The Relationship between Speed Restrictions and Head Injury Admissions to Groote Schuur Hospital

AN INTERIM REPORT

R. A. DE VILLIERS, J. C. DE VILLIERS

SUMMARY

An analysis of the road traffic head injury admissions to the Neurosurgery Wards at Groote Schuur Hospital over two 6-month periods showed a considerable decrease during the second period when the new speed restrictions were in force. This decrease coincided with changes in the pattern of road traffic crashes in the area drained by Groote Schuur Hospital.


Road traffic crashes are, to a large extent, a preventable cause of traumatic illness and it has been asserted by many authors that they should not be considered accidental occurrences. In the search for measures to combat the rising rate of road traffic injuries, many congresses and symposia have been held, many suggestions have been made and theories advanced on ways and means of 'accident' prevention.

In the correspondence columns of the South African Medical Journal, it has already been indicated that in this country, as in the USA and Europe, speed restrictions have brought about a decline in injuries and fatalities. It is well known that there are many factors at work in the causation of road traffic crashes. This has led some people to adopt a fatalistic or defeatist attitude to the problem of 'accident' prevention, which we in the Department of Neurosurgery at Groote Schuur Hospital deplore. Many people are killed or maimed every year despite the efforts of the medical profession to save them, but the numbers could be reduced by effective preventative methods.

Since the introduction of road speed restrictions in November 1973, we have noticed a decrease in the number of head-injured patients admitted to the wards of the Department of Neurosurgery at Groote Schuur Hospital after road traffic crashes. We therefore tried to determine whether this decreased incidence was statistically valid, and to assess the roles played by the various factors which we regarded as being responsible for this decrease.

METHODOLOGY

The problem was defined as being the determination of the relationship between the reduced speed limit and head injuries. The following factors were considered:

1. A general lowering of the speed limits throughout South Africa, from 120 kph to 80 kph for rural traffic and from 60 kph to 50 kph for urban traffic, was brought about by a proclamation in the Government Gazette in mid-November 1973, and was enforced in both the rural and the local urban areas (Table I). The general urban speed limit was increased from 50 kph to 60 kph on 26 January 1974, but the reduction in the effective speed, from 80 kph or 100 kph, on the urban motorways, where most of the serious accidents occur, was still considerable.

<table>
<thead>
<tr>
<th>TABLE I. LOWERING OF SPEED LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before limit</td>
</tr>
<tr>
<td>Rural speeds (at 8 stations)</td>
</tr>
<tr>
<td>Speeding offences at urban checks (Nov. - April)</td>
</tr>
</tbody>
</table>

2. There was a coincidental change in the pattern of occurrence of road accidents in the Cape Town municipal area and surrounding rural areas. For the purpose of this study, a 'serious accident' is one in which a person was injured or killed.

<table>
<thead>
<tr>
<th>TABLE II. CHANGE IN ACCIDENT PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before limit</td>
</tr>
<tr>
<td>Cape Town municipal area</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Western Cape serious accidents</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

3. The lowered speed limit is thought to have had a 'ripple effect' on other factors involved in accident causation (increased driver reaction time, decreased braking accidents.

Department of Neurosurgery, Groote Schuur Hospital, Cape Town

R. A. DE VILLIERS, M.B. CH.B.
J. C. DE VILLIERS, M.D., F.R.C.S.

Date received: 13 September 1974.
distances and improved 'swerveability' of vehicles) thereby bringing about an improved 'accident avoidance'.

We compared the pattern of admission to our Department during the two periods, i.e. before and after the speed restrictions, and we determined the degree of association between the lowered speed limits and the number of admissions.

**Patients**

Patients with head injuries admitted to Groote Schuur Hospital's neurosurgical wards after road traffic crashes, during the two periods, were grouped as follows:

- **Sample group:** Patients admitted during the 6-month period, 1 November 1973 - 30 April 1974, during which time the lower speed limit was operational (from 15 November 1973 onwards).

- **Control group:** Patients admitted during the corresponding 6-month period, 1 November 1972 - 30 April 1973.

The sources of data were the hospital records and the records of the Department of Neurosurgery.

**Elimination of Variable Factors**

Seasonal and climatic variations were eliminated by selection of exactly comparable 6-month periods.

The area drained by Groote Schuur Hospital was the same for both periods studied, and no new accident service was initiated in the area.

The volume of traffic in the municipal area, as determined by 3 'screenline tests' at 11 observation points on different days during the speed restriction period, showed an average drop of 3.5% (17 404 before speed limit and 16 804 after limit). Appropriate correction of the 'serious accident' statistics in the municipal area during the period does not alter validity (using corrected data: \( \chi^2 = 15.789; P < 0.001 \)).

**TABLE III. SERIOUS ACCIDENTS IN CAPE TOWN MUNICIPAL AREA**

<table>
<thead>
<tr>
<th>Nodes Period</th>
<th>Observed</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. '72 - Feb. '73</td>
<td>1471</td>
<td>1344</td>
</tr>
<tr>
<td>Nov. '73 - Feb. '74</td>
<td>1217</td>
<td>1344</td>
</tr>
</tbody>
</table>

The restriction of petrol sales to weekdays between 0600 and 1800, imposed at the same time as the speed limits, brought about no significant change in the ratio of weekend admissions to weekday admissions (43% before limit, 41% after limit).

There was no decrease in the total number of patients treated in the neurosurgery unit during the second period; on the contrary, there was a small increase—from 682 in the first period to 694 in the second period. This is in line with the general trend of admissions to Groote Schuur Hospital during the two periods.

**RESULTS**

The decrease in head injury admissions during the second period compared with the first period is shown in Table IV. There is a highly significant difference between the two periods in the total number of head injury admissions (110 before limits, 70 after limit) (\( \chi^2 = 8.888; P < 0.01 \)).

**TABLE IV. HEAD INJURY ADMISSIONS**

<table>
<thead>
<tr>
<th>Nodes Period</th>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. '72 - April '73</td>
<td>65</td>
<td>45</td>
</tr>
<tr>
<td>Nov. '73 - April '74</td>
<td>38</td>
<td>32</td>
</tr>
</tbody>
</table>

These figures parallel the decline in road traffic deaths and serious injuries both in the Cape Town municipal area, which is the area chiefly drained by Groote Schuur Hospital, and in the Western Cape and the rest of South Africa over the same periods (Table V).

**DISCUSSION**

It is interesting to note that the total hospital stay of the sample group was 1 003 days less than that of the control group, with an average hospital stay of 11 days as opposed to an average of 16 days, respectively. At the conservative figure of R25 per day (total cost of keeping a patient in Groote Schuur Hospital, excluding outpatient visits), this represents a saving of over R2 500 000 in the Neurosurgery Department alone. Alternatively, one may regard this amount as being made available to treat other patients, resulting in an improvement in medical care at no extra cost to the government (or taxpayer).

If one were to consider the cost of further treatment of the patients who are seriously injured and need prolonged physiotherapy after discharge, or those who are permanently institutionalised, the figure would obviously be far greater. In addition there is the loss of productivity, and the amounts paid in disability grants and compensation to be considered. These factors and the apparent decline in morbidity are the objects of further study.

An important question which has to be answered is why a lowering of the speed limit has brought about a profound drop in road traffic crashes. If one considered the problem from the viewpoint of host, agent and environment, with the driver, motor car and road circumstances filling these roles, it is obvious that either drivers, cars or roads, or possibly all three, were not up to the demands of the previous speed limits. At the moment, one can only speculate, but whatever the reason, the result is clear — the lower speed limits save lives.
TABLE V. COMPARISON OF DECLINES IN HEAD INJURY ADMISSIONS, SERIOUS ACCIDENTS AND DEATHS

<table>
<thead>
<tr>
<th>Serious accidents</th>
<th>Cape Town</th>
<th>Western Cape</th>
<th>National</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. '72 - April '73</td>
<td>110</td>
<td>1471</td>
<td>25967</td>
<td>4269</td>
</tr>
<tr>
<td>Nov. '73 - April '74</td>
<td>70</td>
<td>1217</td>
<td>19585</td>
<td>2804</td>
</tr>
</tbody>
</table>

We wish to thank the following for their help: Professor I. W. F. Spencer; Dr R. D. H. Baigrie, Head of the Accident Unit; Inspector J. Minnie, Municipal Traffic Department; Mr Basil E. Fernie, National Institute for Road Research; Mr C. Heezer, Provincial Road Traffic Department; and Mr I. T. Buchanan, Department of Roads, Cape Provincial Administration.

REFERENCES

22. Provincial Traffic Department, Goodwood: Unpublished data.

Influence of Road Speed Restrictions on the Incidence and Severity of Head Injuries

A. P. ROSE-INNES. C. J. G. LE ROUX

SUMMARY

A comparative survey has been made of patients with head injuries admitted to hospital in 1973 and 1974, before and after the introduction of fuel-saving measures, which included road speed restrictions. The severity and incidence of injury are shown to have decreased dramatically. It is concluded from this that the main cause of the improvement has been reduced road traffic speeds. A plea is made that they be permanently maintained.


Abrupt and striking decreases in the road accident rate, morbidity, and mortality were reported throughout South Africa after fuel-saving measures were introduced on 16 November 1973.

During the month of December 1973, the national road accident incidence decreased to 13 213 cases, compared with 19 162 cases in December of the previous year. This included a decrease of 51.4% in fatal accidents (representing 411 lives), of 45.6% in major accidents, of 39.2% in minor accidents, and of 27.1% in accidents without injury. In Cape Town, the number of road deaths during the 3 months between 15 November 1973 and 15 February 1974 fell to 37 cases, compared with 89 cases for the corresponding period a year before. On all Cape Provincial roads between December 1973 and April 1974 there were 21 609 traffic accidents with 702 deaths, in contrast with 26 588 accidents with 1 141 deaths during that period in the previous year.

This improvement was the first significant reversal of the trend of our disastrous national road accident record, which had shown a progressive rise from 3 000 deaths in 1961 to 8 661 deaths in 1972. This reduction has been maintained at a gratifying rate, even if not at those striking levels seen immediately after November 1973. The Minister of Statistics announced on 16 August 1974 that