

ACUTE POISONING AND ITS PREVENTION

BY

J. D. P. GRAHAM AND R. A. N. HITCHENS

*From the Department of Pharmacology and the
Department of Social and Occupational Medicine, Welsh National School of Medicine, Cardiff*

Since the second world war, despite efforts to control the situation, there has been a substantial increase in mortality and in hospital admissions attributed to poisoning. Some part of this almost certainly represents a real increase in incidence in the general population. This has attracted attention from the viewpoint both of medical care (Dooley, 1962; Goulding and Watkin, 1965) and of prevention (Kessel, 1965). Not only "suicidal" but also "accidental" fatalities have increased; and Dooley (1962) showed from the National In-patient Inquiry in the years 1955-9 that hospital admission had increased as much from aspirin poisoning as it had from poisoning with prescribed medicines. He also pointed out that an upward trend had occurred in other countries. This indicates that, while over-prescribing, ready availability of sedative drugs through the National Health Service, and changing reactions to mental stress may each be important, none is the sole answer.

Suicidal fatalities are the main problem and the extent to which an impact can be made on these is the crucial preventive question, especially since, with a change of behavioural pattern, the temporal increase in poisoning deaths has been partially offset by a reduction in other methods of suicide.

Moreover, if suicidal rates are primarily determined by cultural and socio-economic factors, a campaign against one method could merely mean replacement by another. Stengel and Cook (1958) have drawn attention to the subtle relationships between successful and attempted suicides and underlined the possible fallacies of considering all self-administered poisoning episodes as a homogeneous population and of relating increases in the total to increases in deaths.

The extent of possible impact by a preventive campaign on suicidal deaths is therefore arguable, but the size of the problem warrants an empirical approach.

SOURCES AND NATURE OF THE DATA

These comprise all admissions for poisoning to hospitals in the Cardiff area from 1950-65. Cases of alcoholism and adverse reactions to drugs were excluded. Relevant items were abstracted from each case history by a medically-qualified research assistant under the supervision of one of us (J.D.P.G.). In addition to the recording of factual information, cases were divided into four categories: accidental, suicidal (serious attempt), suicidal (gesture), and suicidal (undetermined), the last three assessments being based on the opinion in retrospect of a consultant psychiatrist. In some the attribution of a fatality was clear (*e.g.*, a suicidal note was left or an accident occurred at work), but in about one-third of fatalities no confident classification could be made. A negligible number of non-fatal episodes was doubtful as regards the accidental or suicidal context. Consideration in the present communication is confined to Cardiff residents of whom virtually all at risk would enter the hospitals included in the study.

For simplicity of exposition, in view of these categories defined by psychiatric assessment, the older nomenclature of "attempted suicide" is used in description of the data, but in discussion the more correct term of "self-administered poisoning" introduced by Kessel (1965) is employed.

CATEGORIES AND TRENDS

Over the whole period, 2,484 patients were responsible for 2,702 admissions. Deliberate poisoning episodes (1,736) exceeded those which were accidental (966) and 42 per cent. of the former were regarded after psychiatric assessment as serious suicidal attempts (Table I, opposite). This high proportion probably reflects clinical caution.

Fig. 1 (opposite) shows the trend in the rate of hospital admissions, distinguishing "suicidal" and "accidental poisonings" separately. For both

TABLE I
NUMBER AND NATURE OF HOSPITALIZED
POISONING EPISODES
Cardiff Residents, 1950-65

Nature of Episode		Number	Percentage	
			Suicidal	Total
Suicidal:	Serious attempt	731	42	27
	Gesture ..	696	40	26
	Doubtful ..	309	18	11
	Total	1,736	100	
Accidental	966		36
Total	2,702		100

TABLE II
PATIENTS DISTRIBUTED BY AGE* AND SEX ACCORDING
TO CATEGORY OF SUICIDAL ATTEMPT
Cardiff Residents, 1950-65

Age (yrs)	Suicidal Serious Attempt		Suicidal Gesture		Suicidal Doubtful		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
< 15	—	—	4	6	—	—	4	10
15—	25	45	60	207	25	38	110	290
25—	79	166	79	210	41	60	199	436
45—	92	150	19	44	25	54	136	248
65+	29	50	3	3	12	11	44	64
Total	225	411	165	470	103	167	493	1,048

* In the case of multiple admissions, age at the first episode.

categories the increase over the 16-year period has been considerable, but the phasing was somewhat different with an actual divergence from 1957 to 1962. It is problematical how much of the increase is to be attributed to a real rise in community incidence of poisoning, but contrasting features of the trends would suggest that changing policies of hospital admission are not solely responsible.

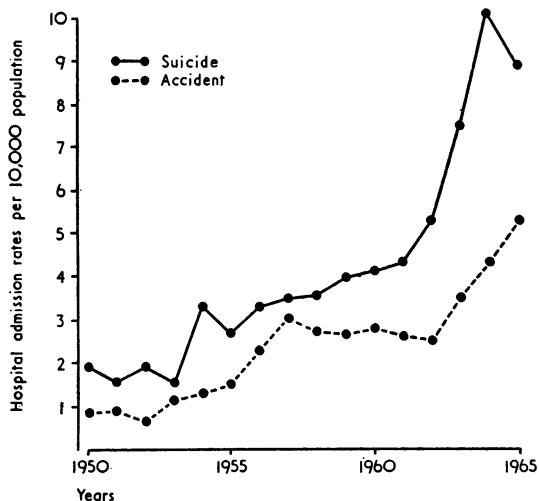


FIG. 1.—Trend in hospital admission rates for poisoning of Cardiff residents, 1950-65; distinguishing "suicidal" and "accidental" episodes separately.

AGE AND SEX

Non-fatal self-poisoning episodes tend to be regarded as mainly calls for help and to be characteristically the behaviour of the young and especially of young women. Table II shows an overall female excess; young people under 25 make a very substantial contribution to the case load, but in fact the biggest contributions both for men and for women is in the age group 25-45.

However, relating the data to the population at risk, Fig. 2A (overleaf) shows the incidence to be at

its highest in the younger age groups, very markedly so for women. The peak for women is at 15 to 25 and for men at 25 to 35. After 35 there is a decline in women continuing sharply until ages 55-65 and followed by a levelling off; in men the rate remains almost uniform from 35 onwards.

The pattern closely resembles that found by Kessel (1965) in Edinburgh. A separate analysis of the last 5 years' experience reveals rates more closely resembling his, the mean rate per 100,000 for young women aged 15-25 being as high as 194. Both sexes and all ages have shared in the increased frequency of admission, but the rise at ages 65 and over has been small. The greatest proportionate increase has been for young men aged 15-25 and for older women aged 55-65.

Fig. 2B (overleaf) shows separately the admission rates for patients considered psychiatrically to have made serious attempts. The overall female excess is 15 per cent. lower than for all episodes and there is a striking difference in age structure. Episodes in the very young of both sexes are usually not thought to be serious. The marked bimodality would suggest that psychiatric considerations such as schizoid conditions in adults aged 25 and over and depressive illnesses in later middle age weigh heavily in retrospective appraisal.

In some respects the pattern is intermediate between pure gesture and fatality. Rather more than half the cases were aged 45 and over and at this age the female suicidal death rate from agents which preponderate in hospital experience—barbiturate and salicylates—is somewhat higher than the male. However, the Registrar General's Mortality Statistics show no bimodality corresponding with this pattern (Registrar General's "Annual Statistical Reviews").

MULTIPLE EPISODES

Where there was discrepancy the psychiatric assessment of the last incident was used for classification.

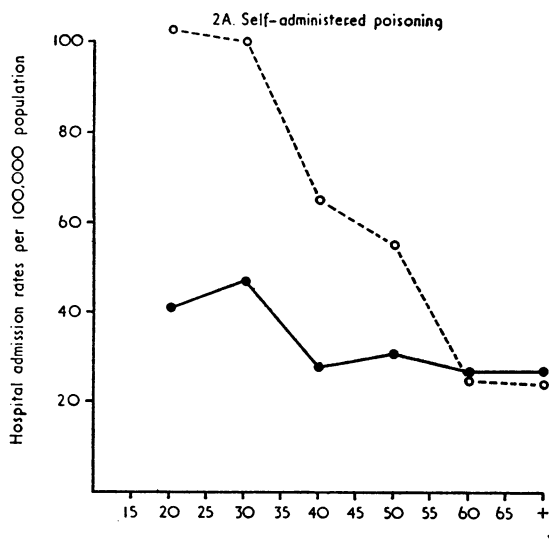


FIG. 2A.—Hospital admissions (persons) for self-administered poisoning by age and sex. Cardiff residents, 1950–65. Mean annual rates per 100,000.

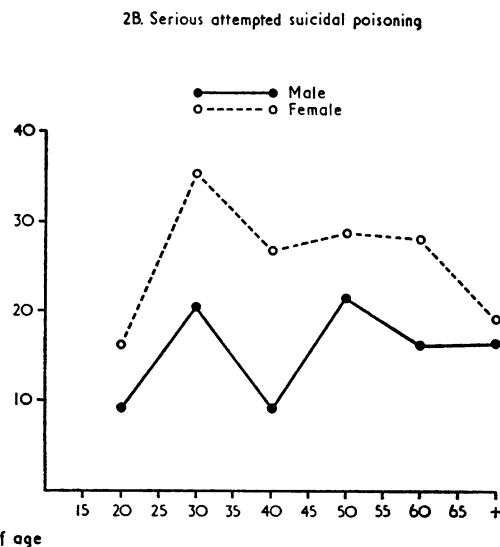


FIG. 2B.—Hospital admission rates (persons) for "serious attempt" suicidal poisonings by age and sex. Cardiff residents, 1950–65. Mean annual rates per 100,000.

1,541 patients were responsible for the 1,736 episodes. 14 per cent. of the serious attempts, 7 per cent. of the gestures, and 11 per cent. of the doubtful group were admitted on more than one occasion, but the mean number of admissions per patient in each group differed little, being respectively 1.2, 1.1, and 1.2. It is unlikely therefore that this was a major criterion in psychiatric assessment.

PHYSICAL STATE

A significant organic illness was reported to be present in 20 per cent. of the total and this characterized not only the serious attempt and doubtful groups, where about a quarter were affected, but also the gesture group to the extent of 12 per cent.

Men (26 per cent.) were more often sufferers than women (17 per cent.), a difference significant at the .01 level. The conditions involved were more frequently painful and uncomfortable (such as peptic ulcer) than lethal or disabling (such as malignancy or arthritis), but there were twenty cancer patients in the serious attempt group. An association of organic illness with suicidal attempts has been previously reported (*e.g.*, by Stewart, 1957). In some individuals a painful condition may initiate or exacerbate depression leading to such an episode.

MENTAL STRESS

Table III shows that 26 per cent. of patients had been under psychiatric care and a further 38

TABLE III
HISTORY OF PREVIOUS MENTAL ILLNESS

Mental State	Suicidal						Total	
	Serious Attempt		Gesture		Doubtful			
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Previous psychiatric treatment	240	37	94	15	77	28	411	26
No previous psychiatric treatment but history of depression	255	39	156	24	59	21	470	30
Other behavioural disorder, functional or organic	38	6	59	9	31	11	128	8
No known previous mental abnormality ..	83	13	329	51	88	32	500	32
Not known or not stated	36	5	7	1	21	8	64	4
Total	652	100	645	100	276	100	1,573*	100

* The discrepancy in the total is due to a small number of patients falling into more than one category.

per cent. were known to have been suffering mental illness of one kind or another—mainly depression—before the poisoning episode. For the serious attempt group these figures were higher—37 and 45 per cent. respectively. It may well be that some patients were recognized by relatives to have been depressed only in retrospect, but even so the proportion of foreseeable episodes must have been high. The proportion with a history of previous psychiatric treatment was higher than that reported by Capstick (1960) in his series of suicidal deaths in Wales.

FORMS OF STRESS

The nature of stress cannot be assessed accurately from retrospective examination of routine hospital records, but an estimate both of cases where stress was known to have been present and of the commoner precipitating factors was possible in a high proportion of the present cases.

Table IV shows mean annual rates in two broad age-sex groups for the commoner types of problems. Marital disharmony and other domestic upsets are very important in younger women and for both sexes decline markedly with age. Bereavement, not numerically important in this context, shows, expectedly, the reverse trend. Other features are less expected. Unexplained episodes increase markedly with age despite there being a much higher proportion of cases adjudged to be serious attempts. It is hardly likely, therefore, that this is due to poorer case recording and suggests that at older ages self-poisoning is less predictable, that the reasons for it are either subtler or more impulsive, and that older people are less willing or able to

communicate their intimate feelings. Also unexpected is a suggestion that at ages 55 and over marital disharmony may become more traumatic for men than for women. Seventeen out of 26 cases were male, in striking contrast to the sex ratio in younger people. At ages 65 and over, nine out of eighteen cases in which bereavement was the reason were males, despite the much higher male mortality rates. These last two findings were not numerically important in the context of the present series, but may possibly be pointers to motivation in suicidal fatalities.

SOURCE AND NATURE OF AGENTS

Prescribed medicines accounted for more episodes than any other class of substance, a fact which underlines homilies on the problems of prescribing. It is nevertheless important that proprietary drugs—mainly aspirin—accounted for some 29 per cent., a problem which presents greater difficulties of control.

Fig. 3 (overleaf) shows the causal agents of "suicidal" and accidental poisonings. Barbiturates, salicylates, and coal gas together account for nearly 70 per cent. of the "suicidal" group. Accidental poisonings are an indication of availability and by contrast with the suicidal group only 39 per cent. were due to these agents. The noteworthy excess in the serious attempt group of coal gas episodes is an indication of public awareness of lethality and this probably applies also to barbiturates. The steeply additive effect of alcohol on the lethality of barbiturate is wellknown to the medical profession, but this awareness is not reflected in the relation of alcohol to seriousness of attempt. The true incidence of coal gas poisoning is not revealed in hospital experience because of its rapidly lethal effects.

Age, sex, organic disease, and psychiatric assessment of episode were each related to agent, but of course were also inter-related. Salicylates were associated with youth, gesture, and physical health, barbiturates with ageing, determination, and organic disease. Women more frequently resorted to barbiturates than men.

MORTALITY

It was possible to inspect records of the inquests held by the Cardiff Coroner for the years 1954–65. Of the suicidal deaths from poisoning, it was especially noteworthy that, while 38 per cent. of those due to salicylate and 22 per cent. of those due to barbiturates occurred in hospital, only 4 per cent. of the deaths due to carbon monoxide did so.

TABLE IV
SELF-POISONING ADMISSIONS (PERSONS) IN
TWO AGE GROUPS, BY SEX
Cardiff, 1950–65, Mean Annual Rate per 100,000

History of Stress	Male		Female	
	15–45 yrs	45 yrs +	15–45 yrs	45 yrs +
Marital disharmony ..	10.2	4.5	32.6	5.1
Other domestic conflict	3.6	2.2	19.4	5.0
Bereavement	0.4	2.2	2.1	3.8
Other stress or misfortune	14.7	6.0	25.9	5.2
Reproductive association*	—	—	7.3	0.8
No history of stress ..	6.9	10.6	9.9	15.5
Not stated	5.7	3.6	5.7	4.7
Total	41.5	29.1	102.9	40.1

* Menstrual tension, menopausal symptoms, pregnancy, etc.

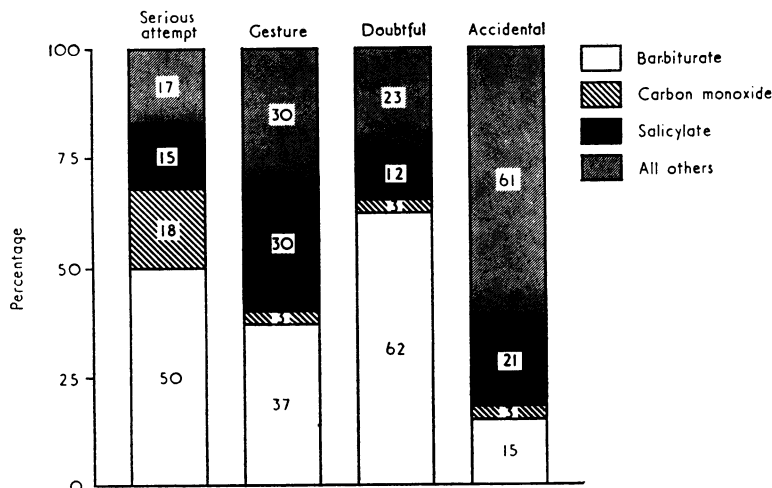


FIG. 3.—Proportionate distribution of agents: suicidal categories and accidental poisonings compared.

DISCUSSION

The preventive problems posed by self-administered poisoning are the reduction of suicides and the prevention of episodes. That these problems are not the same has been pointed out especially by Stengel and Cook (1958), who have put forward the hypothesis that suicide and attempted suicide identify two distinct populations, over-lapping only in the sense that a minority of the latter may later join the former. An alternative hypothesis is that there is one population with a continuous spectrum of motivation ranging from pure gesture to absolute determination with the "centre of gravity" moving with age and varying as between the sexes. This would be analogous with other biological phenomena. Whether or not this latter concept has substance, in relation to poisoning four other relevant factors have perhaps received insufficient attention:

Outcome depends on dosage, lethality of agent, and quickness of action, as well as on motivation;

Case fatality for any given dosage of a sedative tends to increase with age in older adults;

Complications not directly related to poisoning also tend to increase at these ages;

Social contacts may lead to rescue and in this respect the solitary are at a disadvantage.

Moreover, the relative lethality of common poisons is probably not well known to lay people. Often therefore fatal carbon monoxide poisoning of an elderly person may say as much for his social circumstances and the lethality of the agent

as it does for his misery and determination, while, conversely, successful treatment of barbiturate poisoning in a young woman will reflect social and pharmacological as well as psychological factors. Psychiatric studies of "survivors" usually suggest, no doubt correctly, that they were undecided, but were it possible to analyse the motives of those whose poisoning was fatal, many of these might also have been shown to have been basically irresolute. The evidence so far accumulated suggests that reduction in the carbon monoxide content of coal gas has recently reduced suicides due to this agent (Registrar General's "Annual Statistical Reviews". England and Wales; and Scotland) and by so doing has made an impact on total poisoning deaths and on total suicides. Prevention of fatalities as well as of non-lethal episodes would therefore seem practicable. Moreover, evidence from the present study shows that, in hospital cases, the characteristics by age and sex of the attempts psychiatrically judged the more serious are intermediate between gesture and fatality. This would be expected if some were true potential suicides.

If it is accepted that at least some impact could be made on fatality, it would still be desirable to reduce the number of episodes of self-administration because of complications, unforeseen effects, and the expense and in some cases complexity of treatment.

The present study throws light on the potential of some preventive methods advocated or envisaged. These are broadly of three kinds: by medical action; by control of the agent; and by social progress.

As to the first, one suggestion made by Kessel (1965) is that improved appraisal of emotionally-charged situations affords a challenge to the family doctor; and that more effective screening of patients from this standpoint would be revealing. The case histories here presented show certain factors apart from age and sex to have been ostensibly related to self-administered poisoning: emotional conflicts brought about by marital disharmony, bereavement, and financial and related problems, and the not infrequent presence of an uncomfortable organic illness. Whether the last two factors characterized the poisoning patients more than might be expected in the population at large could only be ascertained by reference to a control group and here the difficulties of evaluating subjective criteria in designing a study would probably be insuperable. The supposition from a preventive angle is first that the family doctor would readily get to know of high risk groups so defined, secondly that he could identify those likely to succumb to stress, and thirdly that having identified them adequate care would prevent poisoning.

Organic illness apart, it would seem unlikely that family doctors would necessarily come to know of more than a small proportion of their patients with family or social difficulties. But once he is aware of a problem, the high proportion of the patients in the present series who had actually been psychiatrically referred, apart from those who must have been under general practitioner surveillance, suggests that both identification prior to poisoning and attempts at support are much more frequent than might be supposed. It is true, as is usual with such situations, that failures come to light while successes go unrevealed, but even so the surprisingly large numbers already known and treated medically lend little confidence to the preventive potential of medical care under existing circumstances; and the fact that a considerable number had been under psychiatric supervision would suggest that something more than improvement in existing methods is required. A more specific approach is needed which might include publicity campaigns to alert relatives to the problem of depression and emotional instability; a strengthening and more effective deployment of social workers in the mental health and domiciliary medical services; and the encouragement of voluntary organizations such as the Samaritans, especially when the effect of the Mental Health Act, 1959, has shifted emphasis of treatment from hospital to community. The conjunction of the high proportion of patients under previous psychiatric care with the especially rapid rise in admission rates after 1961,

when this change of policy was gaining momentum, may be significant.

More immediate benefit might result from the control of agents. One important problem—carbon monoxide in coal gas—outside the medical purview is already in hand. Barbiturates and aspirin are the main problems (figuring in this study as elsewhere) which remain. In regard to the former, a much more vigorous emphasis is needed on the dangers of over-prescribing and wherever possible of the need to exhibit less potentially lethal drugs when sedation is required. The effective control of aspirin is a more difficult problem, but it would be possible to put aspirin on the ethical list and replace free sale with paracetamol or some other less toxic agent.

Finally, some might think because suicide is known to be related temporally to adverse socio-economic conditions (McMahon, Johnson, and Pugh, 1963; Registrar General, 1961; Kessel, 1965) that, as a by-product of social advance, both problems might solve themselves. This is not so. While social conditions have steadily improved since the second world war, poisoning episodes and, until recently, fatalities have increased. It has to be remembered that cultural and sociological factors influence suicide rates, as is witnessed by their wide international variation (WHO, 1965), and also paradoxically that in England and Wales the highest social class is one of those at special risk (Registrar General, 1958). Affluence is no safeguard. If therefore prevention is to be taken seriously it must be by deliberate efforts of a much more pointed kind, such as those indicated above.

SUMMARY

The characteristics of 1,541 Cardiff residents, admitted to hospital for self-poisoning over the period 1950–65 are described.

The main findings are:

- (1) There has been a steady increase in admissions for acute poisoning throughout the period.
- (2) Women and young people are at special risk.
- (3) Psychiatric assessment in retrospect divided the patients into three groups based on motivation. The "serious attempt" group differed from the "gesture" group in that it contained a higher proportion of men and of older people.
- (4) 20 per cent. of patients had an organic complaint at the time of the poisoning episode.
- (5) 26 per cent. had been under previous psychiatric care and a further 38 per cent. were known to relatives to have been depressed.

- (6) Barbiturates accounted for nearly half the episodes; salicylates and coal gas were the other two main agents used.
- (7) Most of the deaths in Cardiff which followed a suicidal episode occurred outside hospital. This was especially so for coal gas poisoning (96 per cent.).
- (8) The findings are discussed in relation to possible preventive measures.

This study was supported by a grant from the Welsh Hospital Board and acknowledgements are made both to the Board and to its Research Committee. The authors are also indebted for help in compilation of the data to Dr Ruth Powell.

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