of the disease itself or cutting it down to reasonable proportions. Treatment must continue to be spread between all medical resources according to their availability and efficiency, because the total treatment load of accidents is quite enormous. Professor John Squire, of this university, when working with us in the Medical Research Council Unit at the Birmingham Accident Hospital, through the research work of his colleagues there, estimated that in 1951 five hundred thousand minor wounds requiring at least one dressing occurred in this country each day, that is, a hundred and eighty million a year. Research that that group undertook into the consequences of these wounds showed that in industry 30 per cent of them became infected. Some of them were so seriously infected that the patient lost time from work, to such an extent that the infection of minor wounds caused more lost time from work than any industrial injury other than fractures. In the decade 1940-49 the research group examined the Birmingham coroner's records and found that 19 deaths occurred from infection of minor wounds in this city alone, 13 from septicaemia and 6 from tetanus, a picture reminiscent of the story of sepsis in pre-Listerian days.

Clearly, on this evidence, the treatment of minor wounds is not a minor part of the accident problem. If my calculations are right, there is much more chance of dying from neglecting the early efficient treatment of the minor wound than of winning a five or six figure dividend on the football pools. Following this research, the reporting of minor wounds became compulsory in industry in this country, and efficient methods of early treatment were instituted with the help of instructional films produced in hospitals. The infection rate dropped by over 200 per cent, an excellent example of the results that can be achieved by co-operation between

research, hospital training and teaching, and the industrial medical services, right down to the first-aiders on the production line, because these were the men who were in fact dealing with the dressings. The load of more severe accidents carried by the industrial medical service is not really accurately known, but it must be quite considerable.

I know of no accurate estimate of the number of injuries treated in continuity by the total general practitioner service of this country. We have had some indication from Dr McGregor of the numbers he has treated, but the total number under treatment by general practitioners must be considerable.

Basing my estimate of hospital treatment injuries on my own hospital's records, incidentally confirmed by records made available to me the other day by Mr Scott of Oxford in his region, I believe that the hospitals of this country are now treating about 5 million new injuries each year. These are not reattendance treatment numbers, although reattendance figures do increase the treatment load; they are new accidents. This estimate of hospital treated accidents is considerably higher than the published government statistics—of course, government statistics are entirely dependent on accurate recording, analysis, and reporting by the casualty departments of this country. The Nuffield Trust has published a report on these departments, and which shows that all they can do really is to keep pace with the work that comes before them; the treatment of the patient is much more important than accurate recording. So I believe that the government statistics are a gross underestimate of the accident load now being handled by hospitals. It is undoubtedly true that since the advent of the National Health Service we in hospitals are seeing many more injuries than we saw before 1948. I always tell the story of little Willie who before 1948 cut his finger and went to Mum, and Mum dressed it or, if it was a bit too tough for her, she took him to a general practitioner, and if it was too tough for him then little Willie was sent to the Birmingham Accident Hospital. Now little Willie doesn't even go to Mum. That goes for many trivial injuries. The service is there, the open door policy is instituted to prevent delays and it is used and very often abused. If to this enormous treatment load in and outside our hospital services is added the overriding principle governing the care of all injuries, the avoidance of all delays in commencing treatment, the treatment problem of the injured is seen in its true perspective.

The value of avoiding delays in treating injuries was demonstrated by the research on trivial injuries undertaken by the Medical Research Council team at our hospital. Leonard Colebrook after considerable research work on the larger wounds of burns and scalds stated some

time ago that the longer a wound remains open the more certain it is to become infected, and, since burns and scalds are initially sterilized by the wounding agent, the problem—and it is quite a considerable problem—is to prevent their becoming infected by added bacteria. Again this is a problem of preventing delay in covering these wounds. Some years ago the classical research of Grant and Reeve showed that if after serious wounding a patient's blood volume is allowed to remain below 75 per cent of its normal, even for a few hours, life is in danger, and clinical progress is directly related to both the degree and the duration of lowering of the blood volume. Grant and Reeve's classical research has since been supported, notably by the American Army Medical Service in the Korean campaign when the practical application of this new knowledge resulted in the lowest mortality rate in the history of warfare. The findings of Grant and Reeve have also been confirmed by the late Roscoe Clarke and his research team working on severe civilian injuries.

The total evidence shows that there can be no compromise on the issue of preventing all avoidable delays in treatment of the injured, wherever the accident occurs. In 1938 a government White Paper on the rehabilitation of persons injured by accidents very strongly criticized the delays that occur in all but a few hospitals all over the country in commencing treatment of the injury. But that interdepartmental paper did not suggest how difficult it is to avoid those delays with the existing facilities available in the hospitals of this country.

The present pattern of hospitals of the Birmingham region is a pattern that was established in the middle and the end of the last century to meet the needs of local communities living around these hospitals. It was established before the advent of the accident epidemic, and before medicine understood the treatment needs of the injured and particularly the seriously injured. Clearly each of these hospitals cannot meet, or be developed to meet, unaided the treatment responsibilities of all types of injury without delay. Dr Porter will explain later in this symposium this region's plan to spread the total load of accidents over this hospital pattern according to the facilities that now exist, or can be developed, but the problem is a real one, and my job is to present problems. Something new must be added to the pattern of this distribution of hospitals. The additional accident service must include a large and fully comprehensive accident department attached to a large general hospital; such a department would support by the closest co-operation the accident services of its surrounding hospitals, and support the general practitioner service to ensure a 24 hour a day, 7 days a week service for all injured wherever the accident occurs.

The plan must also give attention to the problem of the relationship between the fast moving accident service that must prevent all delays in commencing and completing treatment and the well established slower moving specialties in surgery.

It is the whole of this picture, specialist services included, that in my view now represents the total accident service needs of any region. Does this mean the development of yet another specialist within surgery, the traumatic surgeon to staff these large accident departments over the 24 hours of each day? I mention this because the matter seems to disturb my very close friends in the Orthopaedic and Plastic Surgical Associations of which I have the honour of being a Fellow. The truth is that the demands of treatment of injuries and particularly multiple injuries (I mean multiple injuries of one patient not multiple injuries in Dr McGregor's sense), the all-over injuries typical of road traffic accidents, have cut across all branches of medicine with a superb disdain for the man-made boundaries of the different specialties. And this group of injuries is forcing us back into the re-establishment of the general surgeon, in the strict sense of that term, not a new type of specialist, not a traumatic surgeon, but a general surgeon capable of understanding the problems of injury to any part of the body, and within the time when treatment can hope to be successful. Our Birmingham experience has shown that the mortality and morbidity rates following serious injuries are directly related to the time in hours, not in days, between the accident and the completion of primary surgery.

I was going through the figures recently for ruptured spleen associated with other injuries that occurred in our hospital in 1959. It was the first year in which we had had no death from that particular injury. The ruptured spleens were associated with other injuries, and they were all due to road traffic accidents; there were 19 of them with no deaths, and the reason for this is that that year for the first time we had succeeded in completing treatment, including splenectomy, within 6 hours from the time of the injury. But our experience has taught us that early diagnosis in an unconscious patient with multiple injuries can be the most difficult of all tasks, requiring constant observation, repeated clinical and, perhaps, radiological examinations during the whole period of resuscitation. It may cover several hours, and even then full diagnosis is not often complete until the operative exploration, and less fortunately is not often complete until the autopsy examination.

The unsolved problem of accurate early diagnosis is one of the main problems before the accident services. It requires intensive research, and one looks to the established specialist divisions in medicine and in surgery, who have a great deal to offer in this field, to apply the diagnostic techniques to the tempo required to meet the

needs of the seriously injured. Given the facilities, the development of a completely co-ordinated accident service depends, as I understand it, upon team work, greater team work than we have known before, starting with the accident crews at the accident site, through the general practitioners who will take whatever load they can of continuity in treatment if their services are co-ordinated with those of hospitals and with specialist services, right through to rehabilitation. The co-ordination of the whole demands, as I understand this problem, the undivided attention of a new type of general surgeon, but no part of the team I have named can afford to disregard the importance of other members.

My brief in accident problems would not be complete without some consideration of medicine's responsibility in accident prevention. This is an important part of this epidemic. Only in industry does accident prevention have a bright outlook. There, of course, the accident epidemic caused by the hostile environment can be strictly controlled, if necessary by compulsory Acts. But industry, particularly mass-production industry, is becoming intensely interested not only in the damage that can happen to the worker, but also in the damage that can happen to the goods during production. The aim of the manufacturer, and he is going a very long way in mass production towards attaining that aim, is to put into one end of an automatic production line a piece of metal that goes through the production line without being touched by hand, and hey presto out of the other end comes a motor car. These methods might mean the prevention of the disease in some types of industry, but clearly similar prevention measures cannot readily be applied to home and road accidents. Yet it is remarkable how often commonsense safety precautions will help, and it is remarkable how planners and designers continue to disregard safety measures and safety precautions.

In the domestic field, where unfortunately the ladies were criticized by Dr McGregor, it is known that falls are the main cause of serious injuries in our aging population. I am more in favour of these old ladies than Dr McGregor. I believe more old ladies get injured than old men because they live longer and there are more of them at risk, but they fall down stairs, down steps, and in the bath room, and little attention has yet been paid to the safer design of the stairs, steps, and bath room.

In another domestic accident field it is known that almost all fatal and disfiguring burns result from a combination of unguarded fires and highly inflammable fabrics. Although we now have legislation about unguarded fires, highly inflammable fabrics still remain the most popular of all materials for party frocks and night gowns for our children. The only voice in these matters that can

speak with authority and with some concern is the voice of medicine, and particularly the voice of the general practitioners.

The standard of safety behaviour on our roads and the use of available safety equipment by all of us still remains at a very low level. I am doing some research into pedestrian accidents, and the last four fatal ones I have investigated were caused by the victims coming from behind cars parked on the roadside into view of moving traffic only a few yards in front of the vehicle that knocked them down. The drivers didn't have a chance; the four persons were aged 86, 77, 66 and, believe it or not, an unaccompanied child of 22 months. Studies of the causes of severe and fatal injuries to the riders of two-wheeled vehicles show that they occur after the rider is unseated by contact of his bike with a heavier vehicle; then he is dislodged from his seat, ejected from his bike, after which he is injured. Should not medicine use its influence to compel pedestrians to use controlled crossings in cities where they are readily available? And should we not think seriously about propaganda for special tracks for two-wheeled vehicles in areas of heavy traffic congestion? I can assure you that those of us who treat serious injuries see far too many injuries that cannot be repaired, that must be fatal. In one rural area in the region we found quite recently that 58 per cent of those who died from road traffic accidents were dead on arrival at hospital. This is much too high a serious injury and fatality rate. Surgery can never solve this problem but prevention can.

In the United States where the congestion of four-wheeled vehicles has almost pushed the pedestrian or the rider of two-wheeled vehicles off the road, the annual road accident rates are still very high, although they are coming down. Last year I think there were 37,000 killed, over 1½ million seriously, or moderately seriously, injured, and 4 million trivially injured in road traffic accidents. Yet no one dares, even in the United States, to call a motor car a dangerous vehicle and demand safer design, and no one, other than the voice of the medical profession in America, can call for the protection of car occupants from injury by safer design. Perhaps this matter may be of personal interest to you, so let's consider the causes of injury to car occupants. After impact the seat occupant is thrown forward off the seat to hit the roof, the windscreen, or the dashboard, receiving serious injuries. Sometimes he remains on the seat; the seat goes forward and he hits his chest if he is the driver and may receive irreparable damage to the chest on occasions, or at least very severe damage. Tying down movable objects in the car is also an important safety precaution. In my road research work I have already heard of two people who have been killed by ejection from the car when the doors flew open.

With safety harness, the lap strap prevents the occupant being

ejected from the seat but does not prevent jack-knifing, and it is essential at least for the driver and front seat passenger to wear shoulder straps as well as lap straps. If the lap strap is fixed a little too high and doesn't allow free flexion of the hip joint, it may injure the back.

At Cornell University where car crashes have been studied, in one instance all the occupants of a car were seriously injured, but the car also contained a crate of eggs that were well packaged, and very few of the eggs were broken. The value of packaging was demonstrated by Cornell research workers after study of many accidents, and they designed the Cornell Safety Car financed by companies who haven't been taken the slightest bit of notice of in the design of production cars. This is because the motor industry cannot afford to suggest that a motor car is dangerous, otherwise they can't sell it.

DISCUSSION

W. N. Leak, M.D. (*Winsford, Cheshire*):

I am particularly struck by what Mr Gissane said about our being in the middle of an accident epidemic. I am interested in epidemics because in 1919, when I was in the R.A.M.C., I was responsible for the public health of a third of Palestine, and had to be ready to cope with outbreaks of cholera, typhus, or smallpox, as well as endemic and epidemic malaria. As port officer for Jaffa, I received telegrams twice a day telling me the state of health of all the ports from Hong Kong to Gibraltar. In my time we only had four epidemics. We had a virulent attack of measles in Nablus which killed over 60 per cent of all the children under one year. We had a queer attack of influenza pandemic in one village. Then we had a curious attack, all over Palestine, of what I presume was desert sore. And, finally, two villages were attacked by malignant malaria, which killed 1.5 per cent of the population every day, that is 8 to 10 deaths in a population of five or six hundred. Curiously enough, news of this reached the Foreign Office, and the result was almost unbelievable. We were given unlimited credit to eradicate malaria, I was put in charge of this work, and within two years malaria was practically banished from Palestine.

I tell you this because it presses home the point that if we are to meet epidemics, we must have organization, and organization