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EDITORIALS: Children, Adolescents, and Television	<i>H. J. Holroyd</i>	549
Chlamydial Ophthalmia Neonatorum	<i>H. R. Harrison</i>	550
Oral Glucose-Electrolyte Solutions	<i>L. Finberg</i>	552
EDUCATIONAL INTERVENTIONS: A Tympanocentesis Learning Aid	<i>M. R. Weir, J. H. Archambault</i>	553
The Emphasis of Telephone Medicine in Pediatric Training Programs	<i>P. D. Fosarelli</i>	555
ARTICLES: Unexpected Death in Childhood Asthma	<i>L. P. Kravis, G. B. Kolski</i>	558
Topical Sulfacetamide vs Oral Erythromycin for Neonatal Chlamydial Conjunctivitis	<i>A. D. Heggie, A. C. Jaffe, L. A. Stuart, P. S. Thombre, R. U. Sorensen</i>	564
Limitations of Theophylline in the Treatment of Apnea of Prematurity	<i>M. E. Sims, G. Yau, S. Rambhatla, L. Cabal, P. Y. K. Wu</i>	567
Oral Glucose-Electrolyte Solutions as Maintenance Therapy of Acute Diarrhea	<i>R. Listernick, E. Zieserl, A. T. Davis</i>	571
Congenital Syphilis Revisited	<i>L. Mascola, R. Pelosi, J. H. Blount, C. E. Alexander, W. Cates, Jr</i>	575
Acute Segmental Necrotizing Enteritis in Children	<i>B. P. Kalani, N. S. Shekhawat, K. C. Sogani</i>	586
Evaluation of Newborns With Suspected Congenital Heart Disease	<i>D. J. Murphy, Jr, R. A. Meyer, S. Kaplan</i>	589
Near-Death Experiences in a Pediatric Population	<i>M. Morse, D. Conner, D. Tyler</i>	595
Focal Motor Seizures Herald Stroke in Full-term Neonates	<i>R. Clancy, S. Malin, D. Laraque, S. Baumgart, D. Younkin</i>	601
SPECIAL FEATURE: Radiological Case of the Month	<i>C. T. Lé, L. W. Young</i>	607
ARTICLES: X-linked Glycogen Storage Disease	<i>J. P. Keating, B. I. Brown, N. H. White, S. DiMauro</i>	609
Seroepidemiology of the Group-A Streptococcal Carriage State in a Private Pediatric Practice	<i>C. M. Ginsburg, G. H. McCracken, Jr, S. D. Crow, B. R. Dildy, G. Morchower, J. B. Steinberg, K. Lancaster</i>	614
Intubation-Related Tracheal Stenosis in Very-Low-Birth-Weight Infants	<i>C. C. Caldwell, J. Stankiewicz, C. L. Anderson, G. S. Ahmed, T. F. Myers</i>	618
Families of Children With Idiopathic Hypercalciuria	<i>L. C. Hymes, B. L. Warshaw</i>	621
Predicting Clinically Significant Lower Respiratory Tract Illness in Childhood Following Mild Bronchiolitis	<i>K. M. McConnochie, K. J. Roghmann</i>	625
Sulfisoxazole Prophylaxis of Middle Ear Effusion and Recurrent Acute Otitis Media	<i>I. Varsano, B. Volovitz, F. Mimouni</i>	632
Thyroid Dysfunction in Down Syndrome	<i>S. M. Pueschel, J. C. Pezzullo</i>	636

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Near-Death Experiences in a Pediatric Population

A Preliminary Report

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• Numerous accounts of a unique psychological state associated with near-fatal events have been described in adults; however, we know of no studies in the medical literature of the nature or incidence of such experiences in children. Four of seven children who survived cardiopulmonary arrests or coma associated with trauma, drownings, or hyperosmolar states reported near-death experiences. Their subjective accounts of their experiences included a sense of being out of the body, traveling in a tunnel or staircase, seeing beings dressed in white, and a decisional return to the body. Six patients hospitalized in the intensive care unit for epiglottitis, heart surgery, or Guillain-Barré syndrome, all of whom had mechanical ventilatory support and were treated with anesthetic agents and narcotics, had no memories of the time they were unconscious. Clearly, children report near-death experiences similar to ones previously described in adults. Further systematic study of this phenomenon is indicated.

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Case reports have appeared in the scientific literature describing altered states of consciousness in patients surviving life-threatening danger or serious illnesses.^{1,2} A traumatic depersonalization syndrome described as including altered time perception, a sense of worldly detachment, and panoramic life review has been described in patients who have survived near-

fatal accidents and who did not lose consciousness.³⁻⁵ More extensive near-death experiences (NDEs) consisting of peaceful affect, panoramic life review, passing through a tunnel, an impression of being outside the body, seeing a world or being of light, and reaching an impassable border have also been described in critically ill adults, primarily in the popular press.⁶⁻¹¹ At least one case report describing an NDE has been reported in children.¹²

Few descriptive studies of the nature and incidence of NDEs exist in the adult literature. Rosen studied seven survivors of suicide attempts from San Francisco area bridges and reported that although one survivor had images of his dead father during his fall, and all had feelings of tranquility, none of the other aforementioned experiences were described.¹³ Sixty of 200 survivors of life-threatening danger were reported as having panoramic memory responses.¹⁴ Druss and Kornfield interviewed ten survivors of cardiac arrests and reported a variety of delusions and hallucinations ranging from one patient who said he was on another floor having a routine procedure done at the time of the arrest to another who stated he had visual images of some sort of afterlife.¹⁵ Only one of the 20 survivors of cardiac arrests interviewed by Dobson et al reported paranormal experiences.¹⁶ Other estimates of the incidence of NDEs have ranged from 2% of patients surviving cardiac arrests¹⁷ to nearly 50% of such patients.^{18,19} The interpretation of these studies is made difficult by a lack of experimental design in selecting patients.

This report presents a descriptive study of NDEs in a pediatric population.

PATIENTS AND METHODS

Medical records of 42 patients who were 3 through 16 years of age and who were hospitalized in the pediatric intensive care unit at Children's Orthopedic Hospital, Seattle, from 1978 through 1983 were non-selectively reviewed. The study population was separated into two groups: a critically ill group consisting of survivors of conditions with a significant mortality, and a seriously ill control group, consisting of patients unlikely to have significant mortality or sequelae given the care in our intensive care unit. The critically ill group consisted of four survivors of cardiac arrests (mortality, 43%),²⁰ two survivors of severe trauma or near-drownings with Glasgow coma scores of 5 or less (mortality, 24% to 45%),^{21,22} and one patient who survived hyperosmolar coma (mortality, 6% to 15%).^{23,24} The seriously ill control group included six patients who were hospitalized in the intensive care unit, underwent mechanical ventilatory support, and were likely to be treated with narcotics, benzodiazepines, and anesthetic agents; these patients had discharge diagnoses of epiglottitis, Guillain-Barré syndrome, pneumonia, or cardiac surgical procedures. No patients requiring treatment with psychiatric medications were included. Twenty-four patients were excluded from the study because of evidence of a failure to return to pre-morbid intellectual functioning, defined as a failure to return to pre-morbid school performance or work. Four patients were unavailable for follow-up, and one refused entrance to the study, leaving 13 patients who were studied.

This study was approved by the Children's Orthopedic Hospital Internal Review Board Human Subjects Review Committee and informed consent was obtained

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Table 1.—Patient Data*

Patient No./Age, yr	Diagnosis	Abnormal Laboratory Values	Medications	Length of Coma
				Critically Ill Group
1/16	Cardiac arrest	pH, 7.63; Pco ₂ , 26 mm Hg; Po ₂ , 429 mm Hg	Halothane, diazepam, morphine sulfate, epinephrine bitartrate, phentolamine mesylate, epinephrine hydrochloride	12 hr
2/6	Cardiac arrest	pH, 7.22; Pco ₂ , 40 mm Hg; Po ₂ , 95-130 mm Hg	Halothane, epinephrine bitartrate, phentolamine mesylate, lidocaine hydrochloride, furosemide, diazepam, dexamethasone sodium phosphate, phenylephrine hydrochloride	6 hr
3/11	Cardiac arrest	Serum potassium, 8.4 mEq/L	None	2 hr
4/8	Hyperosmolar coma	pH, 7.17; Po ₂ , 54 mm Hg; blood glucose, 2,398 mg/dL; serum sodium, 126 mEq/L; Pco ₂ , 37 mm Hg	Insulin	72 hr
5/8	Near-drowning	pH, 7.18; Pco ₂ , 26 mm Hg; Po ₂ , 444 mm Hg	Thiamylal sodium, pancuronium bromide, fentanyl citrate, diazepam, halothane, dexamethasone sodium phosphate	21 days
6/4	Head trauma	Intracranial pressure, 36 mm Hg	Halothane, morphine sulfate, pancuronium bromide, phentolamine mesylate, thiamylal sodium, epinephrine bitartrate, phenobarbital sodium, fentanyl citrate	14 days
7/7	Cardiac arrest	pH, 7.20; Pco ₂ , 71 mm Hg; Po ₂ , 42 mm Hg	Halothane, morphine sulfate, diazepam, epinephrine hydrochloride	2 days
				Seriously Ill Control Group
8/11	Surgical closure of ventral septal defect	pH, 7.40; Pco ₂ , 45 mm Hg; Po ₂ , 55 mm Hg	Thiamylal sodium, halothane, epinephrine bitartrate, furosemide, morphine sulfate, phentolamine mesylate	6 hr
9/8	Epiglottitis	None	Halothane, morphine sulfate, diazepam	24 hr
10/5	Epiglottitis	None	Diazepam, morphine sulfate, halothane, phenobarbital sodium	12 hr
11/6	Epiglottitis	None	Diazepam, morphine sulfate, halothane	12 hr
12/8	Epiglottitis	None	Halothane, aminophylline dihydrate	2 hr
13/16	Guillain-Barré syndrome	pH, 7.30; Pco ₂ , 52 mm Hg; Po ₂ , 320 mm Hg	Halothane, diazepam, morphine sulfate	2 hr

*Pco₂ indicates arterial carbon dioxide pressure; Po₂, oxygen pressure.

†Self-description by family members.

from all of the subjects and their parents prior to participation.

Interviews were conducted by the first two authors. All of the interviews were conducted at least two months after discharge from the hospital. A formal interview schedule was developed as follows. Both the parent and child were interviewed together. After a brief introduction, we asked for a summary of the parent's perception of the medical history. Then both the parent and child were asked open-ended questions concerning the child's memories of his or her hospitalization. Typical questions were "What do you remember about the time you were unconscious or asleep?" "Did you have any dreams?" and "Did your child tell you anything about the time he [or she] was unconscious?" Both parent and child were asked to summarize the family's religious training and attitudes toward death, with particular attention to the family's reaction to any recent deaths in the family. The children were encouraged to

draw pictures of their experiences.

After the parent and child had a complete opportunity to tell of their experiences and the interview was almost finished,¹⁶ directed questions requiring "yes" or "no" answers based on an NDE scale developed for adults²⁵ were asked (eg, "Did you see a tunnel?" "Did you see a being of light?")

Following the parent and child interview, the medical records were examined for medications, results of blood gas studies, length of coma, results of blood chemistry studies, and other medical details of interest.

RESULTS

Thirteen children were interviewed. The critically ill group included four patients who had cardiopulmonary arrests, one patient with closed head trauma, one near-drowning victim, and one patient who had hyperosmolar coma. The seriously ill group included four patients with epiglottitis, one pa-

tient who had a cardiopulmonary bypass procedure, and one patient with Guillain-Barré syndrome.

All of the patients freely discussed their memories with the interviewers. Although the directed-question section was included in all interviews, with this format no new information was obtained that was not previously obtained from the open-ended questioning.

Four of the seven critically ill children reported NDEs. Brief case reports are as follows, with pertinent medical information presented in Table 1.

PATIENT REPORTS

PATIENT 1.—A 16-year-old boy with chronic renal failure secondary to glomerulonephritis developed abdominal and thoracic pain. Cardiac echosonography demon-

Near-Death Experience	Religious Convictions†	Belief in Afterlife
Peaceful affect, dark staircase, decision to return, perception of heaven	Mormon	Yes
Peaceful affect, out of body, bright tunnel	Nonpracticing Christian	No
Frightened, saw classmates and schoolteacher	Practicing Christian	Yes
Out of body, saw classmates and schoolteacher, frightened, saw "doctors in white," decisional return	Practicing Christian	Yes
None	Practicing Christian	Yes
None	Nonpracticing Christian	No
None	Jehovah's Witnesses	Yes
None	Practicing Christian	Yes
None	Practicing Christian	Yes
None	Practicing Christian	Yes
None	Practicing Christian	Yes
None	None	No
None	Practicing Christian	Yes

strated a thickened aortic valve, and the patient underwent an exploratory aortotomy, with a cardiac bypass time of 36 minutes and systemic hypothermia of 18 to 26 °C. There were complications after cardioplegia was reversed and several minutes of cardiopulmonary resuscitation with cardioversion were required. Medications given at that time included halothane, morphine sulfate, prednisone, and antibiotics. The most abnormal arterial blood gas study showed an arterial pH of 7.63, carbon dioxide pressure of 26 mm Hg, and oxygen pressure of 429 mm Hg. There were no neurologic sequelae after the operation, and the patient returned to his regular school class.

When interviewed four years later, the patient stated that he had no memory of the operation. Both parents stated that after the operation he told them "I have a wonderful secret to tell you. I have been halfway to heaven." The experience "felt wonderful and peaceful. I was on a dark

staircase and I climbed upwards." About halfway up the stairs, he decided to turn back because he had a younger brother who had previously died and he didn't think it was his time yet (to die).

This patient's family were devout Mormons, attended church weekly, and believed in a soul and an afterlife existence. Neither the patient nor his parents attached any special significance to his experience and stated that it was not discussed after the postoperative period.

PATIENT 2.—A 6-year-old boy was admitted for tonsillectomy and adenoidectomy for unclear indications. His medical history included regular counseling of the child and his mother since the age of 3 years for behavioral problems. After induction of anesthesia with halothane, there was a cessation of spontaneous heart beat requiring three minutes of chest compressions. While in the recovery room, the patient had a second cardiopulmonary arrest necessitating cardioversion and administration of

cardiac pressor agents. A few minutes later, a third cardiopulmonary arrest occurred that responded to 30 minutes of closed-chest compressions and cardioversion. A review of the patient's laboratory data showed that at no time did the arterial pH drop below 7.22, the carbon dioxide pressure rise above 40 mm Hg, or his arterial oxygen content drop below 95 mm Hg. Later the same day, the patient was described as being alert and eating ice cream, with no apparent neurologic complications. He later returned to his regular school grade and performed satisfactorily. Medications given to the patient during his cardiopulmonary arrests included atropine, calcium chloride, lidocaine hydrochloride, furosemide, diazepam, phenylephrine hydrochloride, epinephrine bitartrate, dexamethasone sodium phosphate, and morphine sulfate.

When interviewed two years later, the patient had very clear memories of his experience while comatose. He had never confided them to his mother previously, but had told a grandparent about his experience one year earlier. He stated that he left his body and hovered above the operating table. He had only hazy images of the doctors, but noted "I had a tube in my mouth." The patient's next memory was that of traveling in a long tunnel that was lined with brightly colored lights of every hue, similar to "airplane landing lights." He felt very peaceful. He specifically stated that he did not know where the tunnel went, why he was in it, how he came to return to his body, or any other details.

The patient's family subscribed to traditional Christian beliefs, but were not practicing members of any church. There were no family teachings concerning the existence of a soul or afterlife. He did not have any apparent psychological sequelae to this experience.

PATIENT 3.—An 11-year-old girl with cystinosis who had a renal transplant at the age of 8 years with subsequent rejection had a brief cardiopulmonary arrest at home after home dialysis. She required several minutes of mouth-to-mouth resuscitation and chest compressions. She responded completely and was alert and conscious without neurologic residua later that day. Laboratory values were normal with the exception of a serum potassium level of 8.4 mEq/mL immediately after her arrest. No medications were given. Arterial blood gas levels were normal.

The patient had no memory of her cardiopulmonary arrest when interviewed five years later. Her mother stated that when her daughter was fully conscious again, she began crying and said "I had a bad dream." The patient told her mother that she

dreamed she was in a classroom and was being scolded for doing something wrong. Her family were devout Christians who attended church regularly. They believed in the existence of a soul, an afterlife, and that Christ was physically present with them at all times. The patient returned to her regular school setting without difficulty, without apparent psychological sequelae.

PATIENT 4.—An 8-year-old girl was admitted with diabetic ketoacidosis and hyperosmolar coma, with a history of Graves' disease. Although initially alert, she became unresponsive in the waiting room and remained obtunded for one day. Pertinent laboratory data included an initial serum glucose level of 2,398 mg/dL, a sodium level of 126 mEq/L, an arterial pH of 7.17, and an oxygen pressure of 54 mm Hg. Results of thyroid function studies were normal. The patient was intermittently responsive for several days and had a full neurologic recovery on the third hospital day, following intensive rehydration and treatment with insulin, sodium bicarbonate, and methimazole. She was not treated for cerebral edema, nor did she receive narcotics, benzodiazepines, or anesthetic agents. She was never hypoglycemic.

The patient's recollection of her experiences when she had been in a coma were as follows. She remembered being in the emergency room, and being asked to give a urine specimen. She then described three discrete memories, which were in color and very vivid. Initially she was on an examination table and felt she was floating above her body. She could look down on her body below, as well as see two male doctors around her. She did not feel any emotions, hear any sounds, and could not supply any other details of this experience. Her second memory was that of being on a bed in another room that she identified as being in the intensive care unit. Her school class and her teacher were gathered around her and were singing songs and wishing her well.

The patient was very apprehensive about describing her third experience. She initially stated that she could not remember anything else, and finally consented to draw a picture of what she remembered. While drawing the picture, she explained that she was lying in bed and that there were several male figures behind her. She was afraid to look at them, but did once, and described them as being doctors dressed in white. They told her to press a red button on a box at her bedside. The patient knew this would be wrong, so she pressed a green button instead, and then regained consciousness. She did not know why it was wrong to press the red button, nor did she know why she was afraid to look at the doctors.

After being discharged from the hospital, the patient returned to her regular fourth-grade class and made satisfactory progress. She had some residual right upper extremity weakness but otherwise made an apparent full recovery. She had no siblings and had an unremarkable history. The patient attended Presbyterian Sunday school once a month. Her mother stated that there is a heaven but that "we will not know what heaven is until we die." No family members had recently died and the family did not have any specific death-related teachings.

Three other critically ill children were interviewed: a 4-year-old survivor of a closed-head injury, a 10-year-old near-drowning survivor, and a 16-year-old patient with chronic renal failure who survived a cardiopulmonary arrest. These patient's medical histories are summarized in Table 1. None of them reported any memories of the time they were unconscious.

In addition, six seriously ill children were also interviewed. All of these patients had undergone mechanical ventilatory support, were treated with narcotics, benzodiazepines, and anesthetic agents, and were unconscious at some time during their hospital course (Table 1). None of these children had any memories of the time that they were unconscious. A typical case report is as follows.

PATIENT 8.—An 11-year-old girl was diagnosed at the age of 5 months as having tetralogy of Fallot. At the age of 18 months transposition of the great vessels, an atrial septal defect, and a ventricular septal defect were documented by cardiac catheterization and a right-sided Blalock-Taussig operation was performed. Subsequently the patient had successful closure of her Blalock-Taussig shunt, closure of her pulmonic valve, and suture closure of multiple atrial septal defects. She was admitted for repair of her ventricular septal defect. The patient underwent cardiac bypass with hypothermia to 26 °C. The noncoronary perfusion time was 64 minutes. She had an entirely unremarkable postoperative course. Her medications included epinephrine bitartrate, phentolamine mesylate, morphine sulfate, diazepam, furosemide, digitalis, lidocaine hydrochloride, codeine phosphate, and nafcillin sodium.

She returned to her fourth-grade class and performed satisfactorily. The patient had no memory of the time she was unconscious. She did experience dreams of doctors turning into monsters and attacking her throughout the postoperative course. She received counseling for chronic depression that was related to her extensive surgical history.

Her mother described herself as a

"devout Christian" with twice-weekly church attendance. Family teachings included belief in the existence of a soul and an afterlife.

COMMENT

A prototype NDE has been described in adults as being unique to critically ill patients, although it contains elements in common with dreams, mystical states, and transcendental experiences. This prototypical experience consists of feelings of peace, entering a tunnel, being out of the physical body, seeing a world of light, entering into that world, meeting others (especially dead relatives), and reaching a border or a limit. There is often a decision to return to the body.⁷ These aforementioned characteristics are a consistent cluster of experiences reported by patients at the point of death, despite the religious or cultural context of the experience. This core experience is qualitatively different from experiences of patients with altered mental status from brain tumors, degenerative central nervous system diseases, schizophrenia, or drug-induced hallucinations.¹⁰

Four of seven critically ill children in our study reported NDEs, while none of the seriously ill control patients had any memories of the time they were unconscious. Both groups were subjected to the sensory deprivation and psychological stresses of the intensive care unit, underwent mechanical ventilatory support, and were treated with narcotics and anesthetic agents. As we know of only one other case report of an NDE in a child in the medical literature, there are not yet enough data available to analyze statistically these experiences. This preliminary report documents that NDEs occur in children as well as in adults.

The NDEs reported by children contain many of the same elements as those reported by adults. Children have described a variety of experiences, from seeing their classmates and teachers (two patients) to out-of-body phenomena (three patients). These are consistent with a similar variety of experiences, from the mundane to the spiritual, described by adult survivors of cardiac arrests.¹⁵ The prototypical NDE elements re-

Table 2.—Subjective Experiences of Children v NDEs of Adults and the Traumatic Depersonalization Syndrome*

Experience	Present Study, No. of Patients		Adult NDE, %	Depersonalization, %
	Critically Ill (n = 7)	Seriously Ill (n = 6)		
Peaceful affect	2	0	70	39
Fearful affect	2	0	<5	0
Out of body	2	0	75	54
"Being of light"	1 (doctors dressed in white)	0	27	0
Sense of being with God, vision of heaven	1	0	72	39 (sense of unity)
Traveling in a tunnel	1 (tunnel) 1 (staircase)	0	31	0
Seeing/communicating with dead persons	0	0	49	0
Seeing/communicating with living persons	2	0	14	0
Impassable border	0	0	57	0
Decisional return to body	2	0	24	0
Life review	0	0	27	47
Worldly detachment	0	0	Not assessed	67
Altered sense of time (slow motion)	0	0	54	80

*Data are from studies by Greyson and Stevenson³⁵ and Noyes and Kletti.⁵ NDE indicates near-death experience.

ported by our study population included being out of the body, going through a tunnel, seeing beings in white, experiencing feelings of peaceful affect, and a decisional return to the body. An unexpected result was that two patients saw living persons, a relatively infrequent finding in adults.³⁶ Significantly absent were elements of the traumatic depersonalization syndrome, including life review, altered time perception, and a sense of worldly detachment. It has been postulated that NDEs are a consequence of traumatic depersonalization associated with acute stress, narcotics, and the sensory deprivation associated with intensive care unit environments.²⁶ None of the 13 patients interviewed described elements of traumatic depersonalization (Table 2).

One physiological explanation for NDEs is that they are caused by chemical alterations in the brain secondary to either hypoxia or hypercarbia at the point of near death. Early work by Meduna using inhaled carbon dioxide as a psychotherapeutic agent demonstrated that all of the aforementioned

elements of NDE can be induced.²⁷ Yacorzynski et al also reported NDE-like experiences in patients receiving inhaled carbon dioxide or nitrous oxide.²⁸

A variety of drugs have been related to alterations in consciousness. LSD has been reported to cause prototypical NDEs in patients with terminal cancer.²⁹ This may be related to alterations in the enzymatic transfer of oxygen.³⁰ The anesthetic agent ketamine is known to produce a wide variety of hallucinations, including out-of-body experiences. Narcotics or endorphin release at the point of near death have also been postulated to cause NDEs by producing a limbic lobe syndrome.³¹

An analysis of our study population could not produce support for any of these physiological mechanisms. One patient who experienced out-of-body phenomena and a decisional return to the body had no evidence of hypoxia or hypercarbia, and did not receive any medications other than insulin (Table 1). Two patients had NDEs associated with intraoperative cardiac arrests

and were not observed to have abnormal blood gas levels. Conversely, all of the patients in the seriously ill control group were treated with narcotics and anesthetic agents and did not have NDEs. A full analysis of possible confounding variables will only be possible with a larger study population.

Numerous other speculations as to the cause of these experiences have been proposed, including a triggered memory of the birth experience,³² a defense mechanism against the fear of dying,³³ or a dissociative reaction to the stress of dying.³⁴ These experiences may represent a physiological equivalent of a jungian archetype, ie, a set of experiences imprinted in the brain that can be released by a variety of stresses. Clearly, NDEs occur in persons who are not critically ill, as demonstrated by reports of NDEs in adults who are exposed to potentially fatal situations but who escaped unharmed.³

Four of seven critically ill patients described memories of events that subjectively occurred to them while unconscious. Three of these patients described experiences similar to the prototypical NDE previously described in adults, including feelings of peace, being out of the body, traveling through a tunnel, and a decisional return to Earth. Six seriously ill age-matched control patients subjected to similar medications and environmental stresses did not report any experiences. We present this preliminary report to alert physicians that NDEs occur to a significant number of critically ill children. Further well-documented descriptions and controlled studies are necessary to advance our understanding of these fascinating phenomena. It is unclear whether these experiences are an artifact of physiological events at the point of near death, or perhaps represent a natural developmental or psychological process associated with dying.

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Michael F. Holick, MD, PhD (*Arch Dermatol* 1985;121:601-603)

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Zeev Hochberg, MD; Amos Gilhar, MD; Salim Haim, MD; Rachel Friedman-Birnbaum, MD; Joseph Levy, MD; Avraham Benderly, MD (*Arch Dermatol* 1985;121:646-647)