Archives of Suicide Research
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/usui20

Analysis of Suspected Suicides Using Poison Center Data

Shile Liang [a] & Lee S. Friedman [a]
[a] University of Illinois, School of Public Health, Division of Environmental and Occupational Health Sciences , Chicago, Illinois, USA
Published online: 09 Aug 2011.

Archives of Suicide Research, 15:185–194, 2011

ISSN: 1381-1118 print/1543-6136 online
DOI: 10.1080/13811118.2011.589674

Routledge
Taylor & Francis Group

Analysis of Suspected Suicides Using Poison Center Data

Shile Liang and Lee S. Friedman

Although there has been extensive research into the epidemiology and prevention of suicide, there continues to be a paucity of research on non-fatal suicides, in particular persons not treated in hospitals following a suicide attempt. In this study, we analyzed call data from the Illinois Poison Center from 2002 to 2007, which primarily comprises of non-fatal hospitalized and non-hospitalized attempts. We analyzed 43,057 calls by persons suspected of attempting suicide. The three most common groups of substances used were analgesics, antidepressants, and sedative/hypnotics/antipsychotics. The Poisson regression model showed significant declines in calls for suspected suicides during periods of holidays and vacations, and was more pronounced among youths. This study provides a current and detailed description of substances used primarily in non-fatal suicide attempts.

Keywords analgesics, poisoning, Poisson regression model, suicide, trend analysis, youths

INTRODUCTION

In 2006, suicide was the 11th leading cause of death in all age groups and was one of the top five leading causes of death among those between 10 to 54 years old (CDC NCIPC, 2006). The age-adjusted rate of fatal suicide attempts in 2006 was 10.96 deaths per 100,000 persons in the U.S. and has remained relatively stable since 1999 (CDC NCIPC WISQARS, 2005). However, the CDC estimates that for every suicide attempt resulting in a death there are an estimated 25 non-fatal attempted suicides, and the margin between fatal and non-fatal suicide attempts is even larger among persons 15 to 24 years old (CDC, 2009). In addition, females attempt suicide more often than men in their lifetimes, but suicide attempts among males are more likely to end in a fatality (CDC, 2009). Furthermore, the societal cost of suicide is tremendous in terms of lives lost, psychosocial ramifications, and economic impact. A study in 1998 reported that the estimated comprehensive cost of suicide in U.S. was $11.8 billion dollars in 1998 (Goldsmith, Pellmar, Kleinman et al., 2002). The cost estimates included medical expenses, lost or reduced productivity and lost wages.

Self-harm poisoning was the second most common cause of emergency department visits for intentional injury in 2006 (CDC, 2008). Among fatal suicides, poisoning is the third most common method of suicide behind the use of firearms and suffocation (CDC, 2004; CDC, 2009) and the most common reported method used by persons attempting suicide in non-fatal events (Andrus, Fleming, Heumann et al., 1991; Prosser, Perrone, & Pines, 2007).

The poisons used in suicides often involve easily accessible over-the-counter products. According to a Drug Abuse Warning Network (DAWN, 2009) report, approximately 70% of drug-related emergency department visits in suicide attempts involved poisonings from pain medication, most of which were over-the-counter drugs. Antidepressants or other psychotherapeutic drugs were used in about 28% of those admitted to hospitals (DAWN, 2006). In a study of 233,756 hospital admissions between 1997 and 1999 in England, the most commonly used substance in fatal overdoses were paracetamol compounds, benzodiazepines, and tricyclic/tetracyclic antidepressants (Gunnell, Ho, & Murray, 2004). While fatal suicides, attempts resulting in hospitalizations, and suicide attempts in psychiatric populations have been well documented in the literature, there continues to be little epidemiological data about the distribution, trend, and factors associated with the occurrence of non-fatal attempts in the general population, in particular those from poisoning and cases that do not involve hospitalizations.

Poison center data provide a useful resource for evaluating non-fatal poisoning and have been shown to accurately reflect patterns of exposure and trends in the general population (AAPCC, 2007; Friedman, 2009). Poison centers receive calls from medical professionals in health care facilities as well as a large proportion of calls from individuals who never seek medical treatment. Information is collected for every call received and the data are then uploaded in real-time to a data repository. The data collected cover a wide range of information about the exposed person including demographic information, reported source of exposure and treatment follow-up.

For this study, call data from the Illinois Poison Center (IPC) was used in order to: (1) describe characteristics of persons attempting suicide through poisoning and the substances they used; (2) assess trends of calls for attempted suicides between 2002 and 2007; and (3) define seasonal factors that were associated with suicide attempts from poisoning.

METHODS

Data Source and Case Definition

A complete dataset of all calls made to the Illinois Poison Center (IPC) between 2002 and 2007 was used. Trained physicians, pharmacists, and nurses receive these calls and provide callers with poison prevention exposure management information. The staff collects standardized data including demographic information, number and type of exposures, medical treatments, and medical outcomes. In the State of Illinois, the poison center staff follow-up on more than 60% of patients after the initial call. The frequency and interval for follow-up calls varies case by case, and is dependent on the severity and pharmacokinetics of the poisoning.

There were a total of 589,897 cases in this data set. There were 95,229 (16.14%) information calls, 451,611 (76.56%) unintentional poisoning cases, and 43,057 (7.3%) suspected-suicide cases. Only calls relating to reported exposures were included in this analysis. Information calls were excluded because they do not involve a specific exposure. Examples of information calls include drug, poison, occupational and environmental hazard information, as well as general prevention and safety recommendations.

The Illinois Poison Center defines suspected suicide attempts as "cases involving an exposure resulting from the inappropriate use of a substance for self-destructive or manipulative reasons" (American Association of Poison Centers, 2001). Call center staff identify cases of suspected suicide attempts by evaluating patient self-reports

(i.e., expressed intent of self harm), psychiatric history provided by the patient to medical personnel, history of past suicide attempts, misuse of a drug with evidence to cause self-harm, physical examination findings reported by health care providers, reports of psychological and emotional distress, and emergency medical personnel description of the scene such as signs, symptoms and physical evidence.

The poison center dataset captures up to five principal exposures per individual. All listed exposures were analyzed. In addition to a detailed description of the toxic agent, each exposure was grouped into 1 of 56 major categories (e.g., analgesics, cosmetics/personal care products, cleaning products) (Illinois Poison Center, 2009). If more than one substance in the same category was used by an individual (e.g., analgesic—aspirin and ibuprofen), that exposure was counted once because the focus of this study was to count individuals, not estimate dose.

Statistical Analysis

The dataset was analyzed using SAS (v9.1.3, SAS Institute Inc., Cary, N.C.). For all statistical tests, a two-sided p-value less than 0.05 was considered statistically significant. Frequency counts and percent distributions were tabulated for gender, age, exposure sites, and hospital flow. Appropriate parametric tests (Pearson's chi-square) were used to evaluate bivariate relationships. For continuous variables we use the student t-test to assess crude statistical relationships. The Levenne Test was used to test for equivariance between samples. The Cochran Mantel Haenszel test for trend was used to assess the relationship between number of substances used in the suicide attempt and proportion admitted to ICU controlling for age and gender.

No serial correlation was observed in the time series, therefore a Poisson regression model was used to model call data. A manual stepwise process was used to identify the final multivariable time trend model. Potential predictors were added to the model only if they significantly improved the model. The final model included the variables for trend (linear), Christmas (dichotomous), Thanksgiving (dichotomous), days of the week (ordinal), and summer (dichotomous). The Christmas variable included the 24th, 25th, and 26th of December, and Thanksgiving included the day itself (Thursday) through Sunday of the immediate weekend. Days of the week were numbered with Sunday being day 1 and ordered consecutively thereafter. Summer included the months of June, July, and August. A similar model was built to evaluate suspected suicides in those 19 years old and under.

RESULTS

From 2002 to 2007, there were a total of 43,057 cases of suspected suicide attempts. Table 1 presents demographic information of all cases. Persons attempting suicide were disproportionately female (63.35%; $p < 0.01$). Persons suffering poisoning as a result of a suspected suicide attempt were older than unintentional poisoning cases (t-test; $p < 0.01$). Among cases of suspected suicide attempts, 83.76% were between the ages of 15 and 54 years, whereas 62.19% of unintentional poisoning cases were under 10 years old. The majority of the exposures occurred in homes for both suspected suicide and unintentional poisoning cases (97.55% and 92.2% respectively; $p > 0.05$). The proportion of pregnant women attempting suicide was more than double the proportion of calls for pregnant women involved in unintentional poisoning.

The proportion of suspected suicide attempt cases suffering from minor, moderate, or major injuries as a result of the poisoning was nearly 3.5 times greater than unintentional poisoning cases (45.63% vs.

TABLE 1. **Calls to Illinois Poison Center for Suspected Suicide Attempts and Unintentional Poisonings, 2002–2007**

	Unintentional poisonings ($N = 451,611$)	Suspected suicide attempts ($N = 43057$)
Sex		
Male	218798 (48.45%)	15047 (34.95%)
Female	222685 (49.31%)	27278 (63.35%)
Pregnant	1660 (0.37%)	356 (0.83%)
Unknown	8468 (1.88%)	376 (0.87%)
Age		
0 to 4 years	249656 (55.28%)	2 (0.00%)
5 to 9 years	31192 (6.91%)	47 (0.11%)
10 to 14 years	20599 (4.56%)	2353 (5.46%)
15 to 19 years	17984 (3.98%)	9106 (21.15%)
20 to 24 years	14365 (3.18%)	6230 (14.47%)
25 to 34 years	25534 (5.65%)	8431 (19.58%)
35 to 44 years	23774 (5.26%)	7675 (17.83%)
45 to 54 years	18923 (4.19%)	4621 (10.73%)
55 to 64 years	11680 (2.59%)	1320 (3.07%)
65 to 74 years	7898 (1.75%)	358 (0.83%)
75 years and above	8192 (1.81%)	243 (0.56%)
Unknown	21792 (4.83%)	2671 (6.20%)
Exposure Site		
Own or other residence	420810 (93.18%)	42249 (98.12%)
Workplace	12664 (2.80%)	14 (0.03%)
Healthcare facility	515 (0.11%)	67 (0.16%)
School	8549 (1.89%)	71 (0.16%)
Other public area or facility	6742 (1.49%)	87 (0.20%)
Other or unspecified	2331 (0.52%)	569 (1.32%)
Hospital Flow		
Not treated in HCF	391773 (86.75%)	12209 (28.36%)
Treated/evaluated and released	45024 (9.97%)	3438 (7.98%)
Admitted to critical care unit	7366 (1.63%)	14585 (33.87%)
Admitted to non-critical care unit	6234 (1.38%)	7128 (16.55%)
Admitted to psychiatric care facility	1214 (0.27%)	5697 (13.23%)

13.06% respectively; $p < 0.01$). Furthermore, the proportion of suspected suicide attempt cases reporting a major effect was almost 14 times higher than unintentional poisoning cases (2.51% vs. 0.18%; $p < 0.01$) and the fatality rate among persons attempting suicide was almost 10 times higher than unintentional poisoning cases (0.27% vs. 0.03%; $p < 0.01$). In addition, poison center staff were unable to follow-up on 25.8% ($N = 11,180$) of suspected suicide attempt cases who were determined to have suffered potentially toxic exposures compared to only 4.8%

($N = 21857$) of unintentional poisoning cases ($p < 0.01$).

Among suspected suicide attempt cases, 71.63% were treated at a health care facility compared to 13.25% of unintentional poisoning cases ($p < 0.01$). Out of all calls to IPC between 2002 and 2007, suspected suicide attempt cases accounted for almost two-thirds (66.4%) of all cases admitted to an ICU, more than half (53.35%) of non-ICU admissions and more than four-fifths (82.43%) of psychiatric care facility admissions (Table 1).

Type of Exposures

Table 2 shows the most common substances used by persons attempting suicide. More than a third (39.70%) of the suspected suicide attempt cases took analgesics of which acetaminophen made up more than half (56.70%, $N = 9692$) of analgesics taken, 23.40% ($N = 3973$) took Ibuprofen, 13.40% ($N = 2291$) took Aspirin, 6.35% ($N = 1085$) took Naproxen, and 2.54% ($N = 434$) took Tramadol.

TABLE 2. **Top 10 Substances Reported to the Illinois Poison Center for Suspected Suicide Attempts, 2002–2007**

Substance	N (%)
Analgesics	17094 (39.70%)
Sedative/Hypnotics/ Antipsychotics	12311 (28.59%)
Antidepressants	8645 (20.08%)
Alcohols	5558 (12.91%)
Anticonvulsants	2912 (6.76%)
Antihistamines	2863 (6.65%)
Cardiovascular drugs	1917 (4.45%)
Cold and cough preparations	1733 (4.02%)
Stimulants and street drugs	1466 (3.40%)
Muscle relaxants	1453 (3.37%)

Notes. *Cumulative percentage exceeds 100% because individuals can be exposed to more than one substance simultaneously.

About a quarter (28.59%) took drugs classified as sedatives/hypnotics/antipsychotics, of which Benzodiazepines made up more than half (59.81%, $N = 7363$) of the drugs taken in this category and 30.74% ($N = 3785$) took atypical antipsychotics. One-fifth of all persons attempting suicide used antidepressants, of which more than half (57.69%, $N = 4987$) were SSRIs. Only 3.4% ($N = 1466$) took stimulants and street drugs, of which 30.08% ($N = 441$) took cocaine, 23.6% ($N = 346$) took amphetamines, and 18.76% ($N = 275$) took methylphenidate. Among those who took methylphenidate in a suspected suicide attempt, 61.09% ($N = 168$) were youths between the ages of 10 to 19 years.

Dose-Response

Figure 1 shows that the likelihood of being admitted to the critical care unit is positively associated with number of reported toxic exposures and age ($p < 0.001$). Across all age groups combined, the dose response curve starts to plateau at 4–5 drug exposures. Figure 1 indicates a diversion between the age groups at a higher number of exposures, but this may be the result of the small number of cases with exposures to five concurrent substances ($N = 220$). We did not observe a difference in the dose response pattern by gender.

Poisson Model

In the final multivariable Poisson model, the trend of daily calls of suspected suicide attempts increased significantly in a linear fashion from 2002 to 2007 (average daily increase of 0.02%, $p < 0.001$). There was no evidence that the trend was curvilinear. Based on the model, calls for suicide attempts declined 3.08% per day from Sunday through Saturday ($p < 0.001$). Figure 2 shows the distribution of suspected suicide

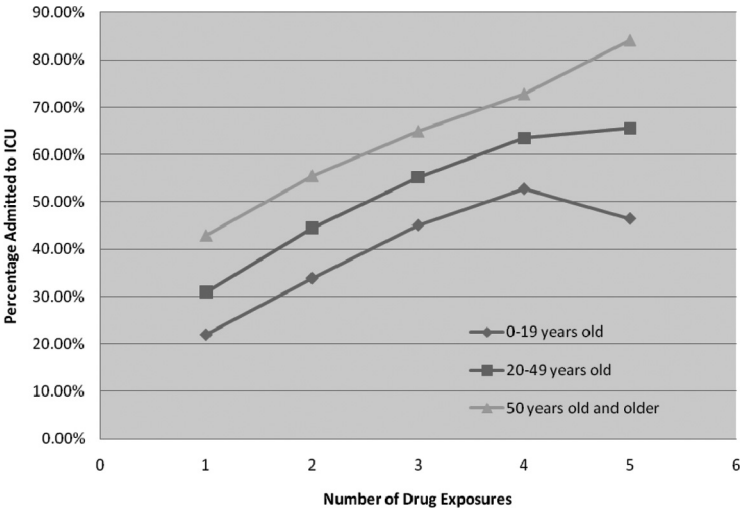

FIGURE 1. *Proportion of suspected suicide attempts admitted to an intensive care unit by the number of drug exposures and age, Illinois Poison Center, 2002–2007.*

attempts by the day of the week. The number of suspected suicide attempts decreased by 31.88% ($p = 0.001$) over Christmas, 13.17% ($p = 0.0156$) over Thanksgiving and 3.27% ($p = 0.0084$) during the summer.

A second model specifically focused on youths 19 years of age and younger also showed that the trend for daily calls of suspected suicide attempts increased significantly in a linear fashion from 2002 to

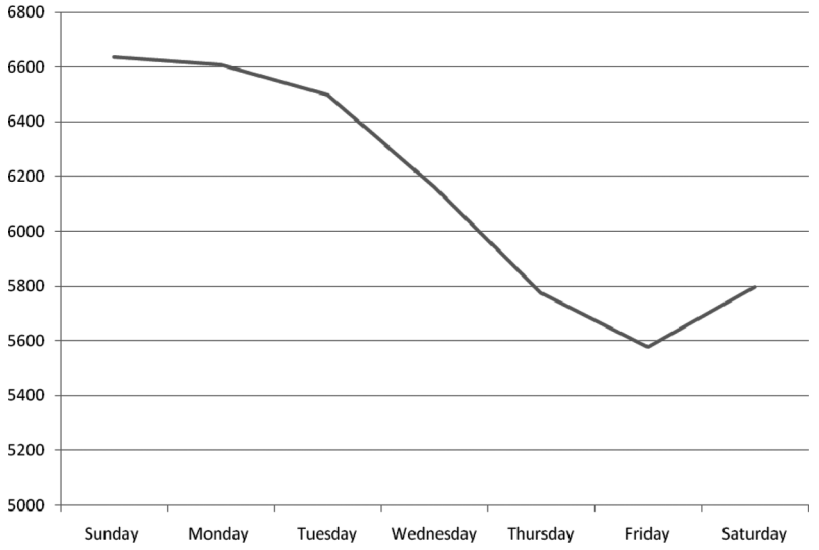

FIGURE 2. *Distribution of suspected suicide attempts reported to the Illinois Poison Center by day of the week, 2002–2007.*

2007 (average daily increase of 0.01%, $p < 0.001$). Based on the model, calls for suspected suicide attempts declined 4.00% per day from Sunday through Saturday ($p < 0.001$). In addition, the number of suicide attempts decreased 53.21% ($p < 0.001$) over Christmas, 47.39% ($p < 0.001$) over Thanksgiving, and 19.36% over summer ($p < 0.001$).

DISCUSSION

There is a paucity of research on non-fatal suicides, in particular persons not treated in hospitals following a suicide attempt. The focus of past research has involved data sources that rely solely or heavily on deaths (e.g., death records and medical examiners), clinical populations (e.g., psychiatric in-patients), and more severe attempts resulting in hospitalizations (e.g., hospital discharge datasets). Because of the nature of poison center data, this study involves almost entirely non-fatal attempts of which almost 36.35% were not hospitalized ($N = 15{,}651$). The poison center data therefore provides a broad picture of patients that have not been readily researched in the past. Even in this population which includes a large proportion of less severe outcomes that were non-fatal and not admitted to a hospital, the characteristics of those attempting suicide, the substances used in the suicide attempts and the seasonal patterns of the suicide attempts were similar to other studies involving suicide attempts resulting in hospitalization or death (CDC, 2009; DAWN, 2006; Gunnell, Ho, & Murray, 2004; Hall, 1999; Shepherd & Klein-Schwartz, 1998; Townsend, 2001).

Among all cases of poisoning reported to the IPC, suspected suicide attempts represented 67% of all critical care unit admissions, 50% of all non-critical care unit admissions, and 90% of all psychiatric admissions. In addition, the dose response analysis shows that the more drugs one takes, the more likely the person was to be admitted to a critical care unit. Of the suspected suicide attempt cases, about a third (33.87%) were admitted to a critical care unit although only 2.51% were recorded as having a major adverse exposure. Persons attempting suicide were probably admitted to the critical care units as a suicide precaution, not because they needed the intensive care (AAPCC, 2001; Doshi, Edwin, Wang et al., 2005). Patients who have attempted suicide require closer observation so that they will not attempt suicide in the hospital. In addition, medical staff often assume the worst in terms of toxicological exposure when treating patients who are suspected of attempting to kill themselves, therefore these patients often end up in a critical care unit. Furthermore, in smaller hospitals, at risk patients often end up in the critical care unit because it is one of the few areas that allows for close observation. In addition, psychiatric facilities will not admit a patient until the treating medical staff can verify that no toxicological risks remain to the patient.

Based on the Poisson models, the overall daily trend of calls for suspected suicide attempts increased between 2002 and 2007, albeit very slowly, and there were clear seasonal and weekly variations in the distribution of calls. Because a large proportion of calls to IPC come from medical staff at healthcare facilities, it is possible that the observed seasonal and weekly variations in calls for suicide attempts were the result of fewer medical staff on duty at medical facilities during these periods. However, in a Poisson model evaluating the trend of all unintentional poisonings, we did not observe a significant change in summer months ($p = 0.249$) or by day of the week ($p = 0.064$). This indicates that the drop in suicide attempts during the summer and over the course of the week reflects a unique pattern in suicides and is

unlikely to be related to changes in medical staffing.

The Poisson model revealed a downward trend of calls for suspected suicide attempts during the week from Sunday to Saturday. We also observed substantial and significant declines in suspected suicide attempts during the Christmas and Thanksgiving seasons. A decline in fatal suicides during Thanksgiving and Christmas seasons has been reported in past research (CDC NCIPC, 2009; MacMahon, 1983; Phillips & Sanzone, 1988; Phillips & Wills, 1987). Our findings show that summer holidays, Christmas, and Thanksgiving seem to be a protective factor for suicide and is most apparent when looking at youths alone. The seasonal variations in suicide incidence may be attributed, in part, to seasonal affective disorders (Eastman, 1990) or social factors that mediate the relationship between temporal associations and suicide (Kposowa, 2010). The CDC's National Center for Health Statistics reports December to have the lowest suicide rate and peaks in spring and fall (CDC NCIPC, 2009). In a study using U.S. vital statistics data, suicides were most common on Mondays and were lowest on Saturdays during summer months and lowest on Sundays during winter months (MacMahon, 1983). Other studies have also reported that the proportion of suicides was highest early in the week (Jessen, Anderson, Arensman et al., 1999; Phillips & Sanzone, 1988).

Concerning youth suicides, it was found that the large majority of methylphenidate poisonings used in suspected suicide attempts were by youths between the ages of 10 and 19 years. An earlier study using poison center data showed that there was an increasing frequency of methylphenidate poisonings among adolescents (Klein-Schwartz & McGrath, 2003). A study done by Cox, Motheral, Henerson et al. (2003) showed that the overall prevalence of children aged 5 to 14 years prescribed at least one stimulant was 4.2%. His study also revealed that children residing in the Midwest and South of the United States were respectively 1.55 and 1.71 times more likely to consume at least one stimulant as compared to children residing in Western United States (Cox, 2003).

Limitations

Conclusions based on poison center data primarily reflect suicide patterns among non-fatal cases. Generally, IPC provides prevention and treatment information. In cases of death, medical personnel will usually not require poison center services. Deaths will more accurately be captured in vital statistic data sources. Because of this reporting bias, Illinois Poison Center data do not adequately capture fatalities and inferences on case fatality rates or mortality rates should be limited. In addition, poison center data are a reflection of calls and not the universe of all suicide attempts, and therefore are not useful for determining the magnitude of suicides, but past research has shown that poison center data are very accurate for evaluating trends and patterns of exposure. For this reason, we do not present prevalence or incidence rates.

The IPC is also unable to verify the accuracy of reports made (Hoffman, 2007) and history taken from a patient who has attempted suicide could be potentially inaccurate and misleading. However, poison center staff are trained to seek multiple sources of information including self-reports, paramedic information, and medical reports from physicians in order to validate exposures and intent. Furthermore, IPC follows up on a vast majority of cases, which provides the opportunity to gather secondary information on toxicological screens and clinical tests.

Finally, individuals may provide misleading information about suicide intent

and the circumstances surrounding a poisoning. A concern is that this could introduce a bias if those that hide an attempt are substantially different from those who admit to attempting suicide.

CONCLUSIONS

This study provides a current and detailed description of substances used primarily in non-fatal suicide attempts and includes many cases that were not hospitalized and therefore would be missed in datasets that rely on death records and hospitalizations.

The Poisson regression model showed distinct seasonal patterns, particularly declines during periods of holidays and vacations. The observed declines in attempted suicides during weekends, holidays, and summer vacations were more pronounced for youths.

Suspected suicide cases were more likely to be admitted to an intensive care unit than non-suicide cases. The estimated average daily cost in an ICU is about twice that of a non-ICU ($2,401 vs. $1,122) (Candrilli & Mauskopf, 2006). Our findings indicate that patients treated for injuries caused during a suicide attempt result in greater service utilization and costs to hospitals as a result of practices used for managing suspected suicide patients. Poison center data should be used more frequently in suicide research particularly as a complementary data source for the analysis of suicide trends. Poison center data are available in real-time and are national in scope.

AUTHOR NOTE

The author (LSF) is a consultant to the Illinois Poison Center for their Latino outreach and health educator programs.

IRB approval number: #2008-0483. IRB approval was made by the University of Illinois at Chicago, Office for the Protection of Research Subjects.

Shile Liang and Lee S. Friedman, University of Illinois, School of Public Health, Division of Environmental and Occupational Health Sciences, Chicago, Illinois, USA.

Correspondence concerning this article should be addressed to Lee S. Friedman, Director, The Social Policy Research Institute, 4001 Emerson, Skokie, IL, USA, 60076. E-mail: lfriedman@tspri.org

REFERENCES

American Association of Poison Control Centers. (2001). *Instructions for the Amercian Association of Poison Control Centers Toxic Exposure Surveillance System (TESS)*.

American Association of Poison Control Centers. (2007). 2006 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS). *Clinical Toxicology*, *45*, 815–917.

Andrus, J. K., Fleming, D. W., Heumann, M. A., Wassell, J. T., Hopkins, D. D., & Gordon, J. (1991). Surveillance of attempted suicide among adolescents in Oregon, 1998. *American Journal of Public Health*, *81*, 1076–1069.

Candrilli, S., & Mauskopf, J. (2006, May). *How much does a hospital day cost?* Retrieved from RTI Health Solutions http://www.rtihs.org/request/index.cfm?fuseaction=displayπD=6465

Centers for Disease Control, & Prevention. (2004). Methods of suicide among persons aged 10–19 years—United States, 1992–2001. *Morbidity and Mortality Weekly Report*, 471–474.

Centers for Disease Control and Prevention. (2009, September 30). *National suicide statistics at a glance*. Retrieved from http://www.cdc.gov/violenceprevention/suicide/statistics/aag.html#1

Centers for Disease Control and Prevention. (2008, March 13). *Poisoning in the United States: Fact sheet*. Retrieved from Injury Center http://www.cdc.gov/NCIPC/factsheets/poisoning.htm

Centers for Disease Control and Prevention. (2009, Summer). *Suicide: Facts at a glance*. Retrieved from Violence Prevention http://www.cdc.gov/violenceprevention/pdf/Suicide-DataSheet-a.pdf

Centers for Disease Control, and Prevention, National Center for Injury Prevention and Control

(CDC NCIPC). (2006). *10 leading causes of death by age group,*. Retrieved from Ten Leading Causes of Death and Injury (Charts), United States −2006 http://www.cdc.gov/Injury/Images/LC-Charts/10lc-by-age-group2006-bw-a.pdf

Centers for Disease Control and Prevention, National Center for Injury Prevention. (2009, December 21). *Holiday suicides: Fact or myth?* Retrieved from CDC Home http://www.cdc.gov/ViolencePrevention/suicide/holiday.html

Centers for Disease Control, & Prevention, National Centers for Injury Prevention, & Control. *Web-based Injury Statistics Query and Reporting System (WISQARS)*. Retrieved from http://www.cdc.gov/injury/wisqars/index.html

Cox, E. R., Motheral, B. R., Henerson, R. R., & Mager, D. (2003). Geographic variation in the prevalence of stimulant medication use among children 5 to 14 years old: Results from a comercially insured US sample. *Pediatrics*, *111*(2), 237–243.

Doshi, A., Edwin, B. D., Wang, N., Pelletier, A. J., & Camargo, C. A. (2005). National study of U.S. emergency department visits for attempted suicides and self-inflicted injury, 1997–2001. *Annals of Emergency Medicine*, *46*(4), 369–375.

Drug Abuse Warning Network. (2009). Detailed tables: Drug-related emergency department visits for 2004–2008. Retrieved from Suicide Attempts: https://dawninfo.samhsa.gov/data/

Drug Abuse Warning Network. (2006). *The Dawn report: Disposition of emergency department visits for drug-related suicide attempts by adolescents: 2004*. Retrieved from https://dawninfo.samhsa.gov/files/TNDR/2006-03R/TNDR03Adolescent-Suicide.htm

Eastman, C. I. (1990). Natural summer and winter sunlight exposure patterns in seasonal affective disorder. *Physiology and Behavior*, *48*, 611–616.

Friedman, L. S. (2009). Real-time surveillance of illicit drug overdoses using poison center data. *Clinical Toxicology*, *45*, 573–579.

Goldsmith, S. K., Pellmar, T. C., Kleinman, A. M., & Bunney, W. E. (2002). *Reducing suicide. A national imperative*. Washington, DC: The National Academic Press.

Gunnell, D., Ho, D., & Murray, V. (2004). Medical management of deliberate drug overdose: A neglected area for suicide prevention. *Emergency Medical Journal*, *21*, 35–38.

Hoffman, R. S. (2007). Editorial: Understanding the limitations of retrospective analysis of Poison Center data. *Clinical Toxicology*, *45*, 943–945.

Illinios Poison Center. (2009). *Answering the call. 2009 annual report. Illinois Poison Center*. Retrieved from http://www.mchc.org/IPC/AboutIPC/IPC09AnnualReport.pdf

Jessen, G., Anderson, K., Arensman, E., Bille-Brahe, U., Crepet, P., De Leo, D., & Wasserman, D. (1999). Temporal fluctuations and seasonality in attempted suicide in Europe. Findings from the WHO/EURO multicentre study on parasuicide. *Archives of Suicide Research*, *5*(1), 57–69.

Klein-Schwartz, W., & McGrath, J. (2003). Poison centers' experience with methylphenidate abuse in pre-teens and adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, *42*(3), 288–294.

Kposowa, A. J., & D'Auria, S. (2010). Association of temporal factors and suicides in the United States, 2000-2004. *Social Psychiatry and Psychiatric Epidemiology*, *45*, 433–445.

MacMahon, K. (1983). Short-term temporal cycles in the frequency of suicide, United States, 1972–1978. *American Journal of Epidemiology*, *117*(6), 744–750.

Phillips, D. P., & Sanzone, A. G. (1988). A comparison on injury date and death date in 42,698 suicides. *American Journal of Public Health*, *78*(5), 541–543.

Phillips, D. P., & Wills, J. S. (1987). A drop in suicides around major national holidays. *Suicide and Life-Threatening Behavior*, *17*(1), 1–12.

Prosser, J. M., Perrone, J., & Pines, J. M. (2007). The epidemiology of intentional non-fatal self-harm poisoning in the United States: 2001–2004. *Journal of Medical Toxicology*, *3*(1), 20–24.

Shepherd, G., & Klein-Schwartz, W. (1998). Accidental and suicidal adolescent poisoning dealths in the United States, 1979–1004. *Archives of Pediatric and Adolescent Medicine*, *152*, 1181–1185.

Townsend, E., Hawton, K., Harris, L., Bale, E., & Bond, A. (2001). Substance used in deliberate self-poisoning 1985–1997: trends and associations with age, gender, repetition and suicide intent. *Social Psychiatry and Psychiatric Epidemiology*, *36*(5), 228–234.