

Suicide by Drowning: A 20-Year Review*

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ABSTRACT: Drowning as a method of suicide is known to occur, but has primarily been described in environments with readily available access to water, such as coastal regions. In this study, we describe and analyze a series of suicidal drownings occurring in a noncoastal area of Texas. Between 1977 and 1996, 52 cases of suicidal drowning were investigated at the Southwestern Institute of Forensic Sciences in Dallas, Texas. Such deaths accounted for only 0.85% of all suicides and 4% of all drowning deaths. In contrast, suicidal drownings reportedly account for 2.8 to 8.9% of all suicides in regions with easy access to water. As with other studies of suicidal drowning, the victims are usually sober white males over the age of 40 years. Our results also confirm that certain individuals who commit suicide by drowning use weights to facilitate the process. A detailed analysis of the cases is provided, as is a synopsis of several questions that may aid in determining the manner of death in suicidal drowning cases.

KEYWORDS: forensic science, suicide, drowning, manner of death

The body recovered from water poses many challenges to the forensic pathologist. Oftentimes, mere identification of subjects is complicated by decomposition. The determination of cause and manner of death in such cases can be an equally daunting challenge. In some instances, many of the essential questions surrounding such deaths are left unanswered even after performing an autopsy. Davis offers an approach to such complex cases (1). Nevertheless, the essential question of whether the individual was alive prior to entering water must be answered. To date, there is no single “test” available to unequivocally demonstrate that an individual recovered from water actually drowned in water. Hence, the diagnosis of drowning is one of exclusion. A diagnosis of drowning is typically rendered when a body is found in water and subsequent autopsy and toxicology are negative. Another useful means in making the required determinations in cases of suspected drowning is the analysis of antecedent factors. Of particular interest are those drowning incidents in which antecedent factors indicate suicide as manner of death. The vast majority of drowning deaths are accidental and the characteristics of these cases are well described (2–5). However, the phenomenon of suicidal drowning is less well described. Herein, we report our experience with such cases and compare our findings to those in the literature.

¹ Southwestern Institute of Forensic Sciences, 5230 Medical Center Drive, Dallas, TX.

² South Bend Medical Foundation and the Department of Pathology, Indiana University School of Medicine, South Bend Center for Medical Education at the University of Notre Dame, South Bend, IN.

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Materials and Methods

The Southwestern Institute of Forensic Sciences (SWIFS) serves the population of Dallas County and the greater metropolitan area of Dallas as well as several surrounding rural areas. The greater metropolitan area population of Dallas (excluding Fort Worth) was 2 055 000 in 1980 and 2 898 000 in 1994 (6). The following parameters were assessed in this study: age, race, sex, medical and psychiatric history, autopsy findings, toxicology, site of drowning, and circumstances surrounding the deaths.

Results

Between 1977 and 1996, the forensic pathologists of SWIFS investigated 52 suicidal drowning incidents. Thirty-one cases were from Dallas county and 21 from surrounding counties. Autopsies were performed in 50 of the 52 cases investigated. The 52 cases of suicidal drowning comprised 0.85% of all suicides (6082 total) and 4% of all drowning deaths (1303 total) during 1977–1996. During this time span, drowning was one of the least common forms of suicide, following firearm (65%), drug/toxin (13%), hanging (8%), carbon monoxide (7%), blunt force (2%), sharp force (1%), thermal (1%) and other (1%) (Fig. 1). The manner of death in the nonsuicidal drowning deaths was deemed accident in 1178 cases with 40 undetermined and 33 homicides (Fig. 2). Of the 52 cases of suicidal drowning, 28 (54%) subjects were male and 24 (46%) were female. Among the males, there were 20 Caucasians, six blacks, one oriental, and one Hispanic individual. Eighteen of the females were Caucasian and the remaining six black. Ages ranged from 21 to 84 years among males and 23 to 82 among females. Among males, 15 (54%) were older than 40 years, of which eight (29%) were >60. In contrast, among females, 16 (67%) were older than 40 years, of which 10 (42%) were >60. Twenty-nine (56%) drowning incidents occurred in lakes or ponds, nine in pools, six in bathtubs, five in rivers or creeks, one in an outdoor fountain, one in a waste pit and one in a well. Thirty-seven percent of the subjects were discovered at or near their homes and 63% were found in remote locales. Alcohol was discovered in the blood of 21 subjects, of which 13 exhibited early to moderate decomposition. Six decedents exhibited blood alcohol levels exceeding 100 mg/dL. Twenty-four (46%) had drugs other than alcohol in their system, but in only four cases was the level of drug(s) near or above lethal range. Twenty subjects had a history of psychiatric illness and/or drug/alcohol abuse. Twenty-six persons were recorded as having suicidal ideation; ten had a history of previous suicide attempt(s), including three who previously attempted drowning. Six drowning incidents were witnessed, and suicide notes were discovered in 19 cases (37%). Four subjects were found with various weights fastened to their bodies. Two subjects were found submerged within motor vehicles.

The following paragraphs are a more detailed breakdown of the 52 cases. Table 1 summarizes the cases. Nineteen cases (36.5%,

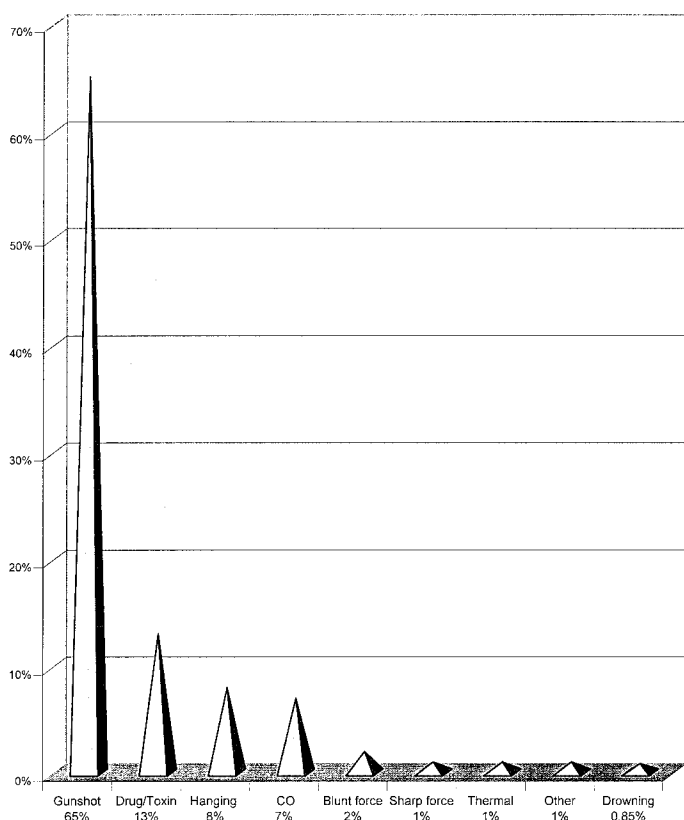


FIG. 1—Relative frequencies of suicide methods (6082 cases; 1977–1996).

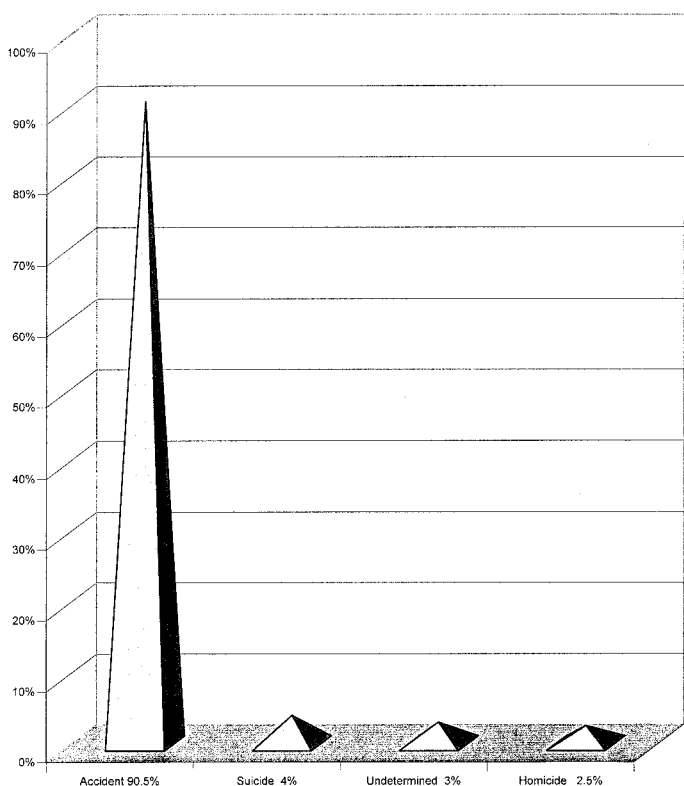


FIG. 2—Manner of death in drowning cases (1303 cases; 1977–1996).

Cases 1–19) were accompanied by a suicide note and had investigations which revealed no evidence of foul play. Of the remaining cases, six persons (11.5%, Cases 20–25) were witnessed entering the water, and subsequent police investigation revealed no evidence to suggest that the subjects' drowning was not self inflicted. Case 26 was a combined homicide/suicide in which the subject shot his wife and then was witnessed leaving the scene of the homicide to be discovered 24 h later in a stock tank. Among the remaining 26 cases, two subjects (Cases 27 and 28) had lethal or near lethal blood levels of a tricyclic antidepressant; one subject (Case 29) was found in a pool with superficial incised wounds of the wrists; five subjects (Cases 30–34) had a history of prior suicide attempt(s), two of whom previously attempted drowning, and ten subjects (Cases 35–44) were recorded as having suicidal ideation, of which three gave exact descriptions of how they would eventually commit suicide by drowning.

Of the eight remaining cases, one man (Case 45) left the hospital against medical advice after learning of his HIV positive status and diagnosis of pneumonia for which he was told he had "2 days to live unless treated." He was found two days later, fully clothed in a lake with no evidence of injury. Two persons (Cases 46 and 47) had a history of psychiatric hospitalization and two others (Cases 48 and 49) were reportedly depressed due to breast cancer. One man (Case 50) was reportedly depressed over the recent overseas departure of his girlfriend and one woman (Case 51) was reportedly distraught over the possibility that she had "cancer on her face" (autopsy demonstrated no evidence of malignancy). The last decedent (Case 52) was found nude in a hotel fountain with her clothing folded neatly nearby. She was seen the previous evening apparently praying and exhibiting bizarre behavior.

In our series, four persons were found with various weights attached to their bodies. One man (Case 41) was recovered from a lake with anchors loosely tied about his neck and ankles. Interestingly, he had recently told others exactly how he planned to drown himself. One male subject (Case 18), accompanied by a suicide note, was found in a pond with a bucket loosely tied to his wrists. He likely filled the bucket as he entered the water to facilitate the process. One man (Case 39) who was reportedly having marital problems and suicidal ideation was found in a stock pond with a concrete block loosely tied around his ankles. The remaining man (Case 50), reportedly depressed over the departure of his girlfriend, was found in a waste pit with a block loosely tied around his neck. Investigations in each of these cases revealed no evidence of foul play, and the autopsy and toxicology findings failed to demonstrate any explanation for death other than drowning.

Discussion

A recent article in *Morbidity and Mortality Weekly Report* indicates that there are significant regional variations in suicide rates and methods among populations that are not fully explained by differences in demographic variables (7). In a short paper in 1989, Lester reported data indicating that states bordering on oceans or the Great Lakes have higher rates of suicide by drowning compared to noncoastal states (8). Unfortunately, few reviews of suicide by drowning are available in the forensic literature. Furthermore, we were unable to find any detailed American studies of suicide by drowning from noncoastal regions.

In a 5-year study, Copeland reported 70 cases from Miami in which drowning and suicide were listed as cause and manner of death (9). This number accounted for 4.5% of all suicides (1569 total) during this period of time. The decedents were characteristi-

TABLE 1—Summary of 52 cases of suicide by drowning.

Case	Age Race Sex	Circumstances/Scene	Mental Status	Note	Attempts	Ideation	Swimmer	Autopsy Findings
1	34 B F	found clothed in creek	history of mental illness	+	unknown	unknown	nd	pulmonary edema early decomposition
2	36 W F	found clothed in lake under bridge (3' drop)	depressed due to pending divorce	+	unknown	unknown	nd	mastoid sinus hemorrhage early decomposition BAC 0.01%
3	36 W F	found clothed submerged in lake, large bloodstains nearby	guilt due to self-perception as a cruel person	+	0	yes	nd	pulmonary edema deep incised wounds of wrists BAC 0.013%
4	37 W F	found in swimsuit at bottom of apartment pool	severe depression s/p ECT	+	0	no	weak	pulmonary edema
5	58 W F	found clothed floating in lake	depression (impending move to nursing home)	+	0	yes	unknown	pulmonary edema incidental lymphoma of lung
6	65 W F	found clothed in lake, car nearby	fear of possible uterine cancer, severe arthritis	+	0	no	no	pulmonary edema
7	66 W F	found clothed floating in river under bridge(150' drop)	depressed due to pancreatic ca	+	0	yes	unknown	pulmonary edema severe ASCVD
8	75 W F	found clothed in neighbor's pool	depressed due to husband's terminal cancer	+	0	no	nd	pulmonary edema moderate ASCVD
9	46 W M	found clothed tied together at waist floating in lake	suicide "pact"	+	0	no	n/a	pulmonary edema BAC 0.02%
10	53 W F							pulmonary edema
11	26 B M	found clothed in lake under bridge	unknown	+	unknown	unknown	unknown	pulmonary edema moderate decomposition BAC 0.03%
12	32 W M	found wearing swim trunks in bathtub with water running at home	chronic drug abuse	+	1, drugs	yes	n/a	pulmonary edema osteogenesis imperfecta mixed drug intoxication
13	34 W M	found clothed floating in pool 19 stories below condo	guilt due to criminal activity	+	0	no	n/a	pulmonary edema multiple BFI
14	35 W M	found nude face-down in filled bathtub	depressed due to self-perception as "failure in life" & recent loss of job	+	0	yes	n/a	pulmonary edema early decomposition BAC 0.320%
15	36 O M	found clothed floating in lake under bridge, car nearby	depressed due to unemployment	+	2, hanging	yes	nd	moderate decomposition BAC 0.043%
16	52 W M	found in pajamas face-down in full bathtub at home	depression with psychotic features	+	0	yes	n/a	pulmonary edema elevated diphenhydramine
17	58 W M	found clothed floating in lake, car nearby	depressed due to work & finances	+	0	yes	no	pulmonary edema
18	75 W M	found clothed floating in neighbor's stock pond with bucket tied to wrists	depressed due to marital problems	+	0	no	n/a	early decomposition

cally white males over age 40 and were frequently found in the Atlantic Ocean, Biscayne Bay, canals, or in pools. A suicide note was present in less than 1/3 of the cases. Alcohol and drugs were infrequent findings. Interestingly, Helpert reported a similar percentage of suicide by drowning (3%) in New York City nearly 50 years ago (10).

In another 5-year study from Newfoundland, Avis reported 22 cases of suicide by drowning (3). This number accounted for 8.9% of all suicides (247 total) during this period of time. Most subjects were males over age 50 and nearly 90% of the subjects were found in the Atlantic Ocean. Drowning was the leading method of suicide among females over age 50. Greater than 90% of subjects had negative blood alcohol concentrations.

Cairns et al. reported 60 cases of suicide by drowning which comprised 26.7% of 225 drowning deaths over an 8-year time span in Auckland, New Zealand (4). The manner of death in the remaining cases was deemed accident in 150 cases with 14 undetermined and one homicide. A 27 year study of drowning deaths from Sevilla, Spain yielded a total of 314 deaths due to submersion as-

phyxia, of which 179 (57%) were accidents, 134 (42.67%) were suicides and one case (0.33%) was a homicide (5). In another study from Sevilla by the same authors, 10% of all suicides were due to drowning, behind falling (jumping) from a height (39%), hanging (17%) and poisoning (16%) (11,12).

Most recently, in a 4-year study from Broward County Florida, Davis reported 25 cases of suicidal drowning (13). This represented 2.86% of 873 total suicides which is relatively low in light of the ready access to water in this geographic area. Nearly 70% of subjects were over 60 years of age, with a slight male preponderance. Swimming pools, canals, and lakes were the most common locales. Suicide notes were present in 32% of cases. Alcohol was present in 24% and drugs in 32%.

When comparing the demographic profiles of our cases to those reported by Copeland, Avis and Davis, we see a similar older male preponderance. However, our study group included a higher percentage of younger individuals. In our group, 40% of subjects were less than 40 years of age as compared with 26% and 18% in the papers by Copeland and Avis, respectively. Our findings are also sim-

TABLE 1—Continued.

Case	Age Race Sex	Circumstances & Scene	Mental Status	Note	Attempts	Ideation	Swimmer	Autopsy Findings
19	80 W M	found clothed in lake under bridge(20' drop), truck nearby	depressed due to dx of prostate ca	+	0	no	unknown	0.04mg/l desmethylsertraline
20	25 B F	witnessed jumping into murky apartment pool "I'm going to jump in and kill myself."	alienated by family	-	1,drugs	yes	no	pulmonary edema BAC 0.257%
21	71 B F	witnessed jumping into apartment pool; delayed death	hx of psychiatric "problems" & therapy	-	1,drowning	yes	nd	autopsy and toxicology not performed
22	35 B M	witnessed jumping into lake from bridge(30' drop)	on parole and unable to find job	-	0	yes	nd	pulmonary edema early decomposition BAC 0.02% 0.33mg/l cocaine
23	43 B M	witnessed walking into river "This is my day."	chronic alcohol & drug abuse	-	0	yes	no	pulmonary edema BAC 0.140% 0.01 mg/l carboxyTHC
24	70 W F	witnessed walking clothed into lake	depression s/p ECT	-	0	unknown	nd	pulmonary edema
25	21 B M	witnessed walking into lake, Bible on shore opened to "The Last Supper"	unknown	-	0	unknown	unknown	pulmonary edema
26	40 W M	found clothed in stock tank 24 hrs after shooting wife, car nearby	paranoid schizophrenia	-	0	unknown	nd	pulmonary edema middle ear hemorrhage ASCVD, early decomp BAC 0.03%
27	38 B F	found clothed floating in pool at place of work	depression	-	0	no	no	pulmonary edema lethal amitriptyline
28	40 W F	found clothed in creek	chronic alcoholism (recent argument with boyfriend)	-	1,drugs	no	nd	pulmonary edema BAC 0.019% lethal imipramine
29	62 W M	found in pajamas in swimming pool	depressed due to recent aortic valve repair	-	0	no	no	pulmonary edema middle ear hemorrhage superficial cuts of wrists 1.3mg/l warfarn
30	26 B F	found clothed floating in lake, truck nearby	severe depression	-	3, same lake	yes	nd	pulmonary edema
31	57 W F	found clothed at home in pool	depressed due to son's marriage plans	-	3,drugs	yes	no	pulmonary edema BAC 0.01%
32	66 W F	found in pajamas face-down in filled bathtub at home	depressed due to insomnia & pain from osteoarthritis	-	2,drugs	yes	n/a	pulmonary edema ASCVD
33	55 W M	found clothed floating in lake	schizophrenia & chronic alcoholism	-	1, drugs	yes	no	pulmonary edema
34	22 B M	found clothed in lake under bridge	mental illness with past hospitalization	-	1,same lake	unknown	unknown	pulmonary edema ASCVD, decomposition BAC 0.01%
35	49 W F	found in swimsuit face down in full bathtub	depressed due to death of husband	-	0	yes	n/a	pulmonary edema BAC 0.110%

ilar to previous studies which indicate that, in contrast to cases of accidental drowning, subjects who commit suicide by drowning are usually sober.

Our experience would indicate that suicide by drowning is rare in noncoastal areas. The infrequency of suicide by drowning in the Dallas area may relate to its geography. Although there are many lakes and ponds in the area, they are not as accessible as the major bodies of water near Miami, Newfoundland, Auckland, and Sevilla. In contrast, the high percentage of firearm related suicides in Dallas likely stems from the fact that guns are readily available to the general population.

The determination of cause and manner of death in subjects found in water can be complicated by several factors, as alluded to in the introduction. Davis has published an excellent article reviewing an investigative approach to bodies found in water (1). Although the autopsy and toxicology serve important roles in excluding causes other than drowning, the forensic pathologist must often rely on an-

tecedent factors to assign cause and manner of death in such cases. In a majority of the cases in our review, there seems to be ample evidence to justify a ruling of "suicide." In several cases, an "undetermined" manner might have been acceptable. In light of the retrospective nature of this study, in which autopsy reports and available files were reviewed, it is possible that these determinations were based in part on data currently unavailable for our review.

A final point that our data indicate is that not all decedents found with weights tied to their bodies are victims of murder. In Cases 18, 39, 41, and 50, various objects were found attached to the decedents' bodies. When investigating these cases, it is obviously very important to rule out homicide. Investigators should attempt to ascertain whether or not the decedent, on his/her own accord, could have attached themselves to and carried the weights.

In any alleged suicidal drowning, it is best to perform a complete autopsy with toxicology. In addition, thorough death investigation is of utmost importance. Questions which should be

TABLE 1—Continued.

Case	Age Race Sex	Circumstances/Scene	Mental Status	Note	Attempts	Ideation	Swimmer	Autopsy Findings
36	67 W F	found in car in lake	depression	—	0	yes	nd	Moderate decomposition BAC 0.160%
37	33 L M	found clothed floating face-down in river	chronic alcohol & drug abuse	—	0	yes	nd	moderate decomposition BAC 0.210%
38	35 W M	found clothed in lake in car 125' below cliff	depressed due to diabetes	—	0	yes	nd	pulmonary edema, ASCVD forehead lac & abrasions
39	62 W M	found floating in neighbor's stock tank with brick loosely tied to ankles	depression	—	0	yes	n/a	moderate decomposition BAC 0.04%
40	75 W M	found wearing adult diaper submerged in golf course pond	depressed due to leukemia & prostate ca	—	0	yes	nd	autopsy not performed, toxicology negative
41	75 W M	found submerged in lake with anchors loosely tied to neck and ankles, boat in lake with truck & trailer nearby	depressed due to poor health and sister in nursing care	—	0	yes	no	pulmonary edema, ASCVD moderate decomposition BAC 0.01%
42	76 W M	found clothed floating in stock pond, shoes & medications on shore	depression	—	0	yes	no	pulmonary edema ASCVD 0.2 mg/l imiprimine 0.32 mg/l desiprimine
43	84 W M	found clothed floating in lake, car nearby with shoes & hat inside	depressed due to poor health	—	0	yes	nd	pulmonary edema severe ASCVD early decomposition
44	34 B M	found clothed in water well	mentally retarded, fear of caretakers death & living alone	—	0	yes	unknown	moderate decomposition BAC 0.05%
45	44 W M	found clothed face-down floating in lake	depressed due to recent dx of AIDS	—	0	no	nd	pulmonary edema Moderate decomposition BAC 0.04%
46	45 W F	found clothed in lake, car nearby	bipolar disorder	—	0	no	nd	pulmonary edema
47	26 W M	found nude submerged in lake with clothing folded nearby	depression with psychotic features	—	0	no	unknown	pulmonary edema middle ear hemorrhage
48	68 W F	found in pajamas floating in neighbor's pool, shoes nearby	depressed due to death of husband and breast ca	—	0	no	no	ASCVD moderate decomposition
49	60 W F	found clothed floating in stock pond behind home	depressed due to breast ca s/p mrm	—	0	no	nd	0.26 mg/L trazadone
50	27 W M	found clothed submerged in waste pit with block loosely tied to neck	depressed due to relationship "break-up"	—	0	no	n/a	pulmonary edema BAC 0.02%
51	82 W F	found clothed in filled bathtub at home	distraught due to possible "cancer on face"	—	0	no	n/a	pulmonary edema ASCVD
52	23 B F	found nude face-up in 1' deep outdoor fountain with clothing folded nearby	psychotic behavior night before death	—	unknown	unknown	n/a	pulmonary edema

NOTE: AIDS: acquired immunodeficiency syndrome; ASCVD: atherosclerotic cardiovascular disease; B: black; BAC: blood alcohol concentration; ca: cancer; dx: diagnosis of; ECT: electroconvulsive therapy; hx: history of; L: Latin; mm: mastectomy; n/a: not applicable (circumstances of drowning were such that the person's ability or inability to swim probably did not matter); nd: not determined (review revealed no record of whether or not person knew how to swim); O: oriental; s/p: status-post; unknown: the question was asked, but no-one was able to answer the question with any degree of certainty; W: white.

answered include:

- Was the event witnessed?
- Was a suicide note present?
- Did the decedent know how to swim?
- What was the decedent wearing?
- Has the decedent attempted suicide in the past?
- Had the decedent ever demonstrated suicidal ideation?
- Did the decedent have any history of medical or psychiatric illness?
- What was the decedent's mental status immediately prior to drowning?

Table 2 is a synopsis of several questions which may aid in determining the manner of death in suicidal drowning cases.

In conclusion, our data suggest that suicide by drowning is a relatively rare phenomenon in noncoastal regions or regions lacking easy access to bodies of water. Similar to the findings of others, subjects are usually sober white males over age 40. Furthermore, those who commit suicide by drowning sometimes use weights to facilitate the process. Although generalizations can be drawn from our data, each case must be viewed independently. Only after careful study of each unique case and after exclusion of other causes, can cause and manner of death be assigned as drowning and suicide, respectively.

TABLE 2—*Specific questions to answer when investigating suspected suicidal drowning deaths.*

A drowning death should be considered a possible or probable suicide if the questions below can be answered in the affirmative. The more affirmative answers, the more likely the drowning death is a suicide. Affirmative answers for those marked with an asterisk (*) should be considered strong evidence that the death is a suicide.

- Does the death investigation rule out homicide?
- Does the death investigation rule out accident?
- Does the death investigation suggest that suicide is a possibility?
- Did the victim leave a suicide note (or equivalent)?*
- Was the suicidal action witnessed by a credible witness?*
- Had the decedent recently expressed suicidal ideation?
- Was the decedent recently known to be depressed?
- Did the decedent recently experience a major, life-changing event typically considered a reason for committing suicide (cancer diagnosis, discovery of spouse's infidelity, financial disaster, etc...)?
- Had the decedent ever considered or attempted suicide in the past?
- Had the decedent expressed suicidal ideation and specifically mentioned drowning as a possible method of suicide?*
- Does the decedent have co-existing autopsy findings which are consistent with suicide (overdose, incised wounds of wrists, etc...)?*

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Additional information and reprint requests:

Joseph A. Prahlow, M.D.
 South Bend Medical Foundation and the Department of Pathology
 Indiana University School of Medicine
 South Bend Center for Medical Education at the University of Notre Dame
 530 N. Lafayette Blvd.
 South Bend, IN 46601