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

AN INTERIM REPORT

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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.

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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.[1-3] 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.[4-9]

In the correspondence columns of the *South African Medical Journal*, it has already been indicated that in this country,[10-11] as in the USA and Europe,[12,13] 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.[4,14-17] 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,[18,19] 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.

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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).[20,21] (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.)[21]

TABLE I. LOWERING OF SPEED LIMITS

	Before limit	After limit
Rural speeds (at 8 stations)	**51,5 mph**	**39,9 mph**
Speeding offences at urban checks (Nov. - April)	**6 166**	**4 101**

2. There was a coincidental change in the pattern of occurrence of road accidents in the Cape Town municipal area and surrounding rural areas.[21,22] For the purpose of this study, a 'serious accident' is one in which a person was injured or killed.

TABLE II. CHANGE IN ACCIDENT PATTERN

Cape Town municipal area	Before limit	After limit
Total accidents	**7 450**	**6 392**
Serious accidents	**1 471**	**1 217**
Western Cape — serious accidents		
Passengers	**264**	**100**
Pedestrians	**177**	**73**

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

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).[21] 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

	Observed	Expected	Expected (corrected for 3,5% decrease)
Nov. '72 - Feb. '73	**1 471**	**1 344**	**1 368**
Nov. '73 - Feb. '74	**1 217**	**1 344**	**1 320**

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

	Nov. '72 - April '73	Nov. '73 - April '74
Adults	**65**	**38**
Children	**45**	**32**
Total	**110**	**70**
Deaths	**24**	**19**
Hospital stay (days)	**1 768**	**765**

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 R25 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

	Head injury admissions to GSH	Serious accidents			Deaths (national)
		Cape Town (mun.)	Western Cape (rural)	National	
Nov. '72 - April '73	**110**	**1 471**	**441**	**25 967**	**4 269**
Nov. '73 - April '74	**70**	**1 217**	**173**	**19 585**	**2 804**

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