THE MAURICE ELLIS LECTURE FOR 1986

The responsibility of emergency medicine towards the prevention of road accidents

W. H. RUTHERFORD

Accident and Emergency Department, Royal Victoria Hospital, Belfast, Northern Ireland

SUMMARY

It is argued that doctors who work in accident and emergency departments should play their part in road accident prevention. It is suggested that this might be done in the field of research, by direct action, through education of the public and by influencing legislation. Examples are given of both small and simple, and major national research projects based in accident and emergency departments. The type of direct action envisaged is modelled on the work of Dr Hayle Hadeson in preventing accidents to children.

Examples of the education of the public are drawn from publicity work in the seat-belt campaign, and experiences of lobbying members of parliament in relation to seat-belt legislation are described.

The relative underfunding of trauma research compared with cancer or heart disease research is seen as a measure of society's lack of interest in accident prevention, and colleagues unchallenged to do more to alter this situation.

INTRODUCTION

Mr President and colleagues, in 1966, near the end of my 19½ years in a mission hospital in India, I was wondering how I would find a corner to return to in British medicine. It was the writings of Maurice Ellis which turned my mind towards the possibilities of working in a casualty department, as it was then known. So, when I succeeded in obtaining a job in the Casualty of the Royal Victoria Hospital, Belfast, in 1967, I was already the owner of the *Casualty Surgeon's Handbook* by Maurice Ellis and, when I was

Correspondence: Mr W. H. Rutherford, Accident and Emergency Department, Royal Victoria Hospital, Belfast BT12 6BA, Northern Ireland

looking for inspiration and advice, it was to the General Infirmary at Leeds I went to meet its author.

The outstanding memory of that one encounter was the enthusiasm of the man. He took me around the department; every corner was full of excitement. I remember burns clinic which he was conducting with the cooperation of a plastic surgeon. I remember the passion with which he spoke of his researches into the effectiveness of penicillin combined with surgery in the treatment of abscesses. I have to confess that it was this very enthusiasm which awoke a scepticism in my own mind which was to lead on to my own first research project in a casualty department.

Dr Laing, my friend and colleague, from Salford, recently sent me the agenda of a meeting which he had arranged in Salford in 1973 with Maurice Ellis's help and encouragement. The agenda contained such items as a specialty journal and a specialty examination, items which at the time seemed little more than an idle dream, yet today are accepted as a normal part of our life. That reminds me of the joy and pride with which he demonstrated a video with a teaching demonstration of how to apply a Thomas's splint to the leg to me in 1967. For some of us today, the idea of teaching techniques with the aid of a video is a new idea which we think we have just discovered and with which we will astonish the world! He was, indeed, a man before his time. Each year at the Annual Scientific Meeting of the Casualty Surgeons' Association this lecture is given so that we should always remember that Maurice Ellis was the father of accident and emergency medicine in Europe.

You will understand the feelings of indebtedness, affection and admiration that I bring to the preparation of this lecture. It is a particular joy and honour to be given the opportunity to deliver it on this historic occasion of the First International Conference on Emergency Medicine. Nineteen eighty-six has been nominated European Road Safety Year and, for that reason, I have chosen as my title 'The Responsibility of Emergency Medicine towards the Prevention of Road Accidents'.

I intend to consider these responsibilities in four areas:

- (1) research;
- (2) direct action;
- (3) education of the public;
- (4) influencing legislation.

Of these four topics, it is the first, research, to which I will devote most time and attention, for at this First International Conference on Emergency Medicine, we do have a particular responsibility towards the scientific and technical aspects. However, the other three aspects are not unimportant and, while research is a possibility maybe only for the minority of doctors in emergency medicine, the other three aspects are ones to which every doctor can make some contribution.

RESEARCH

Good research does not always require a budget of hundreds of thousands of dollars, batteries of computers and an electron microscope; the essential requirement is

question which can be answered positively or negatively by carrying out a series of measurements and making the correct mathematical or statistical analysis. As an example of a simple yet important project, I would draw your attention to a study of the importance of raised blood alcohol in pedestrian accidents (Irwin *et al.*, 1983).

There is a voluminous literature about drinking and driving, but, if such articles are scrutinized in a critical frame of mind, there are very few indeed where blood alcohol values are given not only for drivers and passengers injured or killed in car accidents but for controls.

When the question of alcohol in pedestrian accidents was investigated, it was decided that a study with proper controls had to be designed. There would be no point in demonstrating, for example, that 30% of injured pedestrians had a positive blood alcohol unless it was also known whether, of the pedestrians on the streets at the same time and place, 5% or 50% had positive blood alcohols.

The method was to breath-test for alcohol all pedestrians arriving at hospital over a 3-month period. Exactly one week later, a doctor or medical student would go to the site of the accident: the day of the week and time of day were identical. Pedestrians were observed and the first to pass the researcher of the right sex and approximately the right age was asked to blow into an alcohol breath analyser. The purpose of the test was explained and they were reassured that it was not necessary to know their identity. In the 3 months, 50 injured pedestrians were collected, and in 46 cases the first control to be stopped agreed to cooperate and blew into the machine. In four cases, it was necessary to ask a second member of the public to agree to testing.

From Table 1, it can be seen that there were 27 pairs where neither patient nor control had a positive test. In 12 pairs, both had a positive test. In the remaining 11 pairs, the patient always had a positive test and the control a negative test. The full statistical calculations are explained in the original article and will not be expanded on now, but it can be seen from this table that the relative risk of injury to a pedestrian with a positive blood or breath alcohol can be calculated, and it is almost fourfold.

Not only are pedestrians much more likely to be injured if they have been drinking but, as can be seen from Table 2, they are also more likely to receive severe injuries.

The young man who did most of the work on this research was in a post where, for 12 months, he spent half his time teaching anatomy and the other half working in the department. In his first 6 months, he worked for and passed his primary FRCS examination.

In the second 6 months, it was possible for him to carry out his daily duties in the Emergency and Anatomy Departments and also to help to plan this study and with his anatomy students collect the data. The analysis and write-up spilled over into his next year, but he has to his credit one of about four studies in the world literature where pedestrian patient blood alcohols have been studied in relation to controls. In a more recent study, a medical student doing a 6-week elective period in the department has demonstrated an association between patients injured in accidents whose blood alcohol was positive and unemployment. It seems sure there are many other relatively simple and short studies into the causation of road accidents where young doctors in this specialty can begin to learn how to set up a scientific study, how to carry it through, how to present and publish it, and, at the same time, make a real contribution to our knowledge about risks and injury connected with road traffic.

Table 1 Paired positive and negative alcohol-detected patients and controls

Alcohol-detected patients	Alcohol-detected controls	
	No	Yes
No	27	0
Yes	11	12

Table 2 Severity of injuries for alcohol-negative and positive patients

Injury severity		Alcohol-negative	Alcohol-positive
Mild	(ISS 1-9)	24 (68.6%)	11 (31.4%)
Moderate	(ISS 10-19)	3 (37.5%)	5 (62.5%)
Severe	(ISS 20+)	—	7 (100%)

$X^2 = 8.1$; $df = 1$; $P = 0.004$.

The second research project which attention should be drawn to belongs to the other end of the scale. It was a study to monitor the medical effect of seat-belt legislation in the United Kingdom (Rutherford *et al.*, 1985).

In June and July of 1981, Mr Norman Fowler, who was at the time Secretary of State for Transport, presented to the House of Commons a transport bill. The Bill was a wide-ranging piece of legislation in relation to many aspects of road safety. About the only conceivable measure which was absent from it was mandatory seat-belt wearing. Mr Fowler being a champion of the cause of freedom in this field. However, when the measure was referred from the House of Commons to the House of Lords, Lord Nugent moved an amendment that belt-wearing be mandatory in the front seats of cars. This was passed and, when the measure returned to the Commons, a free vote was allowed and in July 1981 the legislation was passed.

Although it was known then that mandatory seat-belt wearing was coming, it was not known when. No drafting had been done of any of the detailed regulations on such matters as what the fine would be, how it would be collected, who could get exemption and so forth. It was thought that there would be an interval of 6-9 months before the measure became operative.

This opportunity was seized to set up a scientific study to monitor the effects. The special feature of the study was that it was possible to document the position before as well as after legislation was brought into action. The author wrote to 13 colleagues, friends and members of the Casualty Surgeons' Association, asking them if they would join him in collecting the basic data. It is understood that, ideally, the hospitals should have been randomly selected, but the commitment which was sought was not easily found. A team with a strong bond of mutual affection and respect, and a dedication which would last through the whole period of data collection was wanted. In the event,

the hospitals proved to be a reasonably representative sample and covered 5% of the total road accident casualties in the country. Shortly after the exercise was set up, the Falklands war broke out, and there was no time in Parliament for inessential matters like seat-belt regulations. The result was that, by the date of implementation of the Act, the team had been collecting data for exactly one year. The collection continued then for a further year after legislation.

The original intention was to collect figures for both those dead before reaching hospital and those alive on arrival within the drainage areas of all hospitals. In practice, we found great variety in relation to the documentation procedures of pre-hospital deaths and, in order to make the deaths at all hospitals comparable, pre-hospital deaths were omitted everywhere. This absence left a weakness in the study and it was decided to do a small separate study on fatalities. This was based on eight coroners' districts in England. In England, all sudden or unexplained deaths must be reported to a coroner and this includes all road traffic deaths. The methodology for the fatality study was exactly parallel to that for our main study of live patients. The entire study included details on approximately 14 000 patients alive on arrival at hospital, and a fatality study based on 176 deaths. In each case, this represented approximately 5% of similar victims in the whole country.

The data-collection form for each patient contained 214 coding boxes. This meant that there was a possibility of thousands, if not hundreds of thousands of combinations and permutations in which one could present tables. Of these, every twentieth table might show a statistical significance at the 95% level merely through the operation of random variation. Professor Tony Greenfield, the statistician in the research team, warned of the dangers of such data dredging, and insisted that, prior to analysis, the present author should draw up a list of hypotheses predicting in which areas change would take place and in which direction the change would be. There seemed to be marked changes in quite a few other injuries in the analysis. Statistical tests were also applied to these and, in many cases, they reached a 95% probability. However, it is not claimed that change in these unpredicted injuries has been demonstrated. Attention has merely been drawn to them as matters which will need assessment in further studies.

The predictions which were made and whether or not they were confirmed are presented in Tables 3–5. The first predictions (Table 3) were concerned with outpatients, inpatients and deaths. All three were predicted to fall. The first two were shown to do so. The difficulty concerning pre-hospital deaths made it impossible to make a judgement in that respect from the hospital patient data. However, from the fatality study it is clear that there was an overall fall in fatalities of 26%. This figure is reasonably close to the national figures. Details for drivers and front-seat passengers are shown in Table 3. It was predicted that bed days would fall and this was shown to happen. The prediction that there would be a fall in numbers with serious injuries was shown to be correct. The prediction that the proportion of seriously injured patients would fall was shown to be incorrect. If it had been possible to identify those in the second year who would have been injured had they not been wearing a belt and to have included them in the calculation, then the answer might have been different but there is no doubt that the hypothesis as stated was incorrect.

In the case of multiplicity of injuries, the prediction of a decrease was correct both for major and minor injuries.

Table 3 Predictions about the medical effects of seat-belt legislation, and the results for drivers and front-seat passengers

	Driver (%)	Front-seat passengers (%)
A fall in total patients	↓ 13	↓ 26
A fall in admitted patients	↓ 23	↓ 43
A fall in non-admitted patients	↓ 10	↓ 22
A fall in deaths (fatality study)	↓ 34	↓ 22
A reduction in bed days	↓ 27	↓ 35
A reduction in the number of severely injured	↓ 23	↓ 28
A reduction in the proportion of severely injured*	↓ 0.9	↓ 0.1
A reduction in multiple injuries (minor)	↓ 28	↓ 42
A reduction in multiple injuries (major)	↓ 21	↓ 31
A reduction in brain injuries	↓ 30	↓ 57
A reduction in skull fractures*	↑ 2.6	↓ 71
A reduction in facial wounds	↓ 44	↓ 63
A reduction in facial fractures*	↑ 10	↓ 46
A reduction in lung injuries	↓ 33	↓ 58
An increase in neck sprains	↑ 22	↑ 8
An increase in fractures of the sternum	↑ 100	↑ 156
An increase in severity score of belted*	↑ 2.4	↑ 8.1
An increase in severity score of unbelted	↑ 49	↑ 40

* Predictions not confirmed.

A diminution in specific injuries was predicted. It should be noted that brain injuries, facial wounds and lung injuries diminished as predicted for both driver and front-seat passengers. Skull fractures and facial fractures diminished for front-seat passengers but not for drivers. Injuries to the neck and the sternum were predicted to increase, and both did so. It was predicted that the changes which would be seen among front-seat occupants would not be seen among rear-seat passengers. This was confirmed again and again on many different aspects, of which Table 4 is one example.

Table 4 Effect of belting legislation on front-seat occupants and rear-seat passengers

	Front-seat occupants (%)	Rear-seat passengers (%)
Outpatients	↓ 14	↓ 4
Inpatients	↓ 30	↑ 6

It was predicted that, in the second year, the mean injury severity among belted front-seat occupants and the unbelted would rise. The reason for the first prediction was the thesis that those who belt up voluntarily are the most careful drivers and have abnormally low severity scores. The influx of less careful drivers after legislation might make injury severity scores rise. However, this prediction was not confirmed (Table 4). Similarly, those who did not belt up after legislation were expected to be more reckless drivers who would have higher injury risks. The prediction was clearly confirmed.

The last two predictions concerned the time of day. It was expected that late at night and early in the morning belting rates would fall. This proved to be true in both years (Table 5). Similarly, at the same time of day, the mean injury scores were expected to be worse than at other times and this also proved to be true. It is one of the great advantages of hospital records that data are available throughout the whole 24 hours. As far as the author knows, the study was the only one in the UK to contain this information.

Table 5 Belting rates and mean injury severity scores for front-seat occupants in the first and second years for different times of the day

Time of day	Belting rates (%)		Mean injury severity score	
	Year 1	Year 2	Year 1	Year 2
2300-0259	17.5	84.5	3.42	3.51
0300-0759	24.4	89.0	3.46	3.52
0800-1259	25.2	94.7	2.60	2.57
1300-1759	27.3	94.4	2.78	2.73
1800-2259	21.4	92.3	2.73	2.63

It has been carefully shown, firstly, exactly those aspects which can be claimed to have been established, the existence of certain changes beyond reasonable doubt. However, if the figures are a little less critically examined, a much wider pattern of injuries can be seen which appear to have changed through the seat-belt legislation.

Table 6 shows changes between the first and second years in the numbers of different types of injuries in the heads of drivers and front-seat passengers. It can be seen that, for front-seat passengers in all types of injuries to the head, there was a marked improvement in the second year. On the other hand, if we look at drivers we find that while minor brain injuries, facial wounds and contusions and eye injuries have improved, major brain injuries, skull fractures, scalp contusions and facial fractures have increased. The explanation seems to be that retractile seat-belts facilitate contact between the driver's face and the steering wheel.

Injuries in the thorax were much more common among fatalities. Table 7 shows the very satisfactory reduction in injuries to all organs in the chest. As for this and the remaining injuries, drivers and passengers have similar results, figures are given for all front-seat occupants. In the abdomen, kidney injuries were well reduced among patients, and among fatalities liver and spleen injuries were reduced. Figures for the

Table 6 Overall effect on injuries to the head for drivers and front-seat passengers

	Driver			Front-seat passengers		
	Patients, Year 1	Patients, Year 2	Change (%)	Patients, Year 1	Patients, Year 2	Change (%)
Brain injuries (minor)	606	399	↓32	296	124	↓58
Brain injuries (major)	32	46	↑44	22	13	↓41
Skull fractures	27	29	↑7	14	4	↓
Scalp contusions	142	180	↑27	81	60	↓26
Facial wounds	1101	617	↓44	553	206	↓63
Facial fractures	134	147	↑10	59	32	↓46
Eye injuries	42	31	↓26	28	18	↓38

Table 7 Overall effect to the thorax, abdomen, limbs and spine for front-seat occupants

	Year 1	Year 2	Change (%)
Thorax (fatalities)			
Lungs and pleura	92	65	↓ 29
Heart	21	14	↓ 33
Aorta	20	15	↓ 25
Fractured ribs	101	70	↓ 37
Abdomen			
Kidneys (patients)	42	24	↓ 43
Liver (fatalities)	33	14	↓ 58
Spleen (fatalities)	23	15	↓ 35
Gastrointestinal tract (patients)	3	10	↑ *
Limbs (patients)			
Fracture, radius and ulna	150	81	↓ 46
Fracture, humerus	54	39	↓ 28
Fracture, clavicle	80	61	↓ 24
Fracture, femur	113	86	↓ 24
Spine			
Sprain, cervical (patients)	1056	1247	↑ 18
Sprain, lumbar (patients)	30	97	↑223
Fractures, cervical (fatalities)	9	18	*
Fractures, thoracic (fatalities)	6	14	*
Fractures, lumbar (fatalities)	0	2	*
Total spinal fractures (fatalities)	15	34	↑127

*Numbers too small for calculation of percentage change.

gastrointestinal tract were very small but suggested a slight increase. This would confirm that this is a seat-belt injury. Fractures in the upper limb were well reduced and in the lower limb femur fractures were reduced.

For patients there was little change in fractures of the spine, but sprains of both the neck and lumbar spine increased. Among the fatalities, spinal fractures increased. The overall reduction in patients, both admissions and non-admissions, were substantial and it can be seen that the advantage to the front-seat passenger was almost double that to the driver.

Among the public, there has been considerable anxiety about whether wearing belts may not give drivers the feeling of being much safer. This might lead them to take increased risks resulting in increased injury and death among other road users, and negating any value of the legislation. This theory is called 'risk compensation'.

There is no evidence from the study regarding pedestrians and cyclists. However, of all the people most likely to be a reliable guide in this matter, the rear-seat passenger would seem to top the list. In the first year, 98.1% of rear-seat passengers were unbelted and, in the second year, 96.7% were unbelted. A 2% swing in belting is unlikely to have made any substantial change to the injuries. It is likely that some people unhappy about wearing belts may have moved to the back seat, however, this factor will be ignored in the analysis.

Looking, firstly, at rear-seat passengers treated as outpatients, those admitted who survived and those admitted who died (Table 8), we can see a very small decrease in outpatients, a small increase of inpatient survivors and a fall in deaths after admission. It might be thought that these figures were misleading as deaths in the pre-hospital phase are not shown.

Table 8 Results for rear-seat passengers

	Year 1	Year 2	Change (%)
Outpatients	956	914	↓4
Inpatients	202	214	↑6
Died in hospital (patients)	9	3	
Died before reaching hospital (fatalities)	11	9	
Died after reaching hospital (fatalities)	2	5	
Total deaths/fatalities	13	14	
Injury severity score (patients): 1–3	881	841	↓5
Injury severity score (patients): 4–8	219	223	↑2
Injury severity score (patients): 9+	67	67	0

Turning to the fatality study in eight coroners' districts and examining rear-seat passenger fatalities, before and after reaching hospital, a slight fall in pre-hospital deaths is found.

Another way of examining the question is to look at rear-seat patients by the severity of their injuries. It can be seen that there is no real increase in the severity of the injuries sustained by rear-seat passengers.

These findings do not demolish the risk-compensation theory as applied to the

wearing of seat-belts in themselves. They are merely a further addition to the areas in which specific evidence was sought which might support the theory and, as in other studies, no supportive evidence has been demonstrated. There is good evidence that if acceleration, braking, tyre grip and headlights are improved, at least some of the increased safety is taken up by attempting manoeuvres which would have been more risky otherwise. There is no inherent reason why seat-belt wearing should not have a similar effect. The national statistics in the UK for fatalities among rear-seat passengers do show an increase, but there is no similar increase if both the fatally- and seriously-injured are taken into consideration. If some risk compensation is occurring among a limited sector of the public (and so far this is far from proven), it is certainly not sufficient to obliterate the substantial benefits which have occurred as a result of the legislation.

What are the implications of this research report into the medical effects of seat-belt legislation? Firstly, it must be accepted that, in spite of all the pressures of daily work in emergency departments, it is possible to do a first-class research project on a multi-hospital basis. The report was presented for rigorous scrutiny and criticism before an experienced and erudite scientific audience in the Royal College of Surgeons in London in September 1985. A briefer presentation was made to a gathering of experts from the Organization for Economic Cooperation and Development in Washington in November 1985. It came through these tests unscathed. It is important to remember that it forms only one aspect of the monitoring of the British legislation, and that the reports from the Department of Transport and from Professor Durbin and Professor Harvey, based on national figures collected over many years, establish the effectiveness of the legislation in a much more comprehensive way than the study which I have reported. The value of the report is in the detail it gives of the effect on injuries in every part of the body. This demonstrates, not so much that the legislation was effective, as how it was effective. It shows the strengths and weaknesses of seat-belts and points out areas for further development.

It should not be thought that the high standards of the report were easily achieved. The doctors and clerical staff in all the departments did a magnificent job making the fundamental records. The authors were more than fortunate to have as a research fellow Dr Mike Hayes, whose regular visits to the hospitals played a large part in maintaining good standards over the years. The data was analysed by computer, but these marvellous calculating machines are dependent on highly dedicated work by all those who feed in and, later, extract the information. The authors are deeply indebted to Mrs Nelson, who oversaw all this work. The importance of having the goals clearly stated, the planning soundly done and the analyses rigorously carried through in research of this type cannot be over-emphasized. At this point, debt is mainly due to Professor Tony Greenfield, but also to the Advisory Committee of the sponsoring body: the Department of Health and Social Security.

This is the first multi-hospital research project carried out in emergency departments in the United Kingdom. No doubt many more will follow. Those who undertake them will need to plan to carry through and to analyse their work with at least the same care if they wish to achieve results which can stand up to national and international scrutiny.

DIRECT ACTION

Not every specialist in emergency medicine is a researcher. It is possible to be an excellent doctor and never do research. At times, there is a danger of overvaluing people who do research and write papers, and undervaluing doctors whose energies go entirely into looking after patients.

However, there are other ways in which both the researcher and the non-researcher in emergency medicine may make their contribution to the prevention of road accidents. The first of these can be called 'Direct Action' and I would acknowledge my debt to a great proponent of this method, Dr Hugh Jackson, Paediatric Physician in Newcastle-upon-Tyne.

Dr Jackson realized that the greatest cause of mortality and morbidity among his patients was accidents. He felt that merely dealing with the effects of accidents was not enough. One should always ask, 'How and why did this happen, and is there anything to be done to prevent similar accidents in future?' Hugh Jackson's interests encompassed not only road accidents but all kinds of accidents, and, as an example of his method, an injury from broken glass in the home is used here.

A child arrived in hospital with some feet of small intestine protruding from a wound. While the surgeons were interested in the exact nature of this injury and how best to repair it, Dr Jackson wanted to know why and how it happened. He sent a member of his staff to the child's home. Here he discovered that the boy had been playing rumbustiously in the kitchen with his brother. As a result, he fell against the glass door between the kitchen and living-room. The glass shattered and the saw-like remains of fragments along the lower edge of the door had caused the injury. The lessons which Dr Jackson drew from this were:

- (1) Houses should be designed in the knowledge that young children will live there who, at times, will play rumbustious games.
- (2) If glass is used in doors, partitions or low windows it must be thick safety glass, preferably laminated, as in car windscreens. Dr Jackson approached the British Standards Institute to request a suitable modification in the building standards.
- (3) This was one house in an estate where there were many similar doors. Action was needed to make all the doors safe and Dr Jackson contacted the relevant authorities.

The present author cannot claim to have used this method with anything like the devotion and persistence that Dr Jackson has done. However, when a redesigned road junction near the Royal Victoria Hospital, Belfast, resulted in a series of accidents and eventually a fatality, I took up the case with the Department of the Environment. As a direct result of my intervention, further change was made in the road layout, since when we have had no further injuries or deaths from that spot.

I can see that there could sometimes be complications getting drawn into a situation which was already before the courts, but I am convinced that, on the whole, we doctors are too fascinated with the nature of the injuries and their treatment and we do not sufficiently study how and why accidents occur. I am sure we could do much more effective work in accident prevention if we employed Dr Hugh Jackson's method of direct action.

EDUCATION OF THE PUBLIC

Another aspect of our responsibility is with respect to educating the public in matters of road safety. If we consider seat-belt legislation, for example, the mere passing of a law in itself need not necessarily lead to marked change. In the Republic of Ireland, for example, such legislation was introduced in 1979. The seat-belt wearing rate rose from 15% to 45%. This, however, was insufficient to have any serious impact on injury rates which remained unchanged. In the United States, the Federal Government is putting great pressure on states to enact seat-belt legislation. If this is done without any understanding or sympathy in the communities where legislation is introduced, I would expect further experiences similar to those in the Republic of Ireland. Even in countries where the public is convinced and cooperates with the legislation, it is unlikely that the satisfactory results will continue unless continuing educative campaigns are used. This certainly has been the experience in Australia.

Doctors have no monopoly in this field. Indeed, the societies who do most of the public education, like the Royal Society for the Prevention of Accidents in the UK and the American Trauma Society in the USA, are largely run by public-spirited laymen, often with very minimal support or encouragement from doctors. As an example of close cooperation, I would cite a leaflet prepared by the Northern Ireland Road Safety Council in the campaign to get seat-belt legislation accepted. This dealt with common doubts of the public about seat-belts: Will they trap you so that you burn or drown? Do you need to wear them in the city? Do they lead to risk compensation? Is it not safer to be thrown clear? Is it not a private matter where legislation is uncalled for? On the back page, in bold letters, was the punchline, 'In Northern Ireland *all* the Neurosurgeons, *all* the Eye Surgeons, *all* the Plastic Surgeons and *all* the Casualty Surgeons agree that seat-belts were worn the number of car deaths and the severity of injury would be reduced. Do you know better?' It was an accident and emergency doctor who contacted all the surgeons, ascertained their agreement and passed on the information to the Road Safety Council. I show this as an example of how the involvement of doctors in the campaign of public education can be very effective. In Australia, the Royal Australasian College of Surgeons was the pioneer whose public campaigning secured the very first legislation. The same body is still a leader in public education for road safety today.

INVOLVEMENT IN LEGISLATION FOR ROAD SAFETY

The next aspect of road safety to which we have a responsibility is in the question of legislation. Many safety measures require legislation. Politicians are being asked to vote on the basis of technical arguments which are, in part, medical. Doctors in emergency medicine who begin to understand the risks of injury and death, and possible modification of the casualty figures by new legislation have a responsibility to convey the facts and their opinions to legislators.

In the late 1970s, members of the Casualty Surgeons' Association repeatedly lobbied their Members of Parliament on the importance of mandatory seat-belt wearing legislation. This intensified in 1981 with the appearance of a Transport Bill which

omitted any such provision. It reached its climax on the day of our 1981 Annual General Meeting, which just happened to be the day the legislation reached the House of Lords. The Association sent a telegram to Lord Nugent and when he rose to propose his historic amendment he was holding our telegram in his hand. The amendment was carried first in the Lords and later on in the Commons. The legislation was introduced for a trial period of 3 years, commencing on 31 January 1983.

In January 1986, it became necessary to make a definitive decision either for or against belt-wearing. On behalf of the Association, I sent a letter to every member of both the House of Commons and the House of Lords. It was most impressive to read replies from a considerable number of the recipients, and to realize that a carefully worded and timed letter can have a significant influence on the shape of legislation. I would like to pay tribute to the lobbying association for transport affairs, PACTS, whose technical advice was most useful, and also to the Northern Ireland branch of Rospa which helped me with the posting of the letters.

CONCLUSION

I have tried to make a case for road safety research in emergency departments, sometimes small projects and sometimes very large; I have advocated direct action for prevention on the basis of accidents occurring in our hospitals; I have made a plea for public education and for lobbying of legislators; but how important is this whole matter?

A recent report from the United States (Committee on Trauma Research *et al.*, 1985) considered different types of illness in terms of years of life which might be saved and the condition to be eliminated. Admittedly, the United States is a violent country and the proportion of saveable years allocated to trauma may be somewhat larger than elsewhere. However, the findings of this report was that 40.8% of saveable years were due to trauma, 18.6% to cancer, 16.4% to heart disease and 24.8% to all other diseases. Of all the causes of trauma, road traffic accidents are the largest contributor.

The same report then draws attention to the amounts of money spent on medical research for the three main causes of lost years. For cancer the figure is \$998 million, for heart disease \$624 million and for trauma \$112 million. I do not know the exact figures for the United Kingdom but I believe that this appalling distortion of effort is also very similar here. If we ask why trauma research is underfunded, there may be many reasons but one important reason is that doctors have been uninterested, so the demand for funding is low.

Mr Chairman and colleagues, I am greatly honoured and humbled to be asked to give the Maurice Ellis lecture. In a few months now, I am due to retire. I feel that, for the past 5–10 years, I have carried the torch of accident prevention for my association and specialty, most especially in the field of Road Safety. It is time for me to pass on that torch to others. Today I ask you to remember Maurice Ellis and the crusading spirit which he brought to the establishment of our specialty. It is my hope that his spirit will still burn brightly in our hearts and that the young and eager entrants to our specialty will apply their talents and his spirit to the task of making road transport safe for our children.

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