

The Incidence of Near-Death Experiences

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Transcendental or mystical "near-death experiences" (NDEs) may produce alterations in attitudes, beliefs, and values that can result in significant psychosocial morbidity. Accurate estimates of their incidence would give physicians needed perspective on these anomalous events. Differing definitions of NDEs and of nearness to death have confounded estimates of NDE frequency. Some studies based their estimate of NDE incidence on small or biased samples; sacrificed objectivity for rapport with subjects; assessed experiences by mail survey rather than interview; interviewed subjects decades after the experience; disregarded high rates of refusal to participate; and interpreted prevalence as incidence. In contrast to higher estimates of NDE incidence, studies using quantitative instruments administered in personal interviews to intact cohorts of patients near death yield estimates of 9% to 18%. The numbers of subjects assessed in all these studies may be too small to detect the influence of intervening psychophysiological variables on NDE incidence. *Med Psychiatr* 1:92-99, 1998
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Transcendental or mystical experiences that occur on the threshold of death had been described sporadically in the medical literature for a century preceding Moody's (1) introduction of the term "near-death experience" (NDE) (2-19). As described by Moody (1), NDEs typically include feelings of peace, unusual noises, a sense of movement through a dark tunnel and of being out of the body, encounters with other spiritual beings, a life review, and a point of no return. These anomalous experiences are of interest to physicians not only because they may permanently and dramatically alter the experiencer's attitudes, beliefs, and values (20-25), but because these profound changes may lead to significant psychosocial problems requiring intervention (23, 26-29). The following two brief examples may illustrate some of the features often reported by such patients.

A 55-year-old married Caucasian truck driver was admitted to the hospital with irregular heartbeat, and during diagnostic angiography suffered a coronary occlusion. He then underwent emergency quadruple coronary bypass surgery, following which he reported having had a clear sensation of leaving his body and observing the operation from above. He reported accurately certain idiosyncratic behavior of the cardiovascular surgeon, pinpointing it at the correct time during the operation. He also described

being distracted from the operating room scene by a brilliant light, and following it through a tunnel to a region of warmth, joy, and peace, where he experienced an apparent encounter with his deceased mother and brother-in-law, who communicated to him without speaking that he must return to his body. He awoke with an intense passion for helping others and desire to talk about his experience, much to the dismay of his embarrassed wife, who belittled what she called his "spook story" and forbade him to mention what he regarded as the focal point of his life.

A 32-year-old upper-class married Caucasian housewife was hospitalized for spinal fusion after a traumatic back injury failed to respond to traction and rhizotomy. Two days after the operation, she developed internal bleeding and, becoming severely hypotensive, lost consciousness. She later reported that she "awoke" in the corridor outside her hospital room, and "floated" back into her room, where she saw her unconscious body still immobilized in the Stryker frame. She reported that she then felt enveloped in darkness, and felt drawn into a "lush warmth" that she recognized as her deceased grandmother's arms. She experienced a rapid replay of many events from her childhood, seeing them from her grandmother's perspective as well as her own. She then became aware of a "churning" energy and a droning noise, and felt herself expanding and being "wafted" back into her

body. On recovery, she no longer found meaning in the materialism and prestige that had previously formed the foundation of her self-image and marriage, and enrolled in nursing school, to the disapproval of her family. Months later, facing the persistent ridicule and anger of her family and feeling that she no longer belonged in their world, she attempted suicide by overdose.

I have described elsewhere a variety of intrapsychic and interpersonal features of NDEs that may cause them to become a focus of clinical attention, and various therapeutic strategies that have been found helpful (29). The past two decades have witnessed increased interest in these phenomena, among both clinicians and the general population, at least partly stimulated by large estimates of their frequency. However, methodological inconsistencies among studies, as well as differing definitions of what types of experience should be counted as NDEs and of nearness to death, have resulted in estimates of the frequency of NDEs ranging from 0% (30) to 100% (31).

In a prospective, longitudinal study of the outcome of NDEs still under way, my colleagues and I have found only 10 reports of NDEs among an intact cohort of 100 patients surviving cardiac arrests, for an incidence of 10%, far lower than the commonly accepted estimate that NDEs occur to about 33% of patients who come close to death (32). In an effort to explain this discrepancy, I surveyed prior published estimates of NDE frequency. All published empirical studies that estimated NDE frequency are presented in Table 1 by type of study and in order of increasingly large estimate. It should be noted that few of these studies were designed specifically to estimate the frequency of NDEs, but rather included their estimate as an aside or afterthought. With that caveat in mind, it should not be surprising that many of these estimates rest on methodologically weak data; many of these studies were designed to identify the phenomenology or aftereffects of NDEs and not their incidence. The purpose of this paper is to review these prior estimates of the incidence of NDEs critically and to attempt to determine the best estimate of the true incidence of these experiences.

Estimates of NDE Frequency Based on Clinical Impressions

Before any studies of the frequency of NDEs, a few clinicians knowledgeable about near-death crises offered estimates, all of them very low, based on their extensive clinical experience. Shortly after Moody named NDEs and focused attention on them, Cassem and Hackett (59) estimated NDEs to occur to about 2% of people who survive cardiac arrest. Moody himself a few years later estimated their incidence to be below 5% of persons who come close to death (60). Negovsky, who pioneered Russian research on "reanimation" of clinically dead patients, offered an even lower estimate of about 0.3%–0.5% of resuscitated patients (61).

Methodological Variables Confounding Empirical Estimates of NDE Frequency

Several important methodological variables differed among empirical studies and may have influenced their estimates of the frequency of NDEs. Among these critical fac-

tors were varying definitions of NDEs, varying definitions of nearness to death, sample size and representativeness, investigators' rapport with study subjects, retrospective analysis of old cases, confusion of prevalence with incidence, and the so-called "file drawer problem."

Definition of NDEs

Ambiguous Definitions

In the absence of consensus on a definition of the near-death experience, many researchers have developed their own working definitions that allow for considerable ambiguity in descriptions of both the phenomenology and the frequency of the experience. Indeed, the term "near-death experience" has at times been used so broadly as to include any close brush with death, whether or not the survivor can recall any experience. Thomas et al. attempted to estimate the incidence of NDEs with the single question: "Have you yourself ever had an experience during which you strongly felt you were going to die?" (62), although they acknowledged that this criterion was overinclusive.

Ambiguous definitions of NDEs may produce estimates of their incidence skewed by subjects' misunderstanding of the questions. This may be a more serious problem in surveys that are mailed to respondents than in studies using personal interviews of persons who come close to death. Subjects who do not understand what investigators are seeking may fail to report legitimate NDEs, or may produce false positive reports of experiences. The Gallup Poll (35) used the terms *near-death experience*, *near-death incident*, and *verge-of-death* encounter interchangeably and ambiguously, sometimes to refer to a close brush with death regardless of whether it was accompanied by any subjective experience, and at other times to refer to a mystical encounter accompanying the close brush with death.

Any Conscious Mental Activity While Near Death

Some researchers have accepted, as evidence of an NDE, any recollection of conscious mental activity during the close brush with death. Morse and colleagues (57) obtained NDE accounts from critically ill children, using as their definition "any subjective experience of any type that the subject described as occurring during the period of unconsciousness." (57) The experiences they reported included idiosyncratic imagery typical of hallucinations, including illusions of bodily distortion and visions of living persons, but not phenomena typical of NDEs, such as a life review, altered time perception, worldly detachment, or sense of universal harmony or unity. A previous report by that research team, counting as an NDE any "memories of events that subjectively occurred to them while unconscious," (55) included one patient, interviewed 5 years after her cardiopulmonary arrest, who had no memory of the event, but was considered to have had an NDE based on her mother's recollection that the patient had told her "that she dreamed she was in a classroom and was being scolded for doing something wrong" (55).

Schnaper and Panitz also counted as NDEs any recollection of an experience during the period of unconsciousness, and obtained accounts highly dissimilar from prototypical NDEs: "Three themes prevailed: being held prisoner; wrongdoing to justify imprisonment; and death.

Table 1. Published estimates of NDE incidence

Source	Percent NDEs	Sample size	Unbiased cohort interviewed	Quantitative NDE criteria
Surveys of general population:				
Olson and Dulaney (33)	11%	46	no	NDE Scale
Locke and Schontz (34)	22%	32	no	WCEI
Gallup and Proctor (35)	34%	225	random sample	no
Pasricha (36,37)	67%	24	no	no
Green and Friedman (38)	86%	50	no	WCEI
Lindley et al (39)	91%	55	no	no
Surveys of patients near death:				
Lawrence (40,41)	10%	111	no	no
Orne (42)	23%	44	no	NDE Scale
Pacciolla (43)	38%	64	no	NDE Scale
Finkelmeier et al (44)	40%	53	no	no
Feng and Liu (45)	40%	81	no	NDE Scale
Ring and Franklin (46)	47%	36	no	WCEI
Ring (25,47)	48%	102	no	WCEI
Audette (48)	>60%	>2300	no	no
Grey (49)	93%	41	no	no
Surveys of unbiased cohorts:				
White and Liddon (30)	0%	10	cardiac arrest	no
Schoenbeck and Hocutt (50)	9%	11	cardiac arrest	NDE Scale
Milne (51)	14%	42	hemodynamic instab.	NDE Scale
Greyson (52)	26%	61	suicide attempt	WCEI
Tosch (53)	33%	15	traumatic coma	no
Schnaper and Panitz (54)	37%	68	traumatic coma	no
Morse et al (55)	43%	7	critical illness	no
Sabom and Kreutziger (56)	43%	68	unconscious near death	no
Sabom (21)	43%	78	unconscious near death	no
Morse et al (57)	64%	11	critical illness	no
Morse and Perry (58)	67%	12	cardiac arrest	no
Rosen (31)	100%	7	suicide attempt	no

It is interesting that no patient expressed ideas or feelings pertaining to dying" (54). Pasricha (36, 37) used as a criterion for an NDE "some unusual experience he had while unconscious or ostensibly dead" (36). Likewise, in an early description of his research, Sabom defined an NDE as "a definite experience that had occurred during the period of unconsciousness" (63). Tosch (53) did not use the term "NDE," but reported "death-like experiences" from patients while they were comatose. While some of these experiences contained NDE-like imagery, others were confined to "a weird feeling that I had died" or "feelings of helplessness [that] scared me so much I thought I'd died" (53).

Any One Feature Typical of NDE Mentation

Other researchers have accepted as evidence of an NDE any *one item* that they have defined as typical of NDEs. Finkelmeier et al. sent survivors of "sudden cardiac death" a questionnaire that asked about "near-death phenomena," accepting as their criterion "at least one of the enigmatic phenomena," (44) including inability to feel pain; recognizing others, but not by physical appearance; experiencing a place of indescribable beauty, splendor, and peace; awareness of actual events but inability to communicate with living beings; returning to life through darkness, propelled by an outside force; feeling of separation of mind from body; moving rapidly through a dark tunnel, toward a bright light

at the end; passing through solid objects without resistance; meeting a brilliant light that had connotations of a Supreme Being; and hearing a loud noise; or communicating with dead persons by thought. Morse identified NDEs among critically ill children by report of "at least one of the NDE traits," (58) including being out of the body; encountering a tunnel, a light, people who describe themselves as being dead, or a Being of Light; a life review; or a conscious decision to return to the body.

Qualitative Resemblance to a Previous Model of NDEs

Many studies identified NDEs by a subjective qualitative assessment that experiences conformed to another researcher's description of NDEs. White and Liddon, whose study predated the term "near-death experience," looked for "religious or mystical experiences during the actual arrest incident" (30) or a life review as described by Hunter (13) or Pfister (7). Rosen (31), whose study also predated the term "NDE," reported on the "transcendence phase of near death," as described by Noyes (18). Informal second-hand accounts (48, 60) of Schoonmaker's extensive interviews between 1961 and 1979 reported "peak experiences identical to those described by Raymond Moody, Elisabeth Kübler-Ross, and others" (48).

Likewise, Sabom (21) identified accounts of experiences like those described by Moody; Lawrence (40, 41) defined

NDEs as described by Moody and Ring; Grey (49) defined NDEs as conforming to Ring's "core experience"; and Lindley et al. (39) identified NDEs by the presence of Ring's NDE stages. Morse et al. (55) identified NDEs by questions based on Greyson's NDE Scale (64), although they did not use scale scores as intended as criteria for experiences. The Gallup Poll defined NDEs as "some sort of mystical encounter along with the death event" (35).

It is apparent from Table 1 that studies that used a standardized criterion for NDEs, such as Ring's Weighted Core Experience Index (WCEI) (25), tend to report lower incidences of NDEs than those that used a qualitative assessment. Those that used Greyson's NDE Scale (64) tend to report even lower estimates than those using the WCEI.

Definition of Nearness to Death

An overly broad definition of a close brush with death may include persons who are unlikely to have experienced NDEs, and may therefore produce a lower estimate of the incidence of these experiences. Studies of NDEs have varied considerably in their selection of subjects, obscuring differential effects of the cause of the near-death event as well as of actual nearness to death. Studies of NDEs among suicide attempters, for example, include patients who vary greatly in physiological proximity to death. Greyson (52) included, in a study of NDEs following attempted suicide, patients with minor lacerations and jumps from heights as well as self-poisonings and overdoses. Likewise, Rosen's (31) study of suicide attempters included several with minor injuries and one with no physical injury at all.

Ambiguity in the definition of a close brush with death is as problematic as ambiguity in the definition of NDEs. Olson and Dulaney (33), studying NDE accounts among senior citizens who claimed to have come close to death, noted after the fact that some subjects had interpreted that phrase broadly: "For example, one subject believed she was near death when she sat with a dying relative."

Sample Size

Sample sizes that are too small may yield estimates of NDE incidence subject to random population variations. On one hand, White and Liddon (30) found no NDEs in a cohort of 10 cardiac arrest survivors. At the other extreme, Rosen reported "the transcendence phase of near death" (31) in all 7 survivors of jumps from San Francisco Bay bridges.

While these two extreme examples may reflect random fluctuations in actual incidence of NDEs in samples of 10 or fewer persons, nonrandom factors will also exert inordinate influences over small samples. A few NDEs who choose not to disclose their experiences, or a few persons who confabulate an experience, will skew the incidence estimate of a small sample far more than that of a large sample. Morse and his colleagues reported an NDE incidence based on only 4 accounts from 7 critically ill children (55); a year later, their group reported an incidence based on 7 accounts from an expanded sample of 11 critically ill children (57); while still later, they reported an incidence based on 8 accounts from a final sample of only 12 critically ill children (58). Schoenbeck and Hocutt (50) reported an NDE incidence among cardiopulmonary resuscitation

survivors, based on only 1 NDE from a sample of 11 patients. Tosch (53) reported an NDE incidence among patients recovering from posttraumatic coma, based on 5 NDEs recounted from a sample of 15 patients.

Sample Representativeness

Samples that are not random or do not comprise an intact cohort may produce estimates of NDE incidence skewed by unidentified variables. This bias is most likely to arise in studies that rely on voluntary subjects who respond to advertisements or on subjects referred by sources familiar with the investigators' interest, and in studies in which large proportions of potential subjects opt not to participate.

Voluntary Subjects

The use of voluntary subjects, such as persons who respond to newspaper advertisements, may inflate estimates of incidence of NDEs. Even if advertisements are carefully worded to avoid any mention of NDEs, persons who have come close to death but have not had remarkable experiences may be less likely to respond than persons who believe they have a remarkable story to tell. Green and Friedman, who obtained accounts of NDEs from respondents who had volunteered in response to a newspaper advertisement, acknowledged that their sample was "biased in favor of persons who had some type of experience." (38) Likewise, Ring and Franklin, who reported NDEs from suicide attempters identified from respondents to newspaper advertisements, acknowledged that "our respondents can in no way be considered a representative sample of suicide survivors." (46) Lindley et al. obtained NDE accounts from respondents who had volunteered in response to newspaper advertisements or following publicity about their study, but cautioned that "our method of contacting individuals limited the number of non-experiencers we reached" (39). Locke and Shontz (34) obtained NDE accounts from their students who had admitted, on a screening questionnaire administered to an introductory psychology class, that they had nearly died.

Referred Subjects

The use of subjects referred for study may also inflate NDE incidence estimates. Even when sources are asked to refer persons who have come close to death without regard to whether they have any recollection of the event, they may still be more likely to notice and to recall persons who had remarkable experiences than persons who had not. Grey (49) estimated an NDE incidence based on accounts from subjects who were all referred by colleagues, friends, and acquaintances. Tosch (53) reported "death-like experiences" in patients referred to her by staff at two hospitals as having recovered from posttraumatic coma. Lawrence (40, 41) reported an NDE incidence among unconscious patients who "were suggested as suitable candidates from the study by colleagues who knew of the author's interest," but acknowledged that "even although I told them that I was interested in interviewing any unconscious patients, they had a tendency to refer to me those people who had had unusual experiences." (40) Likewise, Ring, who obtained NDE accounts from subjects who had either been referred from a number of hospitals or responded to newspaper

advertisements, acknowledged that "I expect the figure of 48 percent may well be somewhat inflated" (47) by the inherent bias in self-selection and referral from various sources. Orne (42) obtained NDE accounts from survivors of cardiac or respiratory arrest who had been referred to her by doctors and nurses. Pasricha (36, 37) conducted a population survey in South India in which respondents were asked if they knew of any cases of revival after death.

High Refusal Rates

Permitting potential subjects to decline participation in the study may also inflate estimates of incidence. Persons who have not had remarkable experiences may be more likely to opt out of participation than those who have an experience they wish to share. This may be a more serious problem in mailed surveys or newspaper advertisements, which require more initiative of subjects than do studies of an entire cohort. However, it may also be a problem in cohort studies that have a high rate of refusal to participate among potential subjects.

Feng and Liu had randomly selected 100 earthquake survivors but found that 19% of those "were uncooperative or refused to answer questions" (45). Finkelmeier et al. (44) had mailed questionnaires to 79 cardiac arrest survivors but noted that 33% failed to complete the section on recollections of the arrest. Zampiere had mailed to 93 potential respondents a questionnaire, of which 31% declined to return (43). Morse and colleagues (57) noted that 15% of their patients who could be located for follow-up refused to participate. Green and Friedman (38) reported simply that many of their respondents refused to be interviewed; and Olson and Dulaney (33) acknowledged that they could not keep track of individuals who refused to participate. Ring (25) noted that his subjects "were drawn from a larger group, of which many members were either unable or unwilling to participate for a variety of reasons. . . . Only about half the illness victims—who were by far the most numerous group of near-death survivors—eventually took part in our investigation. . . . Only one in every five [suicide attempters] agreed to be interviewed."

Rapport with Subjects

Subjects who feel constrained to please interviewers may inflate the estimate of NDE incidence by confabulating or exaggerating their experiences. An informal report of Schoonmaker's study noted that "His mode of approach was very informal. . . . [and] did not adhere to a scientific protocol in the collection of his data" (48).

On the other hand, subjects who do not trust interviewers may produce lower estimates of NDE incidence by their reluctance to talk about their experiences. Although Hoffman (65) has detailed obstacles to self-disclosure among NDErs in a qualitative study, it is unclear how common this problem is and to what extent it may have influenced research results. Greyson (66) speculated that his finding of NDEs among 26% of suicide attempters (52) might have been lower than Ring and Franklin's (46) estimate of 47% or Rosen's (31) figure of 100% among suicide attempters in part because he interviewed patients in the hospital immediately following their suicide attempts, whereas the other two research teams interviewed subjects

in their homes long after the event: it is plausible that suicide attempters whose discharge plans from the hospital were still undetermined might have been more reluctant to describe anomalous experiences to a psychiatrist on the hospital staff.

Retrospective Analysis of Old Cases

A retrospective review of experiences that occurred years ago may introduce biases that result from distortion of memory over time, and from survival rates that could conceivably differ between those who did and did not have NDEs. Feng and Liu (45) conducted their interviews of earthquake survivors 11 years after the event. Morse and colleagues (57) obtained NDE accounts from children identified through a retrospective review of 6 years of pediatric critical care unit medical records; of the patients who met their selection criteria, 39% were no longer available for follow-up. A few years later, that group reported NDE accounts of critically ill children interviewed up to 10 years after their experience (58). Ring (25) obtained NDE accounts from respondents interviewed an average of more than 5 years after their close brush with death, a few more than 20 years after, and one 51 years after the event. Lawrence (40, 41) reported NDEs among unconscious patients, interviewed from within days of the event to many years after it. Zampiere mailed questionnaires to resuscitated patients identified retrospectively from medical records, but found that 26% had already died (43).

Estimates of Incidence Versus Prevalence

Certain classes of persons, such as cardiac patients, are likely to have experienced more than one close brush with death, but asking such persons whether they have ever had an NDE yields an estimate of the lifetime prevalence of the experience—the percent of persons who have had NDEs—rather than the incidence—the percent of close brushes with death that precipitate NDEs. The prevalence will necessarily be greater than the incidence; but while this distinction is important for estimates of frequency, it is irrelevant to surveys of NDE phenomenology, and therefore has been ignored by some researchers. Finkelmeier et al. (44) collected mailed surveys from 53 patients who reported a total of 91 episodes of "sudden cardiac death." They reported that 40% of these patients had experienced "enigmatic phenomena" during their "sudden cardiac deaths," but did not report what percent of these "sudden cardiac death" episodes were accompanied by "enigmatic phenomena." Zampiere (43) obtained NDE accounts from resuscitated respondents, but it was noted that some of them had had multiple resuscitations. The Gallup Poll (35) asked respondents to their survey if they had *ever* had any near-death phenomena.

The "File Drawer Problem"

Rosenthal (67) focused attention on what he called the "file drawer problem": the suspicion that studies that get published are a biased sample of the studies that are actually conducted. He emphasized that in a field with few published studies, as is the case with near-death research, only a few

studies relegated to the file drawer rather than submitted for publication could change the significance of the results.

Most published studies estimated the incidence of NDEs at 20% to 60% of persons who came close to death. However, comparable studies remained unpublished, in part because their findings were considered uninteresting because of the small numbers of NDEs uncovered. Gulley, Audette, Bordeaux, and Day found 6 NDEs among 70 patients who came close to death in two hospitals, for an NDE incidence of 9% (R. M. Gulley, MD, OSF HealthCare, Peoria, IL, e-mail communication, May 1, 1996); their rigorous study was never submitted for publication. Elfferich and van Lommel coordinated a multicenter prospective study in 10 Dutch hospitals that found 61 NDEs among 331 patients who had survived cardiac resuscitation, for an NDE incidence of 18%; their study is still awaiting publication in a Dutch medical journal (S. Lips, Stichting Merkawah, Amsterdam, e-mail communication, July 7, 1998).

Riba and colleagues (A. L. Riba, MD, Oakwood Medical Center, Dearborn, MI, telephone communication, Sept. 12, 1996) administered the NDE Scale in personal interviews with 54 patients admitted to a cardiac care unit and obtained NDE accounts from 15% of these patients. Our own study, alluded to above, also administered the NDE Scale in personal interviews to 100 patients who survived cardiac arrests, 10% of whom described NDEs. These four unpublished studies, all using personal interviews with large samples of intact cohorts of patients surviving cardiac arrest or unconsciousness near death, yielded an NDE incidence between 9% and 18%; there may be other unpublished studies of which I am not aware.

Studies Designed to Yield Empirical Estimates of NDE Frequency

In contrast to the discrepancies among NDE estimates based on varying methodologies, studies that surveyed an entire cohort of cardiac patients with personal interviews using a standardized criterion for NDEs have produced relative agreement about the frequency of NDEs. Two published studies estimated the incidence of NDEs at between 9% and 14%, using the NDE Scale: Schoenbeck and Hocutt (50) found NDEs in 9% of 11 survivors of cardiopulmonary resuscitation. Milne (51) interviewed patients who underwent cardiac electrophysiology studies at 2 hospitals during a 1-year period, and identified a cohort of those who experienced "hemodynamic instability" during the procedure, defined by a precipitous drop in blood pressure or loss of consciousness. Administering the NDE Scale in personal interviews with this intact cohort of 42 patients, she obtained NDE accounts from 14%. These two studies and the four unpublished studies noted above suggest an incidence of NDEs of between 9% and 18% of survivors of arrests and comparable cardiac crises, an incidence considerably lower than those of previous studies, yet still higher than the clinical estimates offered without the benefit of quantitative studies.

Why Are These Estimates of NDE Incidence Lower Than Previous Ones?

There are three possible explanations for these lower estimates of the frequency of NDEs: that these more recent

studies underestimated the true incidence of NDEs; that previous studies overestimated the true incidence of NDEs; or that the incidence of NDEs has decreased over the intervening years.

Do More Recent Studies Underestimate NDE Incidence?

Recent studies, including ours, could have underestimated the true incidence of NDEs if patients studied were unwilling to tell about their experiences, if criteria for NDEs were too restrictive, or if the criteria for coming close to death were too broad. I consider it unlikely that patients were unwilling to disclose their NDEs, since in our study patients seemed quite willing to describe their prior NDEs, their loved ones' NDEs, and a number of other purportedly paranormal experiences. I also believe it unlikely that our criteria were too restrictive, because there were almost no patients who obtained subthreshold scores on the NDE Scale, a finding that had been reported by previous investigators (42). It is also unlikely that the criteria for coming close to death might have been too broad, since they included surviving cardiac arrest or hemodynamic instability during electrophysiology studies, and all judgments about proximity to death were corroborated by medical records.

Do Earlier Studies Overestimate NDE Incidence?

Earlier studies may have overestimated the true incidence of NDEs if they lacked explicit or rigorous criteria for NDEs, if they biased their sample by investigating subjects referred to the researchers rather than an unselected cohort of patients, or if the "file drawer problem" had led to the sequestration of studies that found few NDEs. As noted above, many studies that reported a high incidence of NDEs used overinclusive or ambiguous criteria for NDEs, or qualitative judgments as to whether experiences matched a specified prototype; and many relied on voluntary or referred subjects. The extent of the "file drawer problem" is difficult to assess.

Has NDE Incidence Declined?

The incidence of NDEs might have decreased over past two decades if the opportunities for NDEs—that is, the number of close brushes with death—has decreased, or if psychological or sociological factors have intervened to decrease the likelihood of patients experiencing or reporting NDEs. Widespread changes in diet, exercise, and smoking, as well as recent advances in preventive cardiology such as thrombolytic pharmacotherapy and automated implantable cardiac defibrillators, may have reduced the number of cardiac patients who come close to death, or mitigated how close such patients come to death or how long they remain in that state. In fact, the incidence of cardiac death had declined 34% between 1980 and 1990 (68).

One might expect that the cultural acceptance of NDEs over the past 20 years might have raised individuals' expectations that they will have an NDE, thereby increasing the chances of their having one and their willingness to report it. However, the increased sociological expectation of NDEs over this time period could have been offset by decreased psychological "need" for NDEs. If it is true, as some investigators (69) have maintained, that NDEs occur to those who "need" them, then perhaps the increased publicity about and sociological acceptance of NDEs has

spread awareness of them so that fewer people now "need" to experience NDEs first-hand. Research into the effect on college students of studying NDEs (70) or of being assigned exercises in "unconditional love" (23) as described by many near-death experiencers suggests that people hearing about NDEs may indeed reap some of the benefits of the NDE by their second-hand familiarity with the experience.

Conclusion

Although published estimates of the incidence of NDEs vary from 0% to 100%, many of them are based on studies that for methodological reasons cannot be taken as accurate estimates of NDE frequency. It must also be borne in mind that the numbers of subjects assessed in all these studies may be too small to detect the influence of intervening variables, both physiological and psychological, on the incidence of NDEs. For example, studies of children and of suicide attempters tend to produce high estimates of NDE incidence, which may suggest that those groups might be psychologically predisposed to acknowledge NDEs when they occur and/or to share them with researchers. On the other hand, studies of cardiac arrest survivors tend to produce lower estimates, which may reflect the high rate of amnesia for the close brush with death experienced by those patients (59). There is some evidence that intoxication or drug ingestion may inhibit either the occurrence or the subsequent recall of NDEs, particularly among suicide attempters (66).

This critique of estimates of NDE frequency should not be construed as criticism of the work of other researchers, but rather as recognition that studies designed to answer other questions may produce misleading estimates of NDE incidence. In contrast to the popular belief that NDEs occur to about 33% of persons who come close to death, studies designed specifically to determine NDE incidence, using standard quantitative instruments administered in personal interviews to intact cohorts of patients near death, consistently yield estimates on the order of 9% to 18%.

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