

Suffocation Using Plastic Bags: A Retrospective Study of Suicides in Ontario, Canada

REFERENCE: Bullock MJ, Diniz D. Suffocation using plastic bags: a retrospective study of suicides in Ontario, Canada. *J Forensic Sci* 2000;45(3):608–613.

ABSTRACT: One hundred and ten cases of suicidal suffocation using a plastic bag were identified in the files of the Office of the Chief Coroner of Ontario, Canada, between 1993 and 1997. The records were reviewed to determine the demographic characteristics of this group compared with all cases of suicide in Ontario, the scene information, autopsy findings and toxicology results. Most suicides occurred in people over 60 years of age, with older women making up a considerable proportion of cases as compared with other methods of suicide. In 40% of cases the deceased was suffering from a serious illness. Autopsy findings were usually minimal, with facial, conjunctival and visceral petechiae present in a minority of cases. One or more drugs were detected in the blood in 92.6% of cases where toxicologic testing was performed. Benzodiazepines, diphenhydramine and antidepressants were the most common drugs found, with diphenhydramine the most common drug present at an elevated concentration. Information at the scene from “right to die” societies was uncommon. One quarter of decedents took additional measures, besides the use of drugs or alcohol, to ensure the rapidity, certainty or comfort of their death. This study further elucidates the characteristics of this uncommon method of suicide. It emphasizes additional scene findings, such as the presence of dust masks, physical restraints and modification of the plastic bag that may be of use to death investigators in determining the correct manner of death.

KEYWORDS: forensic science, forensic pathology, asphyxia, plastic bag, suffocation, suicide, death, Ontario, Canada

Ever since plastic bags became widely available to the general public, small numbers of people have used them as a means to commit suicide (1–3). However, this method of self-suffocation has gained greater attention in recent years since the 1991 publication of the book *Final Exit: The Practicalities of Self-Deliverance for the Dying*. The book describes this method of suicide, in combination with drugs, as a painless way for those suffering from a terminal illness to end their lives (4).

We sought to characterize suicides using plastic bags in the Province of Ontario, Canada (total population of approximately 10.7 million) between the years 1993 and 1997. We describe the demographics of this group of suicides, the circumstances surrounding death, autopsy findings and results of toxicological testing. Prior to the study we came across several deaths in which the victim had combined the use of a plastic bag with other efforts (aside from taking drugs or alcohol) in order to ensure death. These

efforts included the inhalation of noxious fumes and modification or enhancement of the bag for comfort or efficacy. Cases in which additional efforts had been made constituted a significant percentage of the total, and they are emphasized in this study as they contribute to the findings at scene investigation and therefore to the determination of cause and manner of death. These “variations on the theme” of plastic bag suicide have hitherto received little attention in the literature.

We also attempt to determine the frequency with which the book *Final Exit* (or similar information from “right to die” societies) was consulted prior to the suicide, as well as to characterize the sub-population known to be using such information.

Methods

Cases were collected retrospectively from the files of the Office of the Chief Coroner, Province of Ontario, Canada, between the years 1993 and 1997. All cases coded as “suffocation” in the coroner’s computerized files were examined and those that involved the use of a plastic bag to commit suicide were chosen for the study. Accidental deaths (such as cases of autoerotic asphyxia and deaths in childhood), homicides and cases with an undetermined manner of death were excluded. Demographic information, past medical and psychiatric history, circumstances surrounding death and toxicology results were collected. Any modification of, or additions to, the bag were noted, as were other devices used to ensure death.

While most cases received a full autopsy, others received only an external examination by a forensic pathologist at the Office of the Chief Coroner, or were “signed off” at the scene by the investigating coroner (all coroners in Ontario are qualified medical practitioners). The decision to “sign off” a case is based on the coroner’s certainty of the cause and manner of death, possibly with consideration for the family’s desire not to have an autopsy performed. Therefore these cases were clear-cut asphyxial suicides, usually in older, sick persons. All suspicious cases received full autopsies.

Toxicologic testing was performed at the discretion of the investigating coroner. In some cases this involved a comprehensive drug screen, while in others only selected drugs were screened for. The selection was based on what drugs the deceased was known or suspected to have been taking at the time of death and thus depended upon scene findings, medical records and other information. Some coroners chose not to order any toxicology or to restrict it to a determination of blood alcohol. The majority of cases “signed off” at the scene did not have any toxicologic testing. In some of these cases there was evidence at the scene that the deceased had taken drugs and/or alcohol prior to death.

¹ Forensic Pathologist, Office of the Chief Coroner of Ontario and Lecturer, Department Laboratory Medicine and Pathobiology, and Forensic Science Student, respectively, University of Toronto, Toronto, Ontario, Canada.

Received 24 May 1999; and in revised form 16 July 1999; accepted 2 Aug. 1999.

Results

A total of 110 cases of suicidal suffocation by plastic bag were identified in the study period (1993 to 1997). These cases represented 1.91% of all suicides in Ontario during that time period. Table 1 characterizes these deaths by year, age and sex. The number of cases per year remained fairly steady during the study period. In every year but one (1993), males outnumbered females, with a total of 63 (57.3%) males and 47 (42.7%) females. In contrast to the high percentage of females among the plastic bag deaths, women represented only 23.9% of all suicide deaths in Ontario during the study years.

Age and Sex

The mean age at death for all cases was 60.2 years and they ranged from 16 to 95 years. The median age for all cases was 66

years. Over half (54.5%) of the suicides occurred in those over 60 years of age. Figure 1 shows the age distribution of the deaths, with a peak of 30 cases (27.3%) in the 70 to 79-year age group. When the age distribution was further analyzed by sex, there was a trend towards this method among older women, with 61.7% of the females being over 60 years of age, compared with only 49.2% of the males. Self-suffocation was a very uncommon suicide method for those under 30 years of age, with only seven cases or 6.4% of the total in this age group.

Figure 2 compares the age distribution of all other methods of suicide in Ontario from 1993 to 1997 with the cases of suicidal suffocation with plastic bags. Suicide among “seniors” (those 60 years or older) accounted for only 20% of all other suicides in the province during the study years. Those greater than 70 years of age represented only 10.3% of all other suicides as compared with 43.6% of the plastic bag subgroup.

TABLE 1—Demographic data for plastic bag suicides, 1993 to 1997.

Year	Plastic Bag Suicides (% of total)	Total Suicides	Males	Mean Age Males	Females	Mean Age Females	Mean Age All Cases	Age Range	Median Age All Cases
1993	28 (2.32)	1206	13	54.7	15	70.0	64.8	16–90	70
1994	22 (1.90)	1159	16	52.6	6	66.5	56.5	26–80	66.5
1995	14 (1.18)	1186	8	55.4	6	57.5	55.1	24–80	57.5
1996	18 (1.59)	1133	10	58.3	8	51.5	58.8	23–90	51.5
1997	28 (2.58)	1086	16	65.1	12	59.0	62.0	24–95	59
All Years	110 (1.91)	5770	63	57.2	47	66.0	60.2	16–95	66

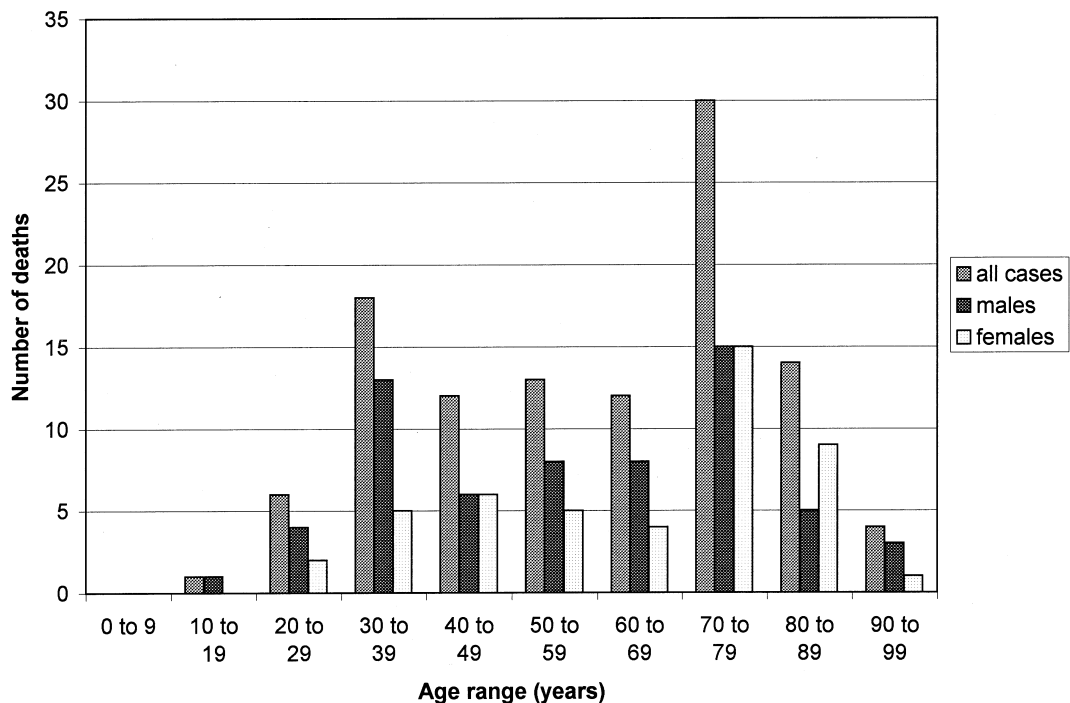


FIG. 1—Distribution of plastic bag suicide deaths by decade and subdivided by sex.

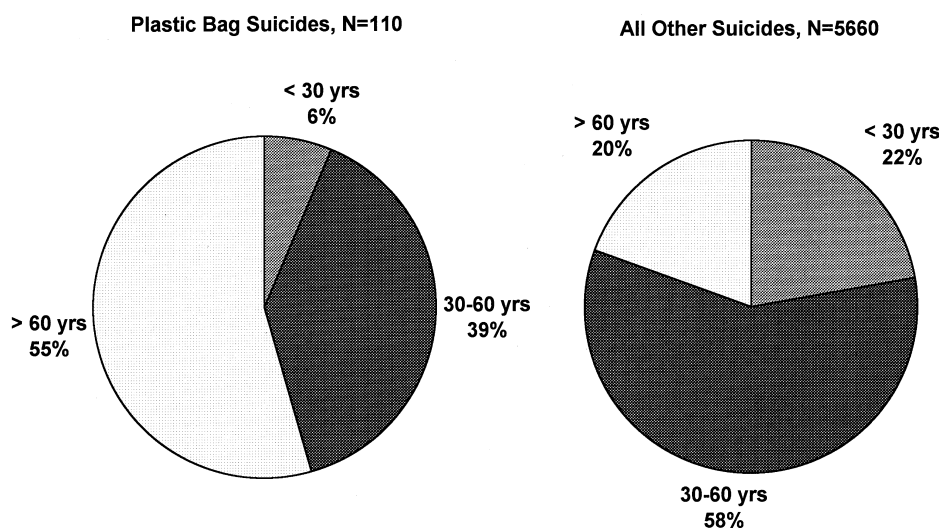


FIG. 2—Comparison of age distribution of plastic bag suicides and all other methods of suicide in Ontario, 1993 to 1997.

Psychiatric and Social History

Among the study group, 35 (31.8%) were known to have attempted suicide or had harmed themselves at least once in the past. The most common prior methods were intentional drug intoxication (13 cases) and sharp force injuries, usually of the wrists (6 cases). Two persons were known to have previously attempted suicide using a plastic bag. Only five persons were documented to have any psychiatric illness other than “depression” or bipolar disorder. This group included two persons with schizophrenia, two with personality disorder and one with multiple-personality disorder. In eight cases (7.3%) there was a history of drug or alcohol abuse. The coroner’s investigations revealed a significant “stressor” leading up to the suicide in 28 cases (25.5%). The stressors cited were: recent loss or imminent loss of a loved one (15 cases), marital or relationship breakup (4 cases), job loss (4 cases) and admission or impending admission to a nursing home (3 cases). In addition, there was one case in which indecent assault charges had been laid against the deceased and another in which a severely disabled man had recently had his disability insurance canceled. Marital status was known in 71 cases (64.5%). Of these cases, 45.1% were married, 35.2% were widowed, 11.3% were single, and 8.5% were divorced or separated.

Medical History

In 44 cases (40%) the deceased had a medical illness (or illnesses) which severely compromised his or her quality of life or was life-threatening, and which was considered to have contributed to the deceased’s wish to commit suicide. The information was gathered from the suicide note in some cases and from family members or medical records in others. In 32 cases there was a well-documented medical condition diagnosed prior to the person’s death. These conditions are listed in Table 2. In 12 cases the “illness” consisted of one or more nonspecific complaints without the specific diagnosis of a severe disease or disability elicited from any of the sources noted above. Examples included an 86-year-old woman with documented hypertension who stated her “heart was acting up” and an 85-year-old woman, also with hypertension and “potassium imbalance,” who was “unable to get outside due to the pain.”

TABLE 2—Medical conditions among plastic bag suicide cases (n = 32).

Eight cases—Cancer
Three cases—Multiple sclerosis
AIDS/HIV seropositivity
Two cases—Diabetes mellitus
Parkinson’s disease
Peripheral vascular disease
One case—Deafness
Ulcerative colitis with arthritis
Muscular dystrophy
Environmental sensitivity
Fibromyalgia
Anorexia nervosa
Alzheimer’s disease
Multiple strokes
Ischemic heart disease
Chronic obstructive pulmonary disease
Chronic myelopathy (wheelchair bound)
Tic douloureux

Scene Information

The site of death was known in all cases. In 88 cases (80.0%), the deceased committed suicide at home, followed by a hotel or motel in 11 cases (10.0%), a nursing home or home for the aged in 6 (5.5%) and a hospital in 4 (3.6%). One person committed suicide in a tent in a provincial park. A suicide note was found in 56 cases (50.9%). In most cases there was a description in the coroner’s warrant of how the bag was used. The bag was recorded as being untied in only five cases (4.5%). In the others it was secured around the neck with a variety of devices, the most common of which was with one or more rubber bands, which were present in 24 cases (21.8%). This was followed by a string/rope in 12 (10.9%) and tape in 11 (10.0%). Other ligatures included neckties (5), pantyhose (4), a belt (3), shoelaces, a telephone cord, ribbon, a scarf, wire, gauze, and a towel. One person used a specially designed “exit bag” with a Velcro™ strap. Eight of the decedents (7.3%) used more than one plastic bag, with one person using three bags and the others two.

Excluding those who used drugs or alcohol, 26 people, or 23.6% of the total, made one or more additional efforts to assist in the certainty, comfort and/or rapidity of their death. Most of these efforts

can be grouped into one of four categories, which include: (1) obstructing the nose or mouth with a gag, or placing a mask over the nose and mouth (Fig. 3); (2) tying the hands and/or feet to restrict movement; (3) inhaling a noxious substance placed within the bag; and (4) modifying the bag, such as by inserting a mouthpiece, eyepiece or a breathing tube (Fig. 4). These methods are summarized in Table 3. Only two women were among the group who made these efforts; one woman placed a dust mask over her face and the other handcuffed her wrists behind her back and bound her legs.

In some cases, the extra measures taken were quite elaborate. One 52-year-old single man with severe heart disease rented an apartment where he set up an electrical device which would simul-

taneously pull a breathing tube out of the bag and shut off the room lights. This man had also placed a filter mask over his nose and mouth. Toxicology revealed a potentially fatal blood secobarbital concentration of 2.1 mg/dL and an ethanol concentration of 164 mg/dL.

A 71-year-old widowed man modified a plastic bag by sewing elastic into its opening (to create a tight fit) and placed it over his car exhaust. He then went into his house and placed the bag over his head. At some point this man also shot himself in the back of the head with a pellet gun, but this did not result in significant injury. His carbon monoxide saturation was 85%.

A 34-year-old single man placed a bag over his head and electri-



FIG. 3—Typical plastic bag suicide with dust mask covering mouth and nose.

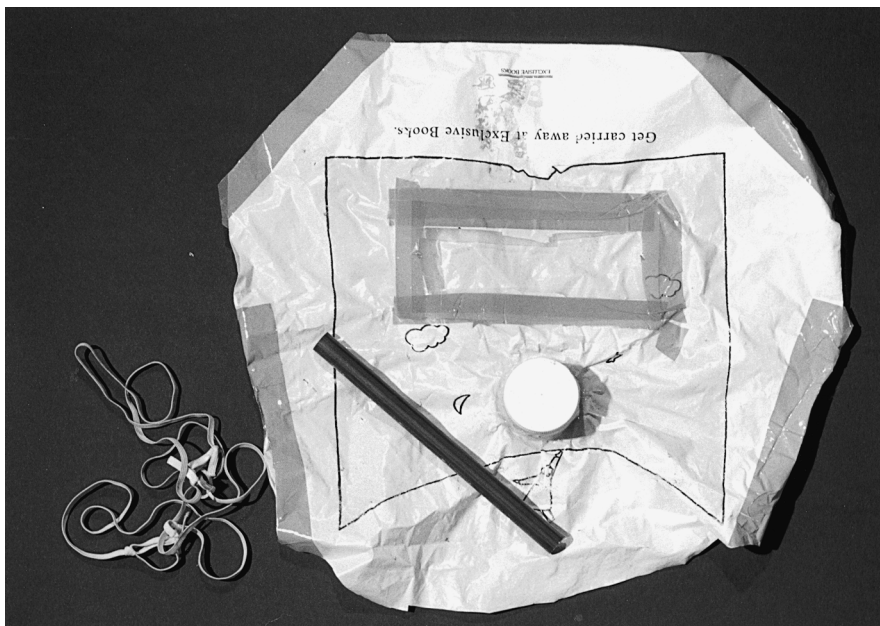


FIG. 4—Example of a modified plastic bag with clear plastic eyepiece, pill bottle inserted over mouth area, plastic tube found nearby, and elastic from around the deceased's neck.

TABLE 3—Additional efforts made to ensure certainty, rapidity or comfort of death.

Obstruction of Nose or Mouth	Restriction of Movement	Inhalation of a Noxious Substance	Modification of Bag or Insertion of Breathing Tube
Gag in mouth (3 cases)	wrists handcuffed behind back	propane (2 cases)	clear plastic eyepiece, pill bottle inserted, plastic tube
Mask(s) over mouth (3 cases)	rope around wrists	gasoline and turpentine	elastic inserted into bag opening for tight fit
Dust mask and scarf over mouth	belt, tied around wrists	carbon monoxide	breathing tube with timer to remove it and turn lights off
Cotton wool in nostrils, duct tape over mouth	electrical cord around neck tied to headboard	ether and chloroform	
Towel over face	wrists handcuffed, legs bound hands and legs bound	contact cement	

cal cord around his neck, the ends of which were tied around the headboard posts of his bed. Frothy fluid was noted in the airways and traces of morphine were detected in his blood.

Findings at Postmortem Examination

Complete autopsies were performed in 91 cases (82.7%), with the coroner choosing to “sign off” the case at the scene in 17 cases and have an external examination performed by a forensic pathologist in two cases. Of the 93 cases in which a complete autopsy or an external examination was performed, a ligature mark was present around the neck in 23.1% cases. Conjunctival or facial petechiae were noted in 7 cases (7.5%). In most of these only a few petechiae were present and in no cases were they noted to be florid. The most common autopsy findings were pulmonary edema and congestion (46.2%) and visceral petechiae (18.7%). Internal neck hemorrhage was not noted in any of the autopsied cases. There was no consistent correlation between the type of ligature used and the presence of a ligature mark or petechiae.

Toxicological Analysis

Of the 110 cases studied, a toxicological analysis for both alcohol and drugs was performed in 68 cases (61.8%). In 9 cases (8.2%) toxicology was restricted to ethanol analysis and in one case it was restricted to measurement of the carbon monoxide level. In 32 cases (29.1%), no drug or alcohol screen was performed.

Of the 77 persons who were screened for the presence of ethanol, 50 (64.9%) had a negative result or only trace amounts were detected. An ethanol concentration of greater than 100 mg% was measured in only 11 cases (14.3%). Sixty-three cases (92.6%) yielded positive results for one or more drugs. Benzodiazepines, diphenhydramine and antidepressants were 50.0, 32.4 and 25% of these cases, respectively. In many cases, more than one benzodiazepine was present. Less commonly detected were acetaminophen (11.8%), barbiturates (8.8%), narcotic analgesics other than codeine (8.8%) and codeine (5.9%).

A concentration of one or more drugs above its therapeutic level was found in 39 (57.4%) of the screened cases. Diphenhydramine was the drug most commonly found above its therapeutic concentration; it was elevated in 15 cases (22.1%). Elevated levels of propoxyphene, flurazepam, sertraline, temazepam, and secobarbital were present in three cases each. The remaining drugs with elevated concentrations were predominantly benzodiazepines and antidepressants.

In only 5 cases (7.4%) was the drug concentration considered to be potentially lethal. Propoxyphene was the drug present in two of

these cases, with one case each of codeine, desipramine and secobarbital.

Evidence of Information from Right-to-Die Societies

Of the 110 suicides, there were direct indications in 13 (11.8%) that the deceased had access to information from “right-to-die” groups such as the Hemlock Society. In 11 cases there was a book at the scene that confirmed this. *Final Exit* (sometimes with other similar literature) was present in nine cases, while *Departing Drugs* and *Deadly Doses* were present in one case each. One person wrote a Living Will similar to an example found in *Final Exit*, while another mentioned in her suicide note a “no fail” way she had studied in a book.

In this subgroup, there were eight females (61.5%) and five males (38.5%) with a mean age of 67.8 years and a median age of 74 years. The age range was from 50 to 86 years. Eight people (61.5%) had life-threatening illnesses or illnesses that they felt severely compromised their quality of life. None of this group had a documented psychiatric illness. Five people (38.5%) in this group had a major “stressor” at the time of their death, which probably contributed to their actions. In four cases this was a loss or imminent loss of a spouse while in one case it was a recent marital breakup. Two people (15.4%) had attempted suicide before.

As expected, toxicology results in this group reflected the recommendations in the right to die literature. Toxicological testing was performed in ten cases and was positive for one or more drugs in all of them. Drugs found at toxic or potentially lethal levels included propoxyphene (two cases), secobarbital (two cases), flurazepam, desipramine/imipramine, trichloroethanol. Ethyl alcohol was detected in five cases, in concentrations ranging from 10 to 98 mg%. In one case on which toxicology was not performed, there was an empty container of secobarbital and an empty vodka bottle at the scene.

Discussion

Asphyxiation with a plastic bag is an uncommon method of suicide in Ontario. It is more common among older individuals, particularly elderly women, who made up a considerable proportion of our cases. Although the precise reasons for this age distribution are unknown, it likely relates, as others have suggested (5), to the ready availability of plastic bags, their ease of use and the painless mechanism of death they provide. These properties would be attractive to an older, possibly frail and immobile population. Awareness of one’s right to “self-determination,” particularly for those suffering from chronic, debilitating and/or fatal illnesses, and the methods of

suicide proposed by “right-to-die” groups such as the Hemlock Society, may also be greater among older individuals.

As with other recent studies (5,6), in only a small proportion of cases was there a direct indication of access to information provided by the Hemlock Society or similar groups. This figure is probably artefactually low, however, due to the fact that only those cases in which an appropriate book (or an excerpt from a book, such as a Living Will or suicide note taken verbatim) was present at the scene, were included. It seems likely that additional people who used sedatives recommended by the Hemlock Society (such as secobarbital, pentobarbital, propoxyphene, and diazepam) or who covered their face with a towel or dust mask, had also been exposed to this literature. The subgroup of deaths in which “right-to-die” information was present did appear, for the most part, to represent the appropriate target audience. They were slightly older than the study group as a whole and most had a debilitating or potentially fatal illness.

Included in our series were several cases in which the decedent had inhaled a noxious substance placed inside a plastic bag. While these cases do not fit the typical profile of a “plastic bag” suicide, they nevertheless represent one end of the spectrum. Deaths combining inhalation and a plastic bag (such as glue-sniffing deaths) are often accidents. Also, some autoerotic deaths involve the inhalation of fluorocarbons or volatile nitrates combined with the use of a plastic bag (7). Therefore, cases involving inhalants require careful investigation to arrive at the correct manner of death. Alternately, binding of the wrists and/or ankles may raise the suspicion of a homicide.

Modification of the bag and the use of a breathing tube have not, to our knowledge, been described previously in the published literature. Both would appear to suggest well-thought-out intent on the part of the decedent to commit suicide. A breathing tube may be used to prevent panic by allowing the deceased to breathe easily while any drugs used begin to take effect. Placing a filter mask or wet towel over the face is suggested by the Hemlock Society as a comfort measure to prevent discomfort from the moist inner aspect of the bag from sticking to the face (Fig. 3). Interestingly, only one of the four persons using a mask or towel had “right-to-die” literature nearby. On the other hand, it appears unlikely that insertion of a gag in one’s mouth, cotton wool in the nostrils or duct tape over the mouth could provide any comfort whatsoever and, therefore, these efforts must be considered as additional means to ensure death.

As a whole, these additional efforts are useful to medicolegal death investigators for several reasons. They may indicate that the deceased used information from “right-to-die” groups in planning his/her death, they provide some indication of the deceased’s state of mind prior to death and, most importantly, they add to the known spectrum of scene findings in this group of suicides.

In contrast to the study of Haddix et al. (5), in which drugs were identified in only 43% of cases screened, nearly all our cases in which a drug screen was performed yielded positive results. This

higher frequency may have been influenced by selection bias on the part of the coroners involved. Drug screens were ordered less frequently in our cases and the coroner may have been more likely to do so when there was an indication at the scene that certain drugs had been taken. In general, the frequent presence of antidepressants and benzodiazepines, usually in therapeutic concentrations, likely reflects their high rate of use among this group as a whole, while diphenhydramine use is an indication of a concerted effort to sedate oneself. This is supported by the fact that in 15 of the 22 cases in which diphenhydramine was present, it was considered to be above the therapeutic level. Propoxyphene and secobarbital were found uncommonly, possibly reflecting the relative difficulty in obtaining these drugs in Canada.

In summary, in Ontario the majority of persons committing asphyxial suicide using a plastic bag are over 60 years of age. In only a small percentage of deaths will there be any literature at the scene from a “right-to-die” group; however, the number of decedents who utilize such a group’s information is likely greater than this would suggest. Most of the decedents will have consumed one or more drugs prior to their death, which in many cases will have contributed to the death, thus necessitating a drug and alcohol screen in all cases. In our jurisdiction, over one quarter of decedents—usually men—make some additional efforts to ensure the comfort, rapidity or certainty of their deaths. These contributing efforts may serve to reveal the true manner of death in some cases and hide it in others.

Acknowledgments

The authors wish to thank Jeff Arnold for assistance with photography and June Frank for assistance with the retrieval of coroner’s records and suicide statistics.

References

1. Polson CJ, Gee DJ. Plastic bag suffocation. *Z Rechtsmedizin* 1972;70:184–90.
2. Hunt AC, Camps FE. Plastic bag suicide. *BMJ* 1962;1:378.
3. Church IC, Phillips JPN. Suggestion and suicide by plastic bag asphyxia [letter]. *Br J Psychiatry* 1984;144:100–1.
4. Humphrey, D. *Final Exit: The Practicalities of Self-Deliverance and Assisted Suicide for the Dying*. Eugene, OR: Hemlock Society, 1991.
5. Haddix TL, Harruff RC, Reay DT, Haglund WD. Asphyxial suicides using plastic bags. *Am J Forensic Med Pathol* 1996;17(4):308–11.
6. Marzuk PM, Tardiff K, Hirsch CS et al. Increase in suicide by asphyxiation in New York City after the publication of *Final Exit*. *N Engl J Med* 1993;329(20):1508–10.
7. Dietz PE, Hazelwood RR. Atypical autoerotic fatalities. *Med Law* 1982;1:307–19.

Additional information and reprint requests:

Martin J. Bullock
Office of the Chief Coroner of Ontario
Forensic Pathology Unit
26 Grenville Street, Basement
Toronto, Ontario, Canada
M7A 2G9