



SUICIDE MORTALITY IN NSW: GEOGRAPHIC VARIATIONS

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This is the first of a series of articles on the epidemiology of suicide in NSW. We examine pooled suicide mortality data for Area and District Health Services from the time of the introduction of the ICD9-CM cause of death coding in 1979 to the most current complete year for which death data are available (1992). The analysis serves as the basis for considering how NSW could establish appropriate local targets and corresponding monitoring processes.

Although suicide is a major cause of mortality, it is nevertheless a relatively rare event. Even with nationwide Australian data, it would be difficult to conclude, on conventional statistical grounds, that a 10 per cent change in the general population suicide rate is more than a chance fluctuation in a stable process¹. It may be just feasible to monitor progress towards the national mental health target² of a 15 per cent reduction in the expected Australian suicide rate over 10 years, and perhaps the more specific objectives for particular target groups, but only at the national level.

On the other hand, most of the action needed to achieve these objectives will take place at the State level, where the ability to monitor change, especially in States with smaller populations, is limited. In Western Australia the State Task Force "considered the question of whether it is reasonable to set specific goals for the reduction of suicide in the general population" and decided that "current knowledge and capacity to intervene preclude this course" given that "suicide is a final common outcome of diverse disorders, risk exposures and the availability of means, and given that many of these influences have their origin outside the health system"³. Within the decentralised health system in NSW, most of the program activity will be the responsibility of Area and District Health Services, many of which have quite small populations. How, then, are we to monitor the outcomes of this activity in NSW?

One standard approach to monitoring rare outcomes in small populations is to pool data over a longer period, so that enough "population years" of risk exposure can be accumulated to allow stable estimation of baseline rates. This report is designed to show the effects of applying that approach to NSW suicide rate data at the Area and District level.

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Suicide mortality in NSW

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METHODS

Australian Bureau of Statistics suicide mortality data for Area and District Health Services were pooled over the period 1979-92 and indirectly standardised relative⁴ to the pooled data for NSW in the same period. Indirectly Standardised Mortality Ratios (SMRs) were scaled in the conventional way so that SMR=100 for NSW as a whole. This standardisation was adjusted for differences in the age-sex composition of the pooled population of that Area or District relative to the pooled NSW population. Thus an SMR of 120 for an Area or District means it had a pooled suicide rate which was 20 per cent higher than that for NSW as a whole over the same period.

Conventional 99 per cent confidence intervals were calculated for each SMR based on the usual assumption of Poisson-distributed events.

RESULTS

A total of 8,747 deaths in NSW was attributed to suicide over the 14-year period 1979-92, giving a crude pooled suicide mortality rate of 12/100,000 population a year. Data on age, sex and place of residence were complete for 8,731 deaths (99.8 per cent).

Figure 1 shows the SMRs for suicide in NSW by Health Areas and Districts and corresponding 99 per cent confidence interval error bars. The shaded area for $SMR \leq 90$ illustrates the general target range of a reduction of 10 per cent or more in the Statewide suicide rate.

Most of the SMRs fell within a fairly narrow range around that for NSW as a whole, and most of the 99 per cent confidence intervals include SMR=100, so for these Areas and Districts it cannot be concluded on conventional statistical grounds that their SMRs varied from the State average.

By contrast, Southern Sydney and South Western Sydney Area Health Services had SMRs detectably lower than that of the State as a whole, while Central Sydney and Eastern Sydney Area Health Services, as well as the Far West District, had detectably higher SMRs.

The slightly higher SMRs for Central Sydney and Eastern Sydney Area Health Services represented an average of 30 excess deaths a year in those two Areas, or about 5 per cent of the total State suicide mortality for the period 1979-92. The extremely high SMR in the Far West District, on the other hand, represents an average of 3.3 excess deaths a year, or only 0.5 per cent of the State total, since the average population of the District was 30,000 from 1979-92.

DISCUSSION

Clearly, even when 14 years of risk experience is accumulated by pooling data and conventional 99 per

cent confidence intervals are used to define random variation, the rarity of suicide makes it almost impossible to detect other than extreme variations in relatively small populations such as those of District Health Services. Even if another 14 years of pooled risk experience for, say, the period 1993-2006 were to be compared with the data shown here, only very large differences would be reliably detectable. In a single year of data, the confidence intervals would be almost four times the width of those shown in Figure 1. Thus observed changes in the annual suicide rate for an Area or District are unlikely to be useful outcome indicators for suicide prevention. It should be noted that this is equally true of other events which are similarly rare, for example motor vehicle accident deaths.

Pooling data in this way also changes the interpretation of the SMRs. The SMR estimates in Figure 1 reflect long-term influences over 14 years on the suicide rates rather than short-term factors. The excess mortality rates of Central and Eastern Sydney Area Health Services, for example, may be associated with typical chronic risk factors in inner-city areas, such as socioeconomic stresses, or a high concentration of people with disabling mental illness. Similarly, since all the Western Districts have higher than average rates, there may be common factors involved, such as isolation, and the rate of suicide in youth or Aboriginal populations would also need to be considered. There may be specific local factors contributing to the chronic high rate in the Far West District, since the bulk of the population lives in the city of Broken Hill.

In summary, the evidence presented serves to make a number of important points about ways of monitoring progress towards targets for reduction in the Statewide suicide rate. In general, it is unlikely that focusing on variation among Area and District Health Services in observed suicide rates will be a valid or useful approach. We therefore agree with the conclusion of the Western Australian Task Force on State Health Goals and Targets. Although there are particular problems which affect the populations of the three local health services, it is also clear that these are chronic, and unlikely to be easily changed. Moreover, in total they contribute only one-third of the reduction that would be required to meet the national target.

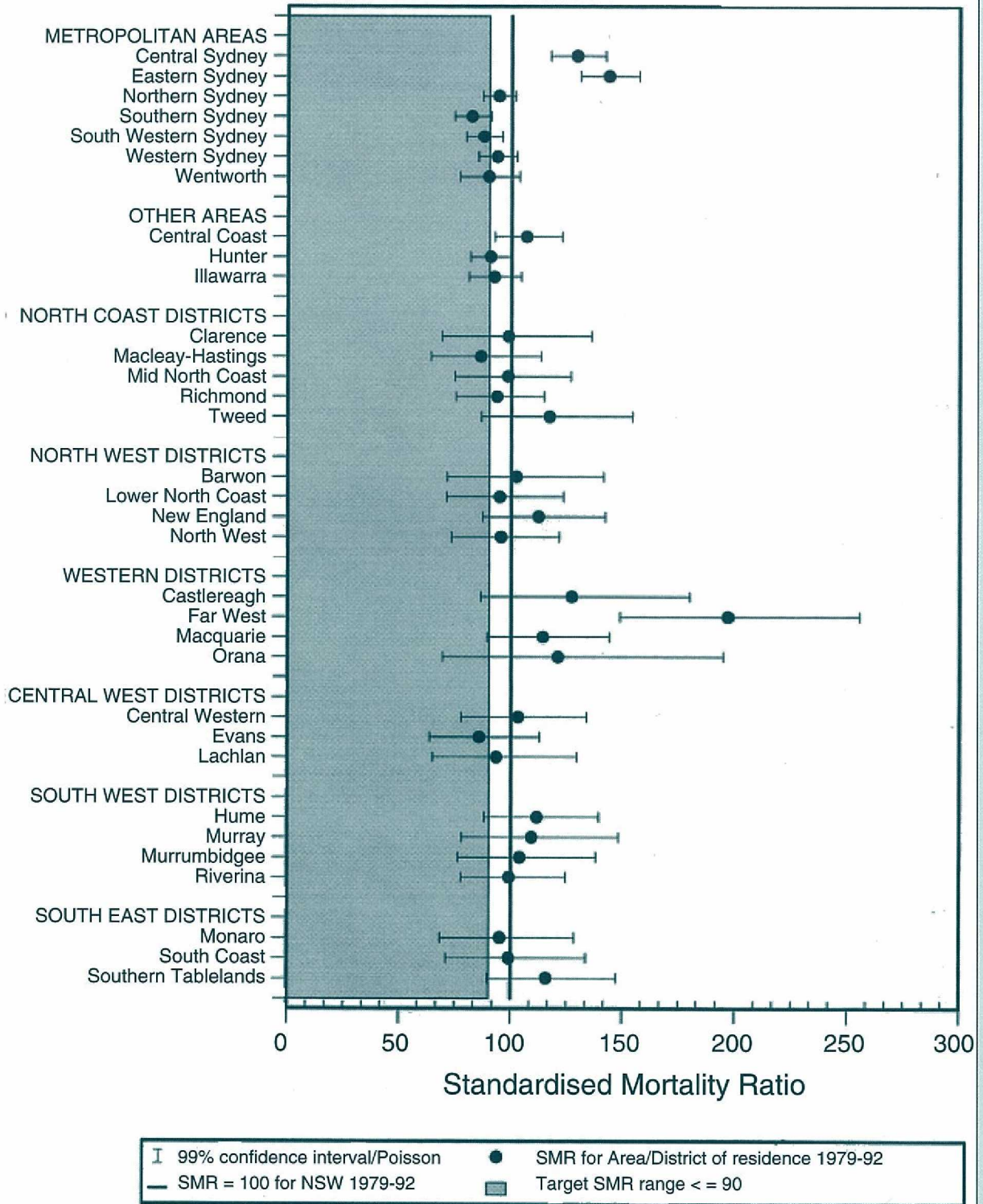
CONCLUSIONS AND RECOMMENDATIONS

The conventional approach of using 99 per cent confidence intervals around an outcome indicator to classify a particular service, or administrative unit, or population subgroup as showing "excessive" variation, is relatively useless when applied to rare events such as suicide. This is an important point, since it focuses attention on the need to find alternatives. We are considering the alternatives listed below and would

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FIGURE 1

**SMRs FOR SUICIDE
NSW POPULATION 1979-92**



Source: Epidemiology Branch, ABS deaths 1979-92, registered by 1993

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welcome comments and suggestions on any of the matters raised in this report.

Clinical audit

There are about 700 deaths by suicide each year in NSW. Ordinary data sources record very little information about these deaths, so the debate on prevention tends to repeat the same limited number of themes. The United States experience of setting goals and targets for specific population subgroups identified in this way is not encouraging. For example, in 1980 a target was set to achieve "a reduction in the rate of youth suicide to 11/100,000 from a baseline of 12.4/100,000 in 1978" but in reality "at the midpoint of this effort – 1985 – the youth suicide rate had increased to 12.9"⁵. Very few of the interventions targeted at "youth" had been evaluated, or were known to be effective.

Setting up clinical audit for all suicide deaths in NSW, and exploring the immediately preceding histories to identify possible preventive approaches, has at least as much merit as other approaches to suicide. In addition, such an approach can be developed at the local level, can address local problems, and visibly meets community expectations that suicide deaths will be given serious attention.

Control charts

There are many sophisticated procedures for monitoring rare events, mainly developed for industrial process control⁶, and these can be adapted to monitor small area suicide data⁷. However, as a recent review article in the media has shown⁸, when four teenage deaths occur over a fortnight in a small area, the local population is unlikely to await, or even accept, a statistical evaluation before wanting to take action. To be effective as a monitoring tool, the control chart approach needs to be supplemented by others which allow a more timely response.

Mental health clients

Since April 1991 the Mental Health Services Branch of the NSW Health Department has operated an incident reporting system which obtains data on possible suicides of current and former clients of mental health services, as and when these become known to the service. A separate report on these data is being prepared. Although it is difficult to relate the data to well-defined population groups, service-based information of this kind

can be useful in identifying factors that may be relevant to a group at particularly high risk⁹.

Self-poisoning patients

The Self-Poisoning Patient Research Group from the departments of Psychiatry and Clinical Pharmacy and Toxicology at the Mater Misericordiae Hospital, Newcastle, has established a specialised service which has monitored self-poisoning incidents for many years. With funding from the NSW Health Outcomes Program, this work is being expanded. Extension of it to other settings provides one of many possibilities for monitoring non-fatal suicide attempts and initiating preventive action. With about 3,500 self-poisoning incidents a year in NSW, there is also some possibility of identifying change in smaller populations or over a shorter time period.

1. Gunnell D, Frankel S. Prevention of suicide: Aspirations and evidence. *Br Med J* 1994; 308:1227-33.

These authors note that the total (unmatched) sample size needed to have 80 per cent power to detect a 15 per cent change (with two-sided 5 per cent significance level) in the England and Wales general population suicide rate of 10/100,000 people a year is 12.9 million, concluding: "Controlled clinical trial must be used where possible, although the sample sizes required to demonstrate the effectiveness of population-based interventions, targeted at such a rare event, are very large."

2. Department of Health & Human Services. Better Health Outcomes for Australians: National Goals Targets and Strategies for Better Health Outcomes into the Next Century. Canberra: Australian Government Publishing Service, 1994.

3. Dobson SK, Penman AG and 2 others. Clinical Health Goals and Targets for Western Australia, Volume 1. First Report of the Western Australian Task Force on State Health Goals and Targets. Health Department of Western Australia, Perth, July 1994.

4. The standardisation program was adapted from a SAS routine supplied by Dr Tim Churches of the Health Informatics Unit.

5. National Committee for Injury Prevention and Control (US). Injury Prevention: Meeting the challenge. Published by Oxford University Press as a supplement to the *Am J Preventive Med* 1989; 5(3):255.

6. Montgomery DC. Introduction to statistical quality control, 2nd Ed. New York: John Wiley & Sons, 1991.

7. Gibbons RD, Clark DC, Fawcett J. A statistical method for evaluating suicide clusters and implementing cluster surveillance. *Am J Epidemiol* 1990; 132:S183-191 and commentary in *Am J Epidemiol* 1992; 135:1310-1314.

8. Bagnall D. Suicide Generation. *The Bulletin*, May 23, 1995, pp 16-19.

9. Goldacre M, Seagroatt V, Hawton V. Suicide after discharge from psychiatric inpatient care. *Lancet* 1993; 342:283-86.

EDITORIAL NOTE

The authors of this article have established a Mental Health Epidemiology Group (MHEG). Membership is open to people with a professional interest and expertise in mental health epidemiology and who contribute to the planning and publication of a series of publications and reports on important mental health topics. Articles are joint publications by the group as a whole, and authors are listed in order of their contribution to the particular report. The contact address is Mental Health Epidemiology Group, Public Health Division, NSW Department of Health, Locked Mail Bag 961, PO North Sydney 2059 (Fax: 391-9232, Internet email: gstew@gwsm.doh.health.nsw.gov.au).