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Motor vehicle exhaust related suicide and self harm in Australia

Paper prepared for FORS Seminar

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Key Facts

- In 1994, 444 persons (87% of whom were male) died as a result of motor vehicle exhaust gas related suicide.
- Motor vehicle exhaust gas suicide represents 7.6% of all male injury deaths and 21% of all male suicide deaths.
- Motor vehicle exhaust related suicide became more common among both males and females between 1979 and 1992. The trend, like the upward trend in suicide, seems to have levelled off over the last two years.
- The proportion of all suicides that were related to motor vehicle exhaust gas increased markedly in the early nineteen eighties for both males and females and was maintained at that high level to 1994.
- In 1992-93, 234 persons were hospitalised as a result of self harm with motor vehicle exhaust gas. Only 2% of these died. It is estimated therefore, that around 670 persons died or needed treatment as a result of self harm using motor vehicle exhaust gas.
- The greatest risk of suicide with motor vehicle exhaust gas occurs among 20 to 50 year old males
- Rates of motor vehicle related suicide death are higher than the Australian average in Western Australia and, possibly, Tasmania and the Australian Capital Territory.



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Introduction

This paper provides a background for discussions on the prevention of motor vehicle exhaust gas related suicide. It has been suggested that modifications to catalytic converters, modification to exhaust systems to prevent the attachment of hoses, and the installation of in car sensors to warn or stop the engine may have merit in reducing the incidence of this means of suicide. Death and hospitalisation data for Australia are examined to provide a description of the frequency and distribution of the problem. Comparisons are made with the success in reducing motor vehicle traffic related death. The implications of the findings in the data for planning prevention are discussed.

In most tables and charts, counts are used. Rates per 100,000 population were also calculated, but for time series add little to understanding the issue. They have been omitted for the sake of simplicity. Comparisons between states and rural and remote areas are based on rates to permit comparison of areas with different size populations. These rates are age standardised to the Australia 1991 population.



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Death

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In 1994, 444 persons died as a result of motor vehicle exhaust gas related suicide. By far the majority (87%) were male. shows the importance of this means in the overall incidence of suicide, and in terms of the injury burden in Australia.

Table 1 Key indicators of motor vehicle exhaust suicide death Australia 1994

Indicator	Males	Females	Persons
Cases	388	56	444
% of all injury deaths	7.6%	2.7%	6.2%
% of suicides	21.2%	13.1%	19.6%

While motor vehicle exhaust gas related suicide is much less common than motor traffic deaths, it still represents a significant problem (Table 2).

Table 2 Comparison of motor vehicle exhaust suicide with other major causes of death by sex, Australia 1994

Method	Males	Females	Persons
Motor vehicle traffic	1370	590	1960
Motor vehicle exhaust	388	56	444
Other suicide	1442	372	1814
Other injury	1889	1082	2971
All injury	5089	2100	7189

Age and sex distribution

Motor vehicle exhaust gas suicide is most common among males aged 20 to 50 years. The peak incidence occurs between 30 and 35 for both males and females (Figure 1). This is a little different from the age distribution of motor traffic related death which rises among 15 to 19 year olds and peaks in the 20 to 24 year age group (Figure 2).

Figure 1 Number of motor vehicle exhaust gas suicides, by age and sex Australia 1994

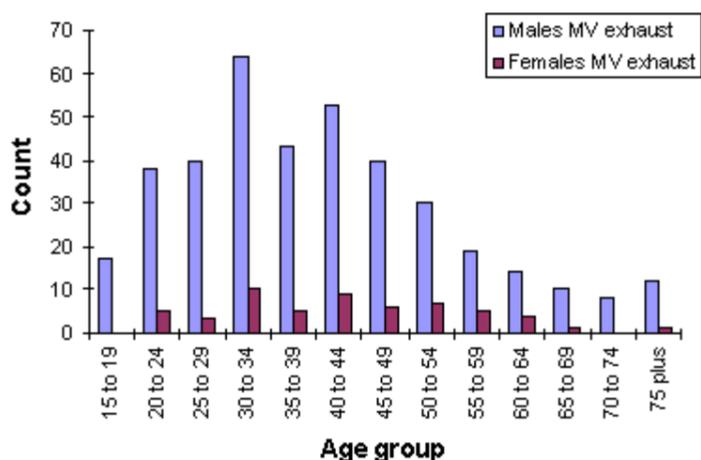
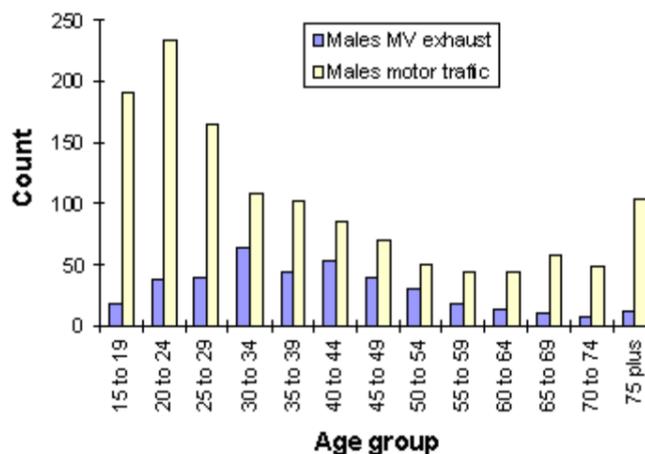


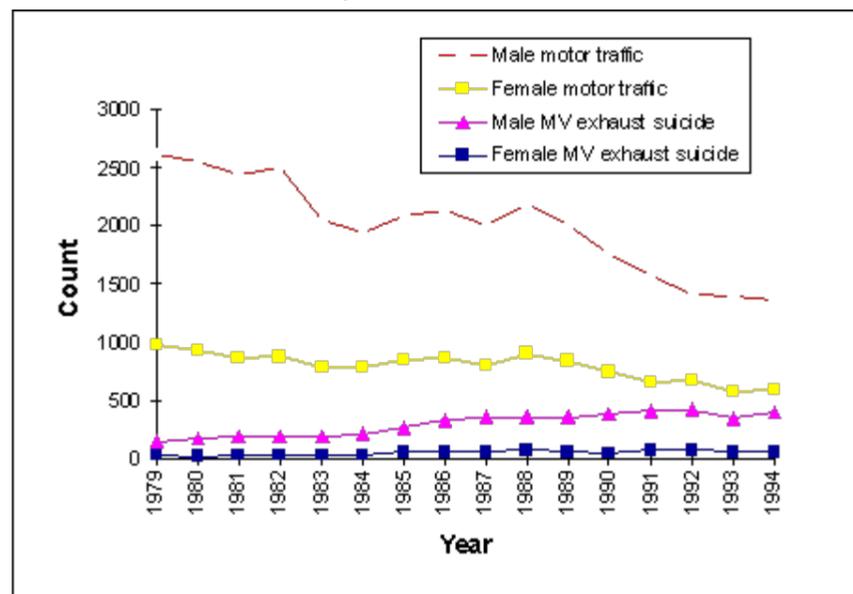
Figure 2 Comparison of age distribution of motor traffic deaths and motor vehicle exhaust suicides, males Australia 1994



Trends in death

In contrast to the successful reduction of motor traffic related deaths, there has been an increase in motor vehicle exhaust related suicide in the period 1979 to 1994 (Figure 3)

Figure 3 Trends in motor vehicle exhaust gas suicide and motor traffic deaths, by sex Australia 1979-1994



Suicide in Australia has increased during the nineteen eighties (Figure 4). For males especially, this was accompanied by increasing use of motor vehicle exhaust gas as the means of suicide. This has resulted in motor vehicle exhaust being responsible for an increasing proportion of all suicides for both males and females (Figure 5). The major increase occurred in 1984 and 1985, but the prominence of motor vehicle exhaust gas as a means of suicide was maintained at least until 1992. It is interesting to note that the fall in suicide numbers in 1993 and 1994 was accompanied by a fall in the proportion of motor vehicle exhaust gas suicides. This reflects the high lethality of motor vehicle exhaust gas where a decrease in the use of this means in suicide attempts is likely to result directly in a similar reduction in deaths.

Figure 4 Number of suicides and motor vehicle exhaust gas suicides, by sex Australia 1979-1994

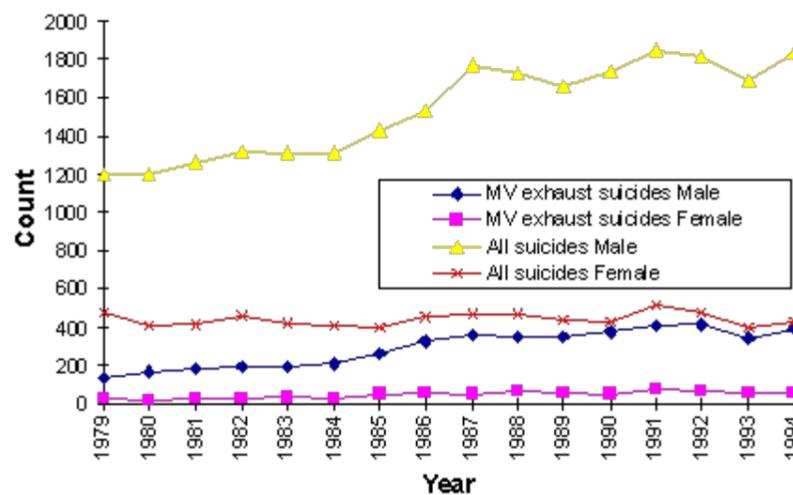
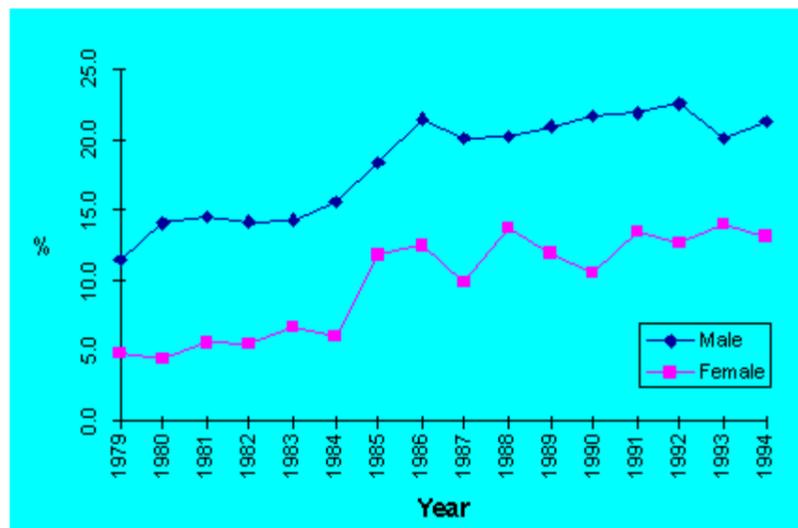
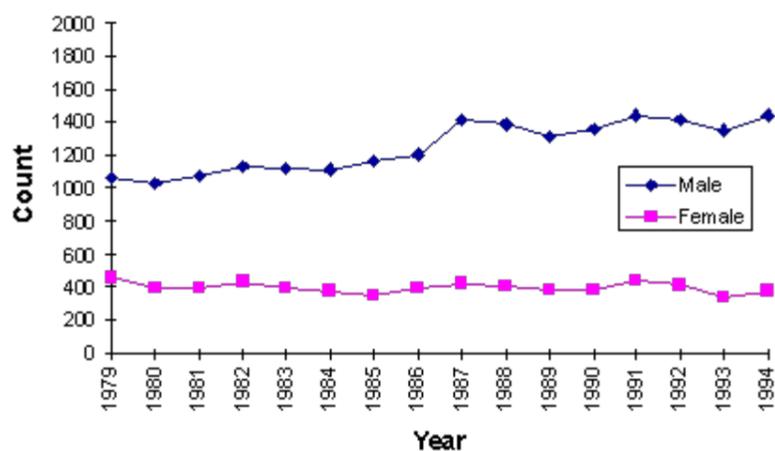


Figure 5 Motor vehicle exhaust gas suicide as a percentage of all suicides, by sex Australia 1979-1994



If, hypothetically, motor vehicle exhaust gas had been eliminated as a means of suicide, the trend in male suicide would have been less marked and female suicide would have remained relatively constant (Figure 6).

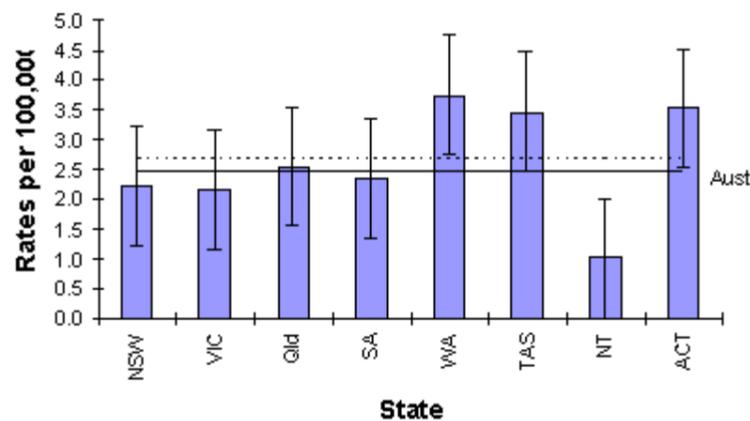
Figure 6 Number of suicides excluding motor vehicle exhaust gas suicides, by sex Australia 1979-1994



State and Territory differences

Western Australia has a significantly higher rate of motor vehicle exhaust related suicide than the Australian average. Tasmania and the Australian Capital Territory also have higher rates but this may be a consequence of variability due to small numbers of cases. The Northern Territory experiences a lower rate (Figure 7). For all means of suicide these differences are less marked.^[1] Motor vehicle exhaust gas related suicide therefore appeared to account for a higher proportion of all suicides in Western Australia, the Australian Capital Territory and Tasmania in 1994.

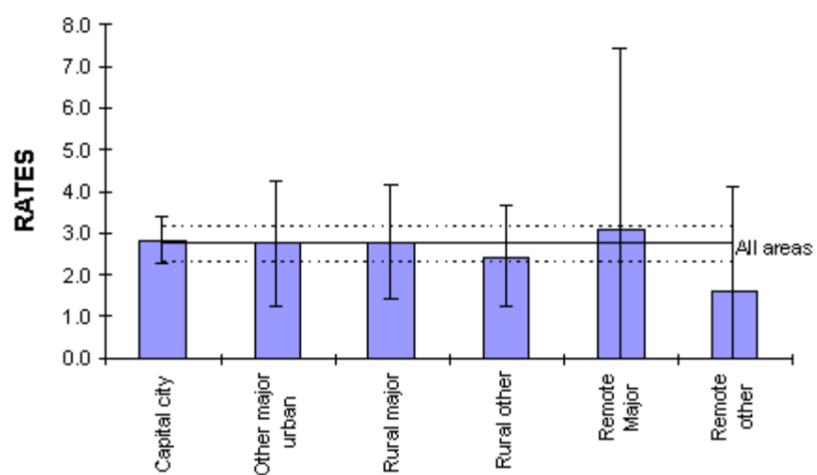
Figure 7 Motor vehicle exhaust gas suicide rates and 95% Poisson confidence intervals, persons, by state Australia 1994



Urban Rural Differences

Figure 8 Annual average rates and 95% Poisson confidence intervals of motor vehicle exhaust gas suicides, persons by type of region Australia 1990-1992

There was little difference between city, rural and remote regions in the rate of motor vehicle exhaust gas related suicide in the period 1990 to 1992. A lower rate for remote other areas is consistent with the lower rate of the Northern Territory in the state by state comparison. This contrasts sharply with the motor traffic death rate which has been shown to be much higher in rural and remote areas than in urban or near urban areas.^[2]



[1] Bordeaux S and Harrison J Injury Mortality in Australia 1994. *Australian Injury Prevention Bulletin Issue 13*. October 1996.

[2] Moller J The spatial distribution of injury deaths in Australia: urban rural and remote areas. *Australian Injury Prevention Bulletin Issue 8*. October 1994.



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Hospitalisation

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In addition to the burden of death caused by motor vehicle exhaust gas related suicide, there are a number of attempted suicides that result in admission to hospital. Table 3 shows data for Australia excluding the Northern Territory detailing how motor vehicle exhaust gas self harm compares to some other injury. Only approximately 2% of these hospitalisations result in death in hospital, and about 70% of them require admission for less than three days with an average length of stay of about 6 days. It is apparent that these represent an additional set of cases to those found in the death figures. Overall there appear to be fewer hospitalisations than deaths from motor vehicle exhaust gas self harm. Motor vehicle exhaust gas related self harm represents a smaller proportion of hospitalised attempted suicides (2%) than successful suicides (19.6%). This is likely to be the result of the lethality of motor vehicle exhaust gas as a means of suicide compared to other means.

Table 3 Motor vehicle exhaust gas self harm and other major causes of hospitalisation for injury, by sex Australia (excl. NT) 1992-93

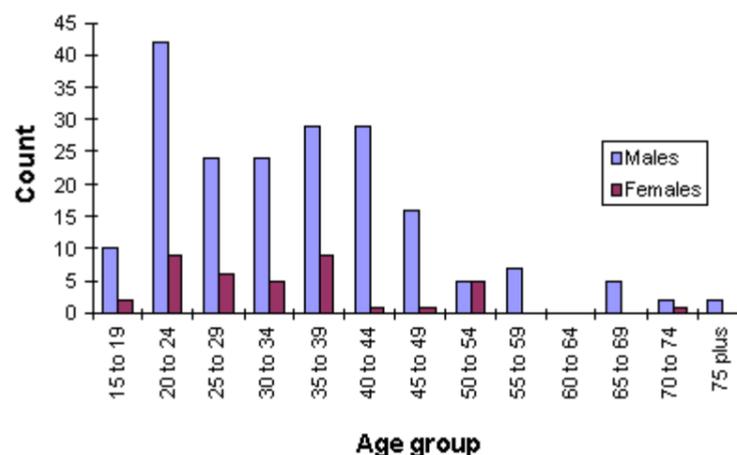
Method	Males	Females	Persons
Motor vehicle traffic	19663	10763	30426
Motor vehicle exhaust self harm	195	39	234
Other self-inflicted injury	5791	7696	13487
Other injury	220601	165161	385762
All injury	246250	183659	429909

Trend data for hospitalisation at national level is not currently available.

Age and sex distribution.

The age and sex distribution of motor vehicle exhaust related self harm is generally similar to that seen for completed suicides. It appears, however, that younger males are relatively more common among hospitalisations. This suggests that attempts among younger males are more likely to be detected before death occurs.

Figure 9 Number of motor vehicle exhaust gas self harm hospitalisations, by sex Australia (excl. NT) 1992-93



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Implications for prevention

The choice of intervention strategies must take into account the nature and distribution of the problem. The following issues need consideration:

- The main target for prevention is males 20-50 years old.
- It is possible that different strategy mixes will be required in different states due to the role that motor vehicle exhaust gas related suicide plays in some states.
- Motor vehicle exhaust is a very lethal method of suicide with a large proportion of attempters dying. There is a need to market prevention strategies in a way that does not increase the use of the method. This could include marketing sensors as a fatigue protection measure by including them in car alarms marketed for vehicle security.
- Some may argue that, if motor vehicle exhaust suicides are prevented, other means will be substituted. This is not borne out by the epidemiological evidence. The replacement of coal gas with natural gas resulted in a reduction in overall suicide rates in the United Kingdom and Australia. Similarly, the better management of barbiturates and their replacement with other less toxic medications brought a long term reduction in female suicide in Australia^[3]. Not all who attempt suicide go on to commit suicide and the control of the most lethal means is likely to be a very effective strategy for reducing suicide levels. Not all attempters will substitute another means and, if a less lethal means is substituted, the opportunity for appropriate treatment is increased.
- The mix of interventions needs to take into account the mix of vehicles driven by the main target groups. Catalytic converters are not suitable for old cars running on leaded petrol and are expensive additions to cars where catalytic converters were not original equipment. Exhaust system modifications are suitable for inclusion with maintenance replacement of older vehicles. Sensors are suitable for inclusion in the engine management systems of new cars and could be produced as part of car theft alarm systems covering older vehicles. A better understanding of the vehicle used in motor vehicle exhaust gas suicide attempts and the vehicle ownership of the highest risk groups is needed to plan the mix of intervention strategies.
- Publicity about a means of suicide can have the effect of increasing the use of the method. A silent set of interventions that change the environment is likely to reduce the risk of means substitution and enhance the impact. This parallels the engineering work already done in motor traffic safety. However, it presents a new challenge, as there will be little opportunity to back the engineering changes with publicity.

^[3] Harrison J and Moller J Learning from experience: towards prevention. In Selby H (ed). *The Inquest Handbook*. Sydney Federation Press. (Forthcoming 1997.)



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Conclusion

Motor vehicle exhaust gas related suicide is a public health problem that requires a careful but incisive preventive approach. The epidemiological data show the importance of the problem and the broad description of high risk groups. The mix of prevention strategies put in place will need to effectively deal with these risk groups. Engineering strategies are likely to be the most successful, as publicity campaigns could have the effect of increasing the rate of suicide and the incidence of the use of motor vehicle exhaust gas as a mean for suicide. A key task is to develop these strategies and find ways of implementing them in both new and old vehicles without inadvertently increasing the use of this means of suicide by identifying its effectiveness to those who are at risk.



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Data definitions

All injury includes all cases coded to an ICD 9 external causes code. Other groups are composed as follows. All deaths are presented by year of death registration and are extracted from the Australian Bureau of Statistics unit record death file.

Injury group	ICD9 External causes codes
Motor vehicle traffic	E810-E819
Suicide and self harm	
Motor vehicle exhaust	E952/0
Other	E953/0 E955/0-4 E950 E956 E951 E952/1-9 E953/1-9 E954 E955/5-9 E957-E959

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