

Observation of Two Suicides by Helium Inhalation in a Prefilled Environment

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Abstract: In recent years information about suicide with helium has spread rapidly on the Internet, in print, and even on video. Increased awareness of this suicide method means that instead of turning to a physician for aid in dying, some people will terminate their lives with this nonpharmaceutical method. Although there are many case reports of hypoxic suicide by helium inhalation, little is known about the pathophysiology of this type of death.

Pathologists should know what hypoxic suicide looks like. Carefully planned, autonomous suicides present possibilities for passive, naturalistic observation of the phenomenon. This article describes a method for direct observation of suicide and reports on 2 hypoxic suicides from inhalation of helium inside a prefilled environment.

Key Words: asphyxia, helium, inert gas, plastic bag, suicide

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In 2002 the *American Journal of Forensic Medicine and Pathology* published the first case report of suicide by helium asphyxiation. A 60-year-old woman died by breathing helium gas inside a plastic bag, in accordance with “how to” literature and an instructional video.¹ Since 2002, numerous suicides by helium inhalation^{2–14} as well as accidental deaths^{15,16} have been reported around the world.

Helium is a nontoxic, noncombustible, colorless, and odorless inert gas and should be used in a well-ventilated area. The Occupational Safety and Health Administration regards helium as a simple asphyxiant, a gas that can dilute atmosphere oxygen below the partial pressure required to maintain life. Normal air contains approximately 21% volume of oxygen and the Occupational Safety and Health Administration defines an oxygen deficient atmosphere as one below 19.5%.¹⁷ The human response to oxygen deficient atmospheres is progressive. At an oxygen volume of 12% to 16% pulse and breathing rate increases and coordination is disturbed. At 10% to 14% there is abnormal fatigue and disturbed respiration. At 6% to 10% there may be nausea, vomiting, loss of free mobility, and loss of consciousness. Levels under 6% oxygen volume can cause convulsions, gasping, loss of respiration, and cessation of heart activity after only a few minutes. Sudden exposure to a severely oxygen deficient environment will cause loss of consciousness within 5 to 10 seconds and permanent brain injury within 2 minutes.¹⁸

Additional to its potential for self-destruction, helium has many practical applications. These include balloon inflation, alleviation of upper airway obstruction, cryogenics, gas chromatography, welding applications, and as an air mixture for underwater diving.

Some pathologists have noted that helium may be misunderstood as a poison, hence the motivation to use it for suicide.²

Although helium is not a poison, accidental and suicidal deaths from its inhalation are documented in several recent annual reports of the American Association of Poison Control Centers.^{4,6,8} Similarly, although helium is not classified as a volatile substance, in the United Kingdom it is included in annual death reports on volatile substance abuse.⁹

The basic mechanism of death from helium asphyxiation is oxygen deprivation. There should be no feeling of suffocation because the exclusion of oxygenated air limits carbon dioxide production and any associated feeling of the need to exhale. Furthermore, an individual who is breathing helium in a prefilled environment will lose consciousness almost immediately, and therefore have no awareness of suffocation.

THE RISE OF HELIUM IN SUICIDE

The use of helium as an agent for suicide is relatively recent. The gas receives no mention in the 1991 first edition of *Final Exit*,¹⁹ the world’s best known “self-deliverance” guidebook. *Final Exit* is famous for describing how prescription drugs and a plastic bag could be used for suicide, and the book may have temporarily influenced choices of suicide method in the United States. In the first year of its publication, suicides with plastic bags in the United States rose 30.8%, from 334 in 1990 to 437 in 1991.²⁰ Interestingly, the overall incidence for suicide in the United States for 1991 actually declined 0.9% from the previous year.²¹ Therefore, although *Final Exit* is correlated with short-term increase in the incidence of plastic bag suicide, it can be argued that the book is associated with suicide prevention because the overall suicide rate in the United States has declined during the decade after the publication of *Final Exit*.²²

The first edition of *Final Exit* dismissed gas methods for suicide. But, in 2000 detailed information about the lethality of helium asphyxiation was published in *Supplement to Final Exit*²³ and a separate video/Digital Video Disc (DVD).²⁴ By 2002 the third edition of the book had a full chapter on helium asphyxia titled, “A speedier way: Inert gases.”²⁵

It appears that the inspiration for the rise of helium as a method for suicide was a November 1999 conference of the Self-Deliverance New Technology Group, NuTech.^{25,26} At this 2 day conference in Seattle, Washington, inert asphyxial gases were discussed by “right to die” activists. Shortly after the conference, organizations in the United States and Canada started distributing print and video products with instructions on the helium suicide method.^{23,24,27,28}

Helium is not established in veterinary euthanasia, but it has been proposed as a potential hypoxic agent for laboratory animals.²⁹ There are veterinary euthanasia protocols for other inert gases, especially nitrogen and argon, which are “conditionally acceptable” for nonhuman primates.³⁰ Sudden deaths of humans inhaling nitrogen^{31–33} and argon³⁴ are reported in the forensic literature.

Death investigators have forecast increases in the number of suicides associated with inert gases, particularly helium.^{11,13} Knowledge about helium suicide has spread quickly² and the essential materials are easily purchased at toy shops, scuba and welding suppliers, and from Internet retailers.

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TABLE 1. Helium Suicides in British Columbia, Canada 1999–2006

Year	No. Suicides			Helium Suicide Literature at Scene	Assay for Helium Attempted
	Male	Female			
1999	1	1	0	0	1
2003	6	5	1	4	0
2004	3	3	0	0	0
2005	3	2	1*	2	0
2006	4	3	1	2	0
Total	17	14	3	8	1

Information is based on BC Coroner's Judgments of Inquiry obtained pursuant to the *Freedom of Information and Protection of Privacy Act*.

*In this 2005 case, the helium and literature were found in a room separate from the deceased. The coroner's report made no conclusion whether the apparatus may have been used and moved.

Further to the growing number of helium death reports in the forensic literature, patterns are emerging in official death records. Here in British Columbia, Canada, records obtained under the *Freedom of Information and Protection of Privacy Act* show that from 1999 to 2006, coroners investigated 17 suicides where there was scene evidence of helium (Table 1). In 8 cases literature about helium suicide was found nearby. The classification of death relied on scene evidence in all of the cases, and in only one instance was assay for helium attempted, with no resulting measure. Given that helium is the usual carrier gas in chromatography, routine toxicological analysis will not reveal helium in the tissues. Auwärter et al¹³ recently published a procedure for tissue collection and analysis for helium by gas chromatography/mass spectrometry, using nitrogen as the replacement carrier gas.

The opportunity to study helium suicide is generally limited to cases where scene evidence reveals the manner of death. Given that there are no pathognomonic signs in asphyxial deaths,³² helium asphyxiation is easily disguised by the removal of the suicide apparatus.^{1,13,26} In fact, the third edition of *Final Exit* suggests "it would be advisable to remove the helium gas apparatus, because that would intrigue the minds of the police, thus making their inquiries lengthier" (p 139).²⁴ Underreporting of helium suicides is likely if the equipment is removed by family or friends. The general stigma of suicide and the fear of being implicated for wrong doing will deter witnesses from volunteering information.

There are many questions about the pathophysiology of asphyxiation by inhalation of helium. How rapid is the loss of consciousness? Are there signs of struggle or pain? How quickly does death occur? Answers are difficult to come by because there are obvious challenges in designing protocols for the scientific observation of suicide. Nonetheless, overt naturalistic observation of the phenomenon is possible. This study describes a method to observe suicide and reports on 2 hypoxic suicides with helium.

MATERIALS AND METHODS

Certain "right to die" activists were informed about this research agenda to observe suicide. In turn, they advised selected members that they could contact the researcher for more information. Two women consented to interviews about their intentions to suicide and the observation of their deaths. Permission to video record their suicides was refused.

A finger pulse oximeter (Meditech PO₂) was used to measure the effect of helium on heart rate and blood oxygen levels. At the suicide events, a stopwatch was used to measure the time of specific observations such as loss of consciousness, breathing changes, and reflex movements, and these were recorded in handwritten notes. In

To Whom It May Concern:

It is my careful and well considered decision to end my life according to my values and beliefs. This decision was made without regard to Mr. Ogden or his research. It is my desire to have Mr. Ogden with me when I decide that it is time for me to end my life.

I am not seeking publicity. I want it known it is clear to me Mr. Ogden is not facilitating, advancing, promoting, expediting, inciting, emboldening, urging or encouraging me to end my life.

My decisions and my actions are carefully considered and I have evaluated the choices available to me. I am clearly aware that I am free to change my mind if I choose.

I understand that Mr. Ogden is an observer and his purposes are academic research, for the benefit of education and scholarship. It is my wish that no harm come to him as a consequence of his attendance.

Dated at _____, this ____ day of _____, 2007

Name (please print)

Address

Signature

FIGURE 1. Sample legal release provided to the investigating coroner/police officer.

Sometimes research participants alter their normal behaviour patterns because they are aware that they are being observed. This is known as "reactivity" to the researcher. Reactivity is defined as "atypical or artificial behaviour produced by respondent's awareness of being studied." It is a requirement of the Research Ethics Board (REB) that I inform you that my presence as a researcher may influence your behaviour.

I am not asking you to complete this self-chosen death. Even though I am here at your request to document this planned death, you do not have to carry through with it because I am here. You can change your mind. The REB's ethical approval of this research in no way is intended as a statement about the ethical status of this proposed self-chosen death.

FIGURE 2. Text of statement to address participant reactivity.

the second suicide observation a micro cassette recorder was used to obtain a continuous audio recording of observations and to verify handwritten notes.

Suicide is not illegal in Canada and it is not an offense to be present at a suicide. There is no legal obligation to prevent a suicide. It is, however, a criminal offense to counsel, aid, or abet a suicide and the maximum penalty is 14 years imprisonment. On behalf of the researcher, the Canadian Association of University Teachers obtained legal advice to ensure that the research protocol was in compliance with Canada's *Criminal Code*. The 2 participants signed a release to confirm that their decisions and actions were autonomous and voluntary (Fig. 1). In accordance with the British Columbia *Coroners Act* the facts and circumstances of the deaths were reported to the Vancouver Regional Coroner and the Vancouver Police Department.

The research protocol to conduct interviews and to observe suicide was approved by the Research Ethics Board at Kwantlen Polytechnic University, Surrey, BC, Canada. To address the issue of participant reactivity, the Research Ethics Board required that participants receive a statement about the concept of reactivity and an assurance that they could change their minds about committing suicide (Fig. 2). This statement was given repeatedly.

TWO CASE REPORTS

Background Circumstances

The 2 female decedents did not know one another. They self-identified as members of "right to die" organizations and said that they wished to terminate their lives to avoid further suffering

brought on by deteriorating health. Control, loss of independence, and quality of life were the primary factors in their decisions.

The suicides occurred in June and October 2007. Each of the women had researched methods for suicide and they eventually decided upon helium asphyxiation inside a plastic bag. Although both women said that they had access to lethal prescription medications, they rejected drug overdose methods after considering the risks associated with swallowing a large number of prescription pills. One of the women was aware of a failed suicide attempt due to vomiting lethal drugs. The other believed that her irritable stomach would not tolerate a large dose of medication. Therefore, their primary reason for choosing helium asphyxiation was the belief that it would cause a quick death and a secondary reason was that helium inhalation would not present any risk of emesis, which is associated with oral drug overdose.

In interview, both women stated that the helium technique for suicide simplified their preparations for dying. They obtained the supplies for suicide without involving other parties and without having to request any assistance from their physicians. The decedents reported that their physicians were closed to any discussion about ending their lives.

Neither decedent expressed distaste about using a plastic bag and inert gas. It is possible that desensitization about the negative esthetics of the plastic bag may have occurred over the course of their planning. They assigned substitute names to the bag: one decedent referred to it as a “mask” and the other called it “kit.”

RESULTS AND OBSERVATIONS

Case 1

The decedent was 65 years old. Her career as a registered nurse ended at age 55 when she experienced the first of several strokes that contributed to decline in health, memory, and sensory perceptions. She characterized these as “small strokes but with very big consequences.” At age 62 she had a heart attack. The decedent was single, childless, and lived independently. She could not tolerate the possibility of more strokes and institutional care.

Several months before her death the decedent researched drug and nondrug methods for suicide. In contrast to case 2, she requested that the titles of her instructional literature not be reported (Fig. 3). All materials for the suicide apparatus were purchased by the decedent several months in advance. The disposable 8.9 cu. ft. helium party balloon tank (Fig. 4) was acquired at a local toy store and the decedent joked that when she was walking home with the 7 lb. box containing the helium, someone inquired if she was planning a party, to which she replied, “It’s a going away party.”

The decedent assembled her suicide apparatus by securing one end of clear plastic tubing to the tank outlet (Fig. 4) and she taped the other end inside an 18 × 22 inch plastic bag that served as a hood to receive the helium. An elasticized hair band acted as a collar to secure the hood around her neck. In the weeks before her death, she reported practicing the steps for her suicide several times.

On the day of her death the decedent tidied up some final errands and arranged to toast her departure with a glass of red wine. She then took a quick bath and retired to her bedroom, where she had set out the helium apparatus sometime earlier. The decedent then engaged some small talk, and confirmed that I would remain with her after she had died and that her mortuary arrangements and executor information would be provided to the local coroner.

In the final minutes before her suicide the decedent recited to herself, spontaneously, a nonreligious prayer to the universe. Her concentration turned intense as she screened out all distractions, including that she was being observed, and she then narrated the steps she had planned for ending her life. She instructed herself to

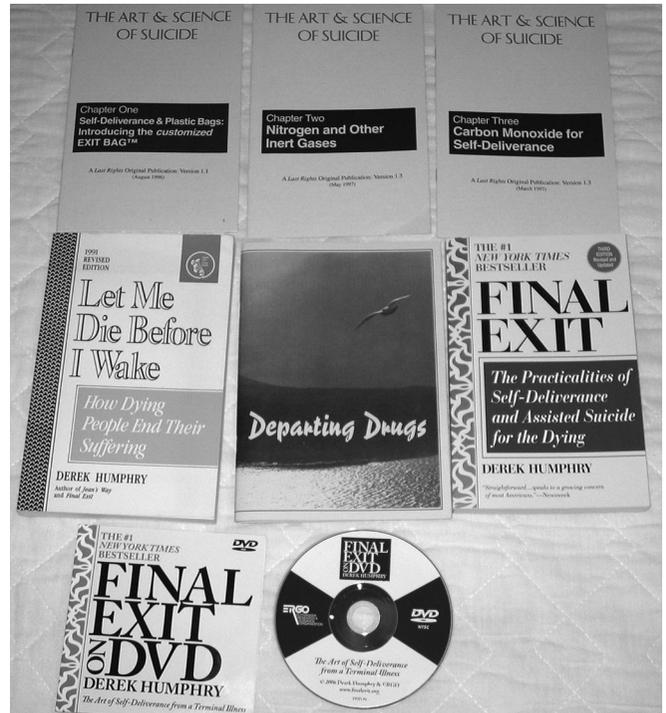


FIGURE 3. Case 2: Collection of right to die literature belonging to decedent.



FIGURE 4. Decedent in case 1, 8.9 cu. ft. helium tank in supply box with plastic tubing attached to outlet.

remain calm and to resist any urge to pull off the plastic bag hood. Drawing from her nursing knowledge, the decedent forecast that unconsciousness would come quickly and her heart, already weakened from myocardial infarction, would stop shortly afterward.

Seated upright on her bed, the decedent placed the hood on top of her head and adjusted it around her forehead, leaving her eyes, nose, and mouth exposed. She opened the valve on the helium tank and the hood inflated on top of her head. The pulse oximeter gave a heart rate reading of 90 bpm and saturation percentage of oxygen (SPO₂) was 98%. Palpating the hood with her hands, the decedent determined that the hood was inflated.



FIGURE 5. Decedent in case 1. From seated position in bed decedent fell into unconsciousness and eased into this final resting position.

To deplete residual oxygen and carbon dioxide the decedent exhaled deeply and then without hesitation pulled the hood down to her neck and adjusted the collar under her chin and jaw line. While still seated in an upright position she said, “I’m going to breathe now,” which transmitted in a timbre that indicated she had already inhaled helium. Unconsciousness occurred in 10 seconds, her eyes widened and took on a contradictory appearance of surprise and blankness, the lips turned blue from lack of oxygen, and she eased backward into a final resting position (Fig. 5). Her skin quickly turned pale.

Considering the time of the first breath inside the helium environment as 0 seconds, the observations are as follows: loss of consciousness at 10 seconds (about 3 breaths); breathing then accelerated for about 40 seconds. At 1:00 the heart rate had accelerated to 114 and SPO₂ dropped to 39%. At about 2:00 breathing had stopped, the oximeter could not fix on a heart rate and SPO₂ was 37%. At 3:00 the oximeter was still not measuring any heart rate and SPO₂ was 34%, which is the minimum range for the device. At 3:45 the jaw fell slack and the tongue extended. Although breathing had ceased after 2 minutes there were 4 terminal gasps at 4:00, 4:45, 6:40, and 8:36. At no point in the dying process was there any extension or contraction reflex of the arms or legs.

Case 2

The decedent was 70 years old and since 1979 had suffered with myalgic encephalomyelitis (ME). Health decline was such that nearly all of her physical activity was oriented to basic survival needs. The decedent was divorced, childless, and lived independently, but with weekly home support service. She participated in Internet support groups for ME, primarily to lend support to younger sufferers of the illness. The decedent believed that most ME patients could make adaptations to enjoy some quality of life, but that after



FIGURE 6. Decedent in case 2. Seated in recliner chair. Two 8.9 cu. ft helium tanks connected with t-junction.

more than 25 years with the disease she believed that her better health was irretrievably lost.

For more than 15 years the decedent had collected “right to die” literature. This included *Final Exit on DVD: The Art of Self-Deliverance from a Terminal Illness* (Fig. 3). She had studied the steps in the DVD and chose to die in a reclining arm chair, exactly as demonstrated in the DVD. In the interview the decedent reported that she had rehearsed the suicide procedure several times. Approximately a year earlier she had purchased by mail a purpose built hood with an elastic neck fastener and plastic tubing for suicide with helium. The custom apparatus was designed to connect 2 helium tanks with a T-connection so that gas would be delivered to the hood with a single tube (Fig. 6). The decedent purchased 2 helium tanks. One was apparently the last in stock at a local toy shop and she obtained a second tank through an Internet purchase from a party supplies store in the United States.

In addition to updating her will and mortuary arrangements, the decedent planned a short ritual for her dying. With a champagne toast she gave a short tribute to her life. The decedent had avoided alcohol for years because it disturbed her stomach, but she had decided that this time it would not matter. When it came time to drink, she commented, “I was looking forward to this, but the taste is disappointing. I had expected more.”

Prior to ending her life the decedent silently read a “Prayer for Dying” that she had written. The prayer was addressed to the “Spirit of the Universe” and stated “My life energy is drawing to a close and I feel it is the right time for me to leave this earth where I can no longer be a part of the flow of life.”

After reciting her prayer, the decedent placed the hood on top of her head in line with her forehead and neckline. She opened the valves to both helium tanks and inflated the hood. After the hood was inflated the decedent spent a moment to say good-bye. Next, in accordance with the instructions in *Final Exit*, she exhaled to remove residual oxygen and carbon dioxide from her lungs and then pulled the hood down to her neck. The pulse oximeter on her left index finger shifted during this process and therefore no pulse and oxygen measures could be recorded.

Once the prefilled hood was over the decedent's head she spoke something indiscernible that sounded like "good-bye." Considering the time of the first breath inside the helium environment as 0 seconds, the following was observed: loss of consciousness at about 12 seconds followed by accelerated respiration continuing to about 55 seconds; at around 40 seconds there were reflexes in the right arm and in both legs. The reflex in the right arm was a single, slow contraction at the elbow. The extension reflex in the legs lasted approximately 15 to 20 seconds.

At 1:44 there was a loud gurgling expiratory breath, possibly due to carbon dioxide escaping (from the 2 glasses of sparkling wine consumed earlier). At this time muscle tone relaxed and the head fell slightly to the right into a final resting position (Fig. 6). Very faint gasps occurred at 3:32, 4:26, and 4:55; the tongue distended at 4:55; further faint gasps occurred at 5:15, 5:47, 6:11, 6:36, and 6:46; barely perceptible muscular twitching of the right cheek took place from about 6:50 to 7:05; at 7:25 a hardly audible snort of the sinus replaced the faint oral gasping; further faint sinus snorts occurred at 7:46, 8:29, 8:51, 9:46, and 11:11, after which all visible respiratory movement stopped.

DISCUSSION

This research protocol required observation of suicide without moral judgment. It is sufficient to say that this was personally conflicting and unsettling. It is beyond the scope of this paper to give a detailed discussion about this difficult kind of naturalistic observation.

Given that permission to video record was refused by the participants, a precise moment-by-moment analysis is not possible. Obviously, videotaping would allow for post hoc documentation of specific physical actions less stressful setting.

The Internet, however, provides independent verification of the speed by which helium can induce unconsciousness without warning. A search of YouTube, the popular video sharing website, reveals several clips of people breathing helium with the purpose of altering the timbre of their voices for amusement, but with the unexpected side effect of sudden unconsciousness. The Internet links in the reference section of this paper show "Helium girl"³⁵ losing consciousness after breathing helium from a balloon for 15 seconds and "Gabby"³⁶ falls unconscious after 18 seconds. In "Passout"³⁷ a young female inhales helium and begins to sing a song, but after 5 seconds of singing she spontaneously stops and falls unconscious to the floor. These YouTube cases involve breathing helium from a balloon, whereas the decedents breathed helium inside a prefilled environment sealed from outside air. Consequently, loss of consciousness was faster and with no chance of recovery. The individuals in the YouTube videos quickly recovered because they were in a normal air environment.

The fact of animal life being dependent upon oxygen was first verified in Joseph Priestley's 1774 demonstration of the lethal consequence for a mouse inside a bell jar with a burning candle.³⁸ Technically, all human life ends because of a lack of oxygen, but the relatively recent entry of helium into the catalogue of suicide methods intensifies the competing interests of preserving life versus respecting autonomy and self-determination. In neither case did the decedents encounter barriers to researching information, obtaining

equipment, and executing their plans. Although they said that they had attempted to discuss their intentions with their physicians, all planning and research actually occurred outside of the health care system. From their perspectives, it was much easier to carry out suicide without medical assistance. Physicians who are uncomfortable about medicalizing suicide may be inclined toward the self-help model because of the distancing it permits. Nevertheless, a model that involves consultation with family, friends, and health practitioners in end-of-life decision making probably offers greater public accountability.

Suicides from helium inhalation are probably underreported, particularly since *Final Exit* suggests that people consider removal of the apparatus. In such cases, analysis of scene evidence is paramount, particularly because toxicological analysis for helium is a complex and little known process.¹³

Toxicology data on the 2 decedent are not yet available. In response to requests for these data, the BC Coroner advised the Judgments of Inquiry are not complete. It could be some time before the information is public. It should be noted that the cases reported in Table 1 the average time for completion of the Judgments of Inquiry is 38 weeks (range, 2.43–164.14 weeks). Additionally, the process of accessing these documents under the *Freedom of Information and Protection of Privacy Act* usually takes several months. Given that neither decedent was known to take any medication prior to ending their lives, toxicology results will probably be unremarkable.

Until now the forensic literature on helium asphyxia has consisted of autopsy studies with no direct information about the pathophysiology. These 2 case reports confirm that helium inhalation inside a prefilled environment will result in rapid loss of consciousness and sudden death.

While there was no evidence that the decedents experienced any pain, it was disturbing to witness preterminal gasping in both cases. In adults, gasping is witnessed in 30% to 40% of cardiac arrests.³⁹ These 2 case reports are insufficient to determine any variability in human response to helium induced hypoxemia, but it is interesting that one decedent experienced no tremors or gross reflex, while the other one did. In an experiment using nitrogen for the euthanasia of dogs it was observed that while death in the canines occurred rapidly and humanely, there was also considerable variation in incidences of convulsion, gasping, and muscular tremor.⁴⁰ The underlying reasons for these variations should be explored.

No experimental conditions were applied to these 2 suicides because the legal environment in Canada prohibits acts of assisting in suicide and the research ethics protocol required strict legal compliance. Therefore, the protocol was for naturalistic observation only. Nevertheless, helium inhalation is the constant in these 2 suicides, and slight variations in the specific methodologies (eg, type of hood, tubing connections, volume of helium) and the physical health of the decedents require caution in drawing any generalized conclusions.

The oximeter measures in case 1, although generally consistent with what would be expected in an oxygen depleted environment, should be treated with caution because the device used was low quality and did not store retrievable data. A medical grade oximeter with data storage capacity would be more reliable.

It is possible that jurisdictions that permit assistance with suicide may also allow research protocols for controlled observation and systematic data collection. Any future research would benefit from video recording and gas analysis of the breathing environment for helium, oxygen, and carbon dioxide.

In countries that permit assisted suicide and euthanasia, it might be useful to compare helium with pharmaceutical methods for terminating life. It is already known that where assisted death is permitted, the particular practices for assisting in suicide expand

over time to the circumstances of dying individuals.^{41,42} In early 2008, one Swiss right to die organization, Dignitas, began to experiment with helium as an alternative to pentobarbital.⁴³ Given that helium is increasingly used in planned, nonimpulsive suicide, efforts to further scientific understanding of this phenomenon should be pursued.

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