J Forensic Sci, Apr. 1974, Vol. 19, No. 2

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On the Improvement of Suicide Determination

Simply stated, suicide is intentional self-destruction. It is tempting to think of it as a clear-cut phenomenon with discrete borders. But every medical examiner and coroner knows the problem of deciding intent when the blood alcohol level is high and the barbiturate level low. The presence of a suicide note, verified to be in the victim's handwriting, may be accepted as reliable proof of suicide. But a note is found in no more than one third of cases judged to be suicide [*1,2*]. The criteria employed in the remainder of cases are unstated, although physical circumstances at the scene and toxicologic findings must be assumed to carry much weight. No set of established criteria or indices exists to guide the decision.

In the past 15 years three careful studies of consecutive suicide verdicts [*3–5*] have searched systematically for a broad range of information concerning the antecedents of and circumstances surrounding a total of 348 suicides. From them it is possible to identify a number of features characteristically or commonly associated with suicide. They go well beyond the familiar demographic variables which are of so little help in decision making. Although population prevalences of these characteristic features have not been established, common experience would lead one to think they are more common in suicides. For example, about two thirds of suicides have previously communicated their intention to others. Roughly one third have a history of suicide attempt. Most have exhibited symptoms of depression, alcoholism, or both. Most have recently been under the care of a physician. Many have experienced recent disruption in their living patterns or interpersonal relationships or both. Most have exhibited a recent change in their behavior. Some clearly departed from their usual routine on the day of death, thus, in retrospect, giving evidence of carrying out a preconceived plan.

The question of whether something could be added to the medical examiner's decision making process by introducing personal and social information of this type was addressed by Litman et al [*2*]. A team of experts in the field of suicide examined 100 consecutive cases of "equivocal suicide" in the jurisdiction of Dr. Theodore Curphey, formerly Medical Examiner of Los Angeles County. After elaborate investigation, including numerous personal interviews, the conclusion was that 55 percent of these equivocal cases should be certified as suicide. This does not represent a net increase of 55 suicide verdicts

This study was supported in part by U.S. Public Health Service Research and training grants MH-05938, 13002, and 18911, and Bi-State (Missouri-Illinois) Regional Medical Program grant No. D4–1.
Received for publication 3 May 1973; accepted for publication 25 July 1973.

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(among roughly 1000) but, rather, includes both confirmation and revision of tentative determinations, only some of which would have been left undetermined. The study illustrates the value of having extensive personal data concerning the victim. But such detailed investigation is quite beyond the practical means, if not the needs, of the average medical examiner's or coroner's office.

The present study was undertaken with practical considerations in mind. Ideally, investigative methods should be simple, uniform, unambiguous, and concerned with readily obtainable information. It has been our experience [*1,3,6,7*] that most of the items of personal and social information that distinguish suicide from other deaths are readily obtainable simply by asking relatives and physicians. However, this information is not uniformly found in death investigation records. Since the St. Louis County[5] Medical Examiner's field investigators nearly always contact relatives and often physicians in cases of possible suicide, we asked these investigators to systematically ask such questions in addition to their usual investigation. We wished to test two hypotheses: first, that *systematic inquiry would increase the amount of specific information available to the medical examiner*, and second, that *increased personal and social information would be inversely correlated with the number of open verdicts*, that is, that uncertainty as to manner of death would be reduced.

Method

The present study is the second effort on the part of the St. Louis County Medical Examiner's Office to improve data collection in cases of possible suicide. In the first step, the St. Louis County Coroner's Office (under former St. Louis County Coroner, Raymond I. Harris) adopted in 1967 a standard report form for police to use in investigating attempted and completed suicides [*6*]. This form included 12 personal and social items that are characteristic, to one degree or another, of suicides. For the present study we selected 20 personal-social items that are characteristic, to one degree or another, of suicides (Table 1). This list includes the 12 items already inquired by the police. These are marked by an asterisk. A copy of the present inquiry form is reproduced in Fig. 1.

Although information concerning the listed items had often been sought previously, it had not always been recorded. This was particularly true for negative responses. However, an item for which a notation is not made cannot be taken as a negative. It can only be regarded as unknown. The emphasis in the study period was on both positive and negative information being recorded systematically. The special form was to be filled out in all cases where suicide was considered to be a possibility.

The new form was first used on 21 Sept. 1972. Data on all nonnatural death investigations in St. Louis County for a period of three months from that date were abstracted. In order to test whether additional personal-social information was in fact obtained during the study period, and whether it makes a contribution to the outcome of the decision making process, comparable data were abstracted from all nonnatural death cases for the same three-month periods in 1971 and 1970. These constitute the control period. During all three years the basic investigation forms had remained the same, as had most of the personnel of the medical examiner's office.

A nonnatural death investigation report might include the following items: a report by a legal investigator from the medical examiner's office, a pathologist's report, a toxicological report, a copy of all police investigative reports, and a summary of the investigative pro-

[5] St. Louis County, an area of 406 square miles, has a population of nearly one million persons. It surrounds the City of St. Louis on three sides but is politically and administratively separate from the City. St. Louis County has the first medical examiner system in the state.

TABLE 1—*Personal and social variables believed important in determination of suicide.*

[a] Recent medical care
[a] Treatment for nervous condition
Treatment for depression
[a] Treatment for medical-surgical illness
History of nervous breakdown
History of psychiatric hospitalization
[a] History of suicide attempt
[a] History of suicide threats
[a] Unhappiness noted
[a] Depression noted
Upset noted
Change in marital status, past year
[a] Change in employment circumstances
[a] Trouble with significant others
[a] Interpersonal trouble, home
Other troubles
Recent change in behavior
Unusual behavior, day of death
[a] Isolation at time of event
[a] Suicide note

[a] Denotes item previously included in St. Louis County Police Investigation Reports.

cedure with a verdict and a copy of the death certificate. Not all of this information was present in every case. A total of 62 items were abstracted from the medical examiner's inquiry report and coded for purposes of the study. After training with the code, two coders independently coded three cases. Absolute agreement was obtained on 98.3 percent of the items. The coded data were computerized for statistical handling. A narrative abstract was made of each case for more detailed examination.

Results

During the three-month study period, the special report form was used in 27 cases. These included all 20 cases receiving a suicide verdict, six cases receiving an open verdict, and one case judged to be accidental death. The form was not employed in 68 accidental death investigations, eleven homicide investigations, or six investigations culminating in an open verdict. In order to evaluate the relationship of the personal-social variables listed in Table 1 to the verdict, a score based on the number of those variables with a definite answer (yes or no) was compiled. A two-way analysis of variance by verdict and year was computed (Table 2). Cases receiving a suicide verdict in the experimental period (21 Sept. to 20 Dec. 1972) had significantly more items from Table 1 answered (whether positively or negatively) than did cases with this verdict from either of the two comparison periods in 1971 and 1970 (t test: probability, $p < 0.01$).

Accident and homicide cases are investigated in a substantially different way than are possible suicides. Far less personal and social information is gathered by the medical examiner's office. The difference in the amount of information by verdict is highly significant ($p < 0.001$). The amount of such information recorded in accident and homicide cases was not increased for the experimental period (1972) as compared to the control periods of 1971 and 1970. This is shown by the significant year-by-verdict interaction ($p < 0.001$) and the nonsignificant main effect due to year. In other words, the medical examiner's office did not operate differently in 1972, except with respect to suicides and open cases. Verdict accounts for 48 percent of the total variance.

CASE # _____

INDEX OF INVESTIGATIVE SUSPICION OF OTHER THAN NATURAL DEATH

(Continued from page 3)

The following questions are important as possible indicators or pointers in decision making about cases. They are currently for investigative purposes only as to their ultimate value in arriving at a proper verdict. While somewhat "delicate" to ask in certain cases, please try - in order to improve our understanding of before death attitudes and circumstances which may indicate "accident proneness" or "suicidal tendencies"

__ s) Recent medical treatment for nervous disorder? __; depression? __; medical-surgical illness? __; history of psychiatric hospitalization? __.
__ t) Victim ever been treated for nervous breakdown? No __, Yes __, When: _____
__ u) Victim's marital status? _____ Had there been any recent change in victim's marital status? No ___, Yes ___. If yes, explain including date: _____

__ v) Other trouble in relationship with family or loved one? No ___, Yes ___. If YES, describe including date: _____

__ w) Has subject been unhappy? __; depressed? __; upset? ___. For how long: _____
__ x) Had there been a recent change in subject's job status? Fired? ___; Quit? ___; Laid off ? ___ ; Demoted? ___; Promoted? ___, Other: _____
__ y) Had there been any recent changes in subject's life or circumstances? No ___, Yes ___. If yes, explain: _____
__ z) Had there been a recent change in subject's behavior? No ___, Yes ___. If yes, describe: _____

__aa) What did subject do differently on the day of his death (than he usually did on that day of the week or at that hour of the day)? Describe: _____

__bb) Had victim ever attempted suicide? No ___, Yes ___, If yes, when: _____
__cc) Had victim ever talked about taking his own life? No ___, Yes ___ When and under what circumstances: _____
__dd) Is there a suicide note? No ___, Yes ___. If yes, use Form 2 N (NOTES, SUICIDE)

Informant's name: _____ Address: _____
Telephone number: _____ Relationship to victim: _____
IF questions s) through dd) are positive, better consider checking for overdose.

CONCLUSIONS:

__ After careful consideration of each of the above questions, nothing is found to warrant further investigations in the case - Death Due to Natural Causes.

__ Despite check marks, positive responses, to one or more of the above questions; careful consideration of all evidence still supports Death Due to Natural Causes.

__ Due to one or more check mark positive responses to the above questions; further investigative studies will be done.

DSP-Index-4

FIG. 1—*Facsimile of present inquiry form for nonnatural deaths for St. Louis County.*

Another way of examining the contribution of the new form is by comparing the number of questions answered in 1972 open-verdict cases where the form was employed (six cases) and where it was not (six cases). A Mann-Whitney U test showed significantly more of the personal-social items answered when the form was used ($p < 0.01$). The increase in information for suicides and for open-verdict cases is largely attributable to the use of the special form, and our first hypothesis is upheld.

TABLE 2—*Number of answers for suicide related variables by verdict and year.*

Verdict		1970	1971	1972
Suicide	N	30	18	20
	$\bar{X}$	11.800	10.778	15.550
	S	3.537	3.388	4.454
Open	N	21	20	12
	$\bar{X}$	3.952	3.950	8.333
	S	5.113	4.718	6.541
Accident	N	49	40	69
	$\bar{X}$	2.408	3.525	2.217
	S	2.908	3.404	3.351
Homicide	N	8	6	11
	$\bar{X}$	2.250	1.667	3.364
	S	2.435	0.516	2.618
Total	N	108	84	112

Analysis of Variance

	SS	*Df*	*MS*	*F*	*p*
Verdict	4082.72	3	1694.24	121.12	<.001
Year	5.27	2	2.64	0.19	N.S.
Year by Verdict	391.60	6	65.27	4.67	<.001
Within Cells	4084.16	292	13.99		

N = number
$\bar{X}$ = arithmetic mean
S = standard deviation
SS = sum of squares
Df = degrees of freedom
MS = mean square
F = ratio of MS of an effect to MS of the error term
p = probability

TABLE 3—*Numbers of positively answered suicide variables compared by verdict and year.*

Verdict		1970	1971	1972
Suicide	N	30	18	20
	$\bar{X}$	7.300	6.278	8.650
	S	3.852	2.562	3.884
Open	N	21	20	12
	$\bar{X}$	1.476	0.750	3.750
	S	3.010	1.293	3.841

Analysis of Variance

	SS	*Df*	*MS*	*F*	*p*
Verdict	884.55	1	884.55	84.51	.001
Year	206.10	2	103.05	9.84	.001
Year by Verdict	4.00	2	2.00	0.19	N.S.
Within Cells	1203.70	115	10.47		

N = number
$\bar{X}$ = arithmetic mean
S = standard deviation
SS = sum of squares
Df = degrees of freedom
MS = mean square
F = ratio of MS of an effect to MS of the error term
p = probability

The number of positive responses (those items of Table 1 answered affirmatively or in a manner most consistent with suicide) was summed, and an analysis of variance was computed (Table 3). The difference between suicide and open verdicts in the number of positive answers is highly significant ($p < 0.001$). Since only half the open cases were investigated with the special form, this difference is in part a reflection of the different total amounts of information obtained, as previously shown. The number of items answered correlates 0.60 with the number of positive answers. Comparison of open verdicts reached with and without the special form shows significantly more positive answers for those cases in which the form was used (Mann-Whitney U test: $p < 0.05$).

The number of positive responses is significantly greater for 1972 suicide verdicts than for those of 1971 (t test: $p < 0.05$). However, it is not different than 1970, perhaps due to large standard deviations. The conclusion seems warranted that although some suicide verdicts can be reached with a minimum of personal and social information (where circumstances are compelling), some cases require a substantial amount of such information for a confident verdict.

The second hypothesis to be tested was that the use of the special form would reduce the number of open verdicts. With increased information about the personal and social antecedents of nonnatural deaths, more confident rulings of suicide should be possible. The number of open verdicts is in fact significantly lower in the experimental period than in the control periods ($p < 0.02$). However, the number of suicide verdicts is not increased. Frequency distributions of the four nonnatural death categories are seen in Table 2 to fluctuate widely between the three 3-month periods under consideration. This fluctuation points up the necessity for adequate sample size as a basis for firm conclusions. The present sample size is not large, and therefore the findings should be regarded as indicative rather than proof that more information results in fewer open verdicts. Our second hypothesis is tentatively sustained.

Discussion

Systematic studies indicate that suicides have a surprisingly high frequency of certain personal and social characteristics. These include recent care by medical, surgical, and psychiatric physicians; history of suicidal communication (including suicide attempts); depression; and recent changes in life circumstances. We proposed that systematic inquiry in cases of possible suicide would increase the amount of information available pertaining to these characteristics (first hypothesis). We further proposed that availability of this additional personal and social information would increase the confidence with which suicide verdicts would be reached. This would be shown by a reduction in open verdicts (second hypothesis).

We have developed a brief, systematic inquiry schedule for use in investigating possible suicides (Fig. 1). We have shown that the amount of personal and social information concerning subjects of the inquiry is significantly increased through its use. Thus, our first hypothesis is sustained. The second hypothesis is also sustained, in that the number of open verdicts was significantly smaller. Both because the number of suicide verdicts was not increased and because the number of cases in various nonnatural death categories fluctuates considerably over short time periods, this conclusion is best regarded as tentative.

While the number of suicide verdicts was not increased, it is of interest to note that no suicide verdict was reached in the absence of a special investigation form during the experimental period. At the same time, this form was employed in only seven cases where a verdict of suicide was not reached. In a number of these cases many of the specified times could not be answered by the informants. There is obviously a close association between

the amount of information available and the confidence of the verdict. This is not to say that completeness of this type of information alone will lead to a resolution of all possible cases. Even when all questions are answered, the information may be largely negative, that is, few personal-social factors associated with suicide reported by the informant. This may be because such factors were lacking, because they were unknown to the informant, or because the informant chose to conceal them.

Alternatively, the weight of personal-social factors may be equivocal, as in the case of a high blood alcohol level and a low blood barbiturate level. Other physical findings may complicate the picture, as in the case of head trauma plus asphyxiation by carbon monoxide. Did the victim fall and become unable to turn off the engine and escape, or did he become confused in the course of asphyxiating himself and fall? Not all of these questions can be answered by even the most searching investigation. But it is striking that in this study, when the personal-social investigation was carried out, the verdict was definite (that is, suicide) in three fourths of the cases.

Several investigators have concluded that the number of suicides recorded annually represents a significant underestimate of the actual number. Donovan and Nash [*8*] have cited a low proportion of autopsies and infrequency of toxicologic studies among coroners' cases in different jurisdictions as a contributing factor. Litman et al [*2*] consider that many coroners are too lax in interpreting gunshot and ingestion deaths as accidental. Davies and Kaplan-Dinur [*9*] find one-third fewer suicides recorded when the family physician signs the death certificate than when the police make an independent investigation. Ovenstone [*10*] has recently reviewed undetermined verdicts in Edinburgh over an 18-month period and concluded that this category contains one third of the actual suicide cases in that jurisdiction. All of these observations suggest that a substantial number of suicides may be overlooked.

In this study, none of the 24 single-vehicle deaths in the experimental period was ruled suicide. Others have pointed out that drivers in single-car fatal accidents differ significantly from other drivers in personality, behavior, and recent experiences [*11–13*]. Some, but by no means all, of their characteristic features are found among those listed in Table 1. Despite the assertion that single vehicle fatalities hide an unknown number of suicides [*2,14*], it is not yet customary to screen for the possibility. The medical examiner's office has been aware of this problem and generally has attempted to rule out suicide in each single-vehicle death. However, the routine adoption of the supplemental suicide questionnaire should improve the evaluation of vehicular accidents. The current plan is to utilize the questionnaire in all violent death investigations in order to evaluate each question in the series and those categories of cases where it might prove permanently useful. The results of these studies will be the substance of a future report.

Our experience suggests the importance of adequate instruction to the investigative staff on the necessity of recording all answers, whether positive or negative. The filling out of the special form is not automatic, but requires some training. Special emphasis must be placed on recording negative information, as this step is most likely to be omitted. When the forms were first introduced the investigators were of the opinion that they "routinely" asked these questions anyway. However, review of the narrative reports filed prior to the study period of 1972 showed that, in fact, some of these questions were not asked and recorded "routinely." While many narrative reports contained positive information of the type required for the study, negative findings were rather commonly omitted. After working with the forms for the three-month period the investigative staff members were themselves convinced of the added convenience and thoroughness of the approach. The medical examiner finds the additional information particularly helpful in equivocal cases.

In the absence of published standards and procedures for investigating possible suicides, the present supplementary form (Fig. 1) offers a straightforward means of improving the extent and usefulness of the information with which the coroner or medical examiner works.

Summary

In order to improve systematic data collection, a special form covering 20 personal and social variables relevant to suicide was designed for field investigators of the medical examiner's office to use in cases of nonnatural death. Comparison of the data recorded through use of the new form to data recorded in inquiries made prior to its adoption, showed a significant increase in the recording of both pertinent positive and pertinent negative information related to the likelihood of suicide. These increases were most marked in inquiries leading to a verdict of suicide. The number of open verdicts was significantly decreased. Experience with the form led to the conclusion that it is convenient to use and improves thoroughness of investigation.

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