MEDICAL PRACTICE

A Modern Epidemic

Road accidents: need they happen?

BY A SPECIAL CORRESPONDENT

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In 1977 some 6600 people in Great Britain were killed in road accidents and over 341 000 reported injured.[1] The total of nearly 348 000 casualties was over 8000 more than the previous year. But the official figures, being based on police reports, actually underestimate injuries as these are not always reported.[2 3]

The waste of life is even greater than it at first appears. About half of those killed (and 58% for males in 1976) are under 35.[4] For both sexes the peak is in youths aged 15-19, who would mostly have had a long life ahead of them; the 912 road deaths in boys formed almost half the deaths from all causes. Permanent disablement has a similar age distribution. Each day in 1977 an average of 18 people were killed on the road, two of whom were children, three youths, nine in their middle years, and four over 65. Six on average were pedestrians and seven were in cars, three on motor cycles, one on a bicycle, and one in another type of motor vehicle; 10 would have died in towns and villages, seven on country roads, and one on a motorway.[1]

Preventive measures

"It needn't have happened" is a common reaction to accident and injury; and the Transport and Road Research Laboratory[5] has calculated that as many as three-fifths of casualties could be prevented. Improvements in the road environment and vehicle safety (including the use of seat belts) and effective measures to influence road users would all make a difference to the statistics —safety measures have indeed been making their mark for many years, partly by preventing accidents and partly by preventing or reducing injury. But have we the will to do better? Present efforts may create a continued slow improvement, but a different climate of opinion is needed for radical change. Some have argued that drivers, far from being safety conscious at heart, are basically aggressive and irresponsible.[6] Although the Transport and Road Research Laboratory's studies[7] have not found these traits to be an important factor in accidents, on the whole road users have little perception of risk—and in one sense correctly so, since at a given time the chance of death or injury is minute: reported injury accidents happen no more than once in every million kilometres driven.[4] We need to be more worried about the risks. This series of articles will look at some of the worrying aspects of accidents and the scope for change.

Injury and disability

The average stay in hospital after a road injury is about a fortnight,[1] but some people spend months or years there and some are never the same again. For example, a 7-year-old boy who was knocked down by a car in 1968 suffered such severe head injury that his condition seemed hopeless. Eventually active treatment ceased, but he did nevertheless improve a little. Now he can move his head slightly and the fingers of his left hand; he has no speech, though he may understand it. Nursed at home, this 17-year-old is carried about by his father.

The largest long-term study of the outcome of injury was carried out in 1969 by Gissane and his colleagues at the Birmingham Accident Hospital.[8] Of the 4342 road casualties seen in 1961, 1268 had been admitted as inpatients, about half for a brief stay. Intensive care, often for multiple injuries, was given to 349 patients. About 260 had some kind of permanent disability; in a later analysis 49 of the disabilities (brain, spinal cord, and leg injuries) were classed as severe or very severe—1·1% of the total.[9] More recent but smaller studies confirm this general pattern. A survey of road injuries seen at the Battle Hospital, Reading, for example, found severe permanent disability in 0·8% of cases.[3] Thus the likelihood of irreversible serious disability is very low; nevertheless, the actual number of people in the community who are so disabled clearly must be large—a single year's accidents could well lead to some 3500 such cases.

Different types of accidents show different characteristics in

the severity and nature of injury. Being unprotected by a vehicle, pedestrians are especially vulnerable and much more often killed or seriously injured than other road casualties. In 1976, although they accounted for only 20% of the casualties, they represented 36% of all road deaths.[4] In the Birmingham survey pedestrians and motorcyclists had more than their share of permanent disabilities.[8] In both, leg injuries predominate.[3 8] Head injuries, though common in all groups, are most frequent in vehicle occupants and bicyclists[3]; in the former, however, wearing a seat belt can reduce the risk of head injury. Motorcyclists are much less likely to suffer head injury now that crash helmets are compulsory. A report from Queensland, where the wearing of seat belts and crash helmets has been compulsory since 1972 and 1970, has shown the changed frequencies of injuries in fatal accidents since the legislation.[10] Both head and spinal injuries became less common in those who were killed, other injuries being relatively more frequent; probably higher impact speeds and, for cars, gross deformation are now required for fatal injuries.

In general, multiple injuries are a feature of serious road accidents and are increasingly frequent; compound fractures are common, fragmented bone presenting particular problems. Injuries that would not normally be life threatening on their own make death more likely when combined with other injuries.[11] Patterns of injury and approaches to road accident surgery are documented in Gögler's classic monograph[12]; this is based on the experience of the Heidelberg University surgical clinic, which has done much of the pioneering work.

Trends in death and injury rates

Road accidents have come to be referred to as an epidemic. A three-month survey[13] at the Radcliffe Infirmary, Oxford, showed them to be the commonest cause of accidental injury; they accounted for 483 of the 1417 casualties admitted to the accident service and 15 of the 24 deaths. Yet in some ways British accident statistics may seem to be encouraging. The number of deaths in 1977 was not vastly more than in 1927 (5329) and was virtually the same as in 1937 (6633); and injuries had increased less than two and a half times in 50 years. The number of motor vehicles, on the other hand, had risen from 1·7 to over 17 million.[1] In other words, although the population at risk has so greatly increased, death and injury rates have improved over the years. Both roads and vehicles, of course, have become safer; and with denser traffic has come awareness of the dangers and measures to control them. Better treatment too has helped to lower the death rate. There seems to be a general trend here[6 14]—countries that still have relatively few cars on the road, such as Yugoslavia and Portugal, tend to have high death rates[4]; and the developing countries have notoriously high rates.[15] But Britain's road deaths even compare well with those of apparently similar countries such as West Germany.[1]

Clearly, however, we cannot take comfort from the fact that our rates are better than in the past, or better than those of other countries. The real world is made up of people, not proportions, and the salient point is that more and more people are at risk. Moreover, the drop in casualties that started in 1973 at the time of the energy crisis has stopped and the figures are creeping up again. Pedestrian casualties, particularly in children, improved remarkably after 1972—there was a decrease of almost 15 000 in four years—but in 1977 they increased by nearly 3000 to over 71 000.[1] Deaths and injuries in motorcyclists have increased startlingly: the latest figure is over 64 000, nearly 22 000 more than in 1974. But the way various trends are related to specific developments in the last 10 years offers hope for the future.

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Epidemiology for the Uninitiated

Conduct of surveys

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Anyone who has attempted a study using ordinary clinical case notes knows the problems of unstandardised recording and missing information. For most epidemiological studies it is essential to have purpose-designed records.

Record design

The aims of the design are to help standardisation, speed, and accuracy in recording under field conditions, and coding and retrieval of results afterwards. Writing takes time, and, where possible, non-numerical information should be ringed or ticked rather than written out. The layout should facilitate subsequent numerical coding and data extraction, with one answer box for each item of information. Copying takes time and may introduce errors; if the record can be precoded, results may go straight to the analysis. An orderly and uncluttered layout makes for fewer mistakes, in both the field and the analysis: results should be vertically aligned on the right of the page, well separate from questions and instructions.

The record starts with the subject's serial number in the study, followed by sufficient personal identification to permit any planned follow-up (address for postal contact, full name, date of birth, and—if available—NHS number for later tracing of morbidity through general practitioners, or mortality through the NHS Central Registry). If general practitioner or hospital follow-up is envisaged, the subject's consent should be recorded on the initial record.

Records should be pretested, both in the field on representative subjects and in the office for subsequent coding and data extraction. It is impossible to foresee all the practical snags. In large studies the record design should be discussed with the statistician who will later be concerned in the analysis.

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QUESTIONNAIRES

The contrasts of clinical and epidemiological methods are epitomised by the approach to history taking. Clinically it calls for the highest skill—in establishing rapport with the patient, choice of questions, and distinguishing vague from convincing answers. In epidemiology, unfortunately, all unstandardisable skills must be excluded if comparisons are to be valid. Nevertheless, a good questionnaire is not so inferior to a clinical interview as might be imagined, for it concentrates on those few items which are most discriminating, and eliminates what is superfluous; and for these key items the questions are phrased with maximum conciseness and clarity.

Closed-ended questions, with one box for each possible answer (including "don't know"), are more readily answered and classified. Two short questions, each covering one point, are better than one longer question which covers two points at once. Questions which seem clear to a doctor may be difficult or understood differently by the subject, and pretesting is essential. Interviewers must keep strictly to the questions as printed and avoid supplementary questions if possible. Observer variation may be avoided altogether by using self-administered questionnaires.

Staff and training

In a small study the doctor himself may do all the work, but in large surveys he will need helpers. If an epidemiological examination technique requires skill and clinical judgment, it has probably been insufficiently standardised: if it is adequately standardised, it can usually be taught to any intelligent person.

The figure shows how two observers had distinct but opposite time trends in their performances during the early stages of a survey of skinfold thickness. Such training effects, which are common, should have been completed before the start of the main study: new staff need supervised practice under realistic field conditions.

Despite all precautions, observer differences may persist. Observers should therefore be allocated to subjects in a more or less random way: if one person examined, for example, most of the men, and another most of the women, then observer differences would be confounded with true sex differences. To maintain quality control throughout the survey each examiner's identity should be entered on the record—results for different examiners may then be compared.