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Suicide and Life-Threatening BEHAVIOR

ORIGINAL ARTICLE

Analysis of veterans crisis line data: Temporal factors associated with the initiation of emergency dispatches

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Abstract

Purpose: To identify temporal patterns of emergency dispatches as initiated by Veteran Crisis Line (VCL) responders and among moderate- and high-risk contacts.

Methods: Incidence rate ratios (IRRs) were used to examine the incidence of emergency dispatches among all 1,437,543 VCL contacts across 2019–2020.

Results: Emergency dispatches were initiated in 57,077 (4.0%) contacts. IRRs were elevated during Labor Day, IRR (95% CI) = 1.33 (1.15–1.54), and Independence Day, IRR (95% CI) = 1.22 (1.05–1.43), weekends, Saturdays, IRR (95% CI) = 1.04 (1.01–1.08), Sunday (reference), and 6 pm to 11:59 pm, IRR (95% CI) = 1.06 (1.04–1.09). IRRs for moderate- and high-risk contacts were higher on Memorial Day, IRR (95% CI) = 1.16 (1.00–1.33), Sunday (reference), and 6 pm to 11:59 pm (reference).

Conclusions: The initiation of emergency dispatches fluctuates over time and were highest during Labor Day and Independence Day, weekends, and evenings. Moderate- and high-risk contact also fluctuate over time and were highest on Memorial Day, Sundays, and midnight to 5:59 am. VCL policy makers can use knowledge of temporal fluctuations to allocate public health resources for increased efficiency and greatest impact; however, additional research on temporal stability and generalizability is needed.

KEYWORDS

crisis line, emergency dispatch, prevention, suicide

INTRODUCTION

United States (U.S.) military veterans are at increased risk for suicide compared with their age- and gender-matched peers in the general population (Office of Mental Health and Suicide Prevention, 2020). Although suicide rates for U.S. veterans declined in 2018, they remain high, and researchers continue to study the components of the

Department of Veterans Affairs (VA) suicide prevention strategy that was implemented in 2008 to address risk in this population (Department of Veterans Affairs, 2008; Office of Mental Health and Suicide Prevention, 2020). A core element of that strategy was the development of the veterans suicide hotline, which was later renamed the Veterans Crisis Line (VCL) to attract veterans who are in crisis but not yet suicidal (Knox et al., 2012). The VCL has been widely used from its inception, with responders answering more than 5.6 million calls, engaging in over 660,000 web-based chats, and responding to more than 218,000 texts (Department of Veterans Affairs, 2021). Moreover, utilization of crisis lines is expected to grow in the United States as the National Suicide Hotline Designation Act of 2020 designates 988 to replace the National Suicide Prevention Lifeline and VCL numbers as a destigmatizing, easily remembered, and nationally accessible number to facilitate help seeking for mental health crises, following the example of 911 (116th Congress, 2020). Nonetheless, foundational work is needed to examine key factors associated with crisis line contacts, in particular those that result in the initiation of emergency dispatches (i.e., initiation of 911 or other local emergency services), to educate policy makers and responders, and inform the efficient allocation of public health resources.

Researchers have been interested in temporal patterns of suicide since at least the 1880s, when Morselli noted that suicide peaked in Europe during the summer rather than the winter, and on Wednesdays when compared with Sundays (Morselli, 1883). These findings have been replicated in analysis of U.S. population-level data that shows a higher incidence of suicide during the summer when compared with winter and on Wednesdays compared with Sundays, even after adjusting for socioeconomic and demographic factors at the individual and state level (Kposowa & D'Auria, 2010). A more recent study examining poisoning suicides within the United States found that the number of intentional fatal poisonings was higher on Sundays, Mondays, and New Year's Day, and lower on Independence Day, Thanksgiving, and Christmas (Beauchamp et al., 2014). Although firearms have become the number one method of suicide across both sexes in the United States as of 2018, poisonings remain more common among females than males (Centers for Disease Control and Prevention, 2020). Research from the United Kingdom, Ireland, and South Korea shows similar overall findings with suicide highest on Mondays, spring and summer and lowest in winter, but also shows some variation across demographics including age, sex, and method (Corcoran et al., 2004; Kim et al., 2019; Massing & Angermeyer, 1985).

Although temporal fluctuations are observed for suicide, there is a paucity of research examining similar variability in the utilization of crisis services, and it is possible that they do not follow the same patterns as suicide. Because they are a 24-h service that allows for anonymous help seeking for mental health crises when other services are not available, crisis lines are often the front line in suicide prevention efforts. When crisis line responders determine that callers are at imminent risk for suicide or are otherwise in need of immediate attention, one intervention they utilize is emergency dispatches, which initiate 911 or other local emergency resources to provide on-site needs assessment, transportation to emergency departments if it is needed, and subsequent triage to requisite care. A recent systematic review highlighted follow-up care for high-risk individuals as an evidence-based strategy for suicide prevention (Mann et al., 2021). There is, however, a general lack of knowledge regarding factors associated with the initiation of emergency dispatches by crisis line responders. It is critical to understand temporal factors associated with the utilization of emergency dispatches because the VCL is a highly visible suicide prevention resource within VA, and the number of dispatches initiated by the VCL and other crisis lines in the United States is expected to increase due to the implementation of 988 as a mental health emergency phone line (116th Congress, 2020). Dispatches are also costly, often consist of police and emergency services, and are of unknown effectiveness.

The purpose of this study is therefore to examine temporal patterns of emergency dispatches initiated by VCL responders. Based on temporal variations observed for suicide and the strategic use of emergency dispatches to provide crisis services to callers at imminent risk for suicide and other negative outcomes, it was hypothesized that there would be temporal variations in the incidence of emergency dispatches. Specifically, it was hypothesized that their initiation would be impacted by time of day, day of the week, month of the year, and by holidays. Additional analyses were conducted to determine whether fluctuations in dispatches were closely linked to changes in the volume of calls determined to be at moderate to high risk for suicide.

METHODS

Study population

The VCL Medora database, which is maintained by VCL responders to document characteristics (i.e., time, date, reasons for contact, risk evaluation results, etc.) of VCL contacts, including outcomes such as whether the contact ended with an emergency dispatch, was used to identify contacts across calendar years 2019–2020. Contacts included all identified calls, chats, and texts that were received over the time frame to ensure full coverage of call

volume and increase generalizability of the findings. Contacts therefore included those from self-identified veterans and nonveterans, multiple contacts from the same individual, and concerned third parties (i.e., family, friends, clinicians, and acquaintances). The initiation of emergency dispatches is recorded by responders and the present analyses focus on all types of emergency dispatches, including those where fatal or nonfatal suicidal behaviors are suspected.

Study design

Temporal variables of day of contact were determined by the time stamp as recorded in the Medora database when the responder opened a new call record. Time of day was the time that the responder answered the contact and was divided into four time frames of 6 h (i.e., midnight to 5:59 am, 6 am to 11:59 am, noon to 5:59 pm, and 6 pm to 11:59 pm). Each day started at 12:00 am and ended at 11:59 pm. Months and holidays were determined by the U.S. calendar.

Because there was considerable variability in contact volume across time frames, we conducted secondary analyses to determine whether fluctuations in emergency dispatches coincided with fluctuations in contacts by callers determined to be at high risk for suicide. This helped to determine whether changes in emergency dispatches were influenced by changes in moderate- and high-risk contacts (i.e., contacts rated as moderate-to-high and high risk by VCL responders). VCL responders are required to ask about suicidal ideation, recent suicidal ideation in the past month, and lifetime history of suicide attempt, and use other information from the call (i.e., their determination of imminency, intoxication, presence of a firearm) to determine whether risk is *low-to-moderate*, *moderate-to-high*, or *high*. Ratings are reviewed by supervisors for quality assurance purposes, but no formal research has been conducted on inter-responder reliability or test–retest reliability. Nevertheless, the ratings have predictive validity as callers rated as moderate-to-high risk are 1.55 (95% CI = 1.18–2.04) and callers rated as high risk are 2.87 (95% CI = 2.06–4.02) times more likely to die by suicide than callers rated as low-to-moderate risk (Hannemann et al., 2021).

Statistical analyses

The analytical plan was informed by a similar study examining temporal factors of myocardial infarction in Sweden (Mohammad et al., 2018). Poisson regression was used to calculate incidence rate ratios for year, time of day, day of week, month of year, and holidays and to determine statistical differences in emergency dispatches across each time factor. The first time frame was used as the control for each comparison, such that the time-of-day control was the early morning hours (midnight to 5:59 am), the day of the week control was Sunday, and the month control was January to maintain consistency across temporal analyses. The control for holidays was the 2 weeks preceding and following the date of each holiday, to minimize potential holiday "season," seasonal (i.e., winter, spring, summer, and fall), and monthly effects. Statistical significance was set at a two-sided p value of <0.05. Statistical analyses were conducted with SAS Enterprise Guide version 8.2 (SAS Institute Inc., Cary, NC).

RESULTS

Descriptive information

Across 2019–2020, there were 1,437,543 VCL contacts and 57,077 (4.0%) emergency dispatches. In 2019, 3.9% (27,105/689,026) of contacts ended with an emergency dispatch, whereas in 2020, 4.0% (29,972/748,517) contacts ended with a dispatch, IRR (95% CI) = 1.02 (1.00–1.03), $p = 0.03$. Of these dispatches, approximately 93% were initiated as a result of calls, 4% texts, and 3% chats.

Time of day, daily, and monthly patterns

The 6 pm to 11:59 pm time frame had a higher incidence of emergency dispatches compared with midnight to 5:59 am, whereas the 6 am to 11:59 am and noon to 5:59 pm time frames were associated with a lower incidence of emergency dispatches (Table 1). When the association of time of the contact with the incidence of moderate- and high-risk contacts was examined, all the other time periods had fewer high-risk contacts than midnight to 5:59 am. Thus, the incidence of emergency dispatches was highest from 6 pm to 11:59 pm, whereas the incidence of moderate- and high-risk contacts was highest midnight to 5:59 pm.

The incidence of emergency dispatches was lower on Monday through Friday and higher on Saturday, when compared with Sunday (Table 1); however, the incidence of moderate- and high-risk contacts was lower on Monday through Saturday than it was on Sunday. Thus, the incidence of emergency dispatches was highest on Saturday, yet the incidence of moderate- and high-risk contacts was highest on Sunday.

No monthly differences in emergency dispatches were observed (Table 1). However, the incidence of

TABLE 1 Incidence rate ratios (IRR) of temporal factors for emergency dispatches and moderate- and high-risk calls.

	All contacts ($N = 1{,}437{,}543$)	
	Emergency dispatches	**Moderate- and high-risk calls**
Time of day	IRR (95% CI)	IRR (95% CI)
Midnight to 5:59 am	Ref.	Ref.
6 am to 11:59 am	***0.78 (0.76–0.80)***	***0.84 (0.82–0.86)***
Noon to 5:59 pm	***0.86 (0.84–0.88)***	***0.76 (0.75–0.78)***
6 pm to 11:59 pm	***1.06 (1.04–1.09)***	***0.91 (0.89–0.93)***
Day of week		
Sunday	Ref.	Ref.
Monday	***0.83 (0.80–0.85)***	***0.86 (0.84–0.89)***
Tuesday	***0.85 (0.82–0.88)***	***0.84 (0.81–0.86)***
Wednesday	***0.86 (0.83–0.88)***	***0.86 (0.84–0.89)***
Thursday	***0.86 (0.83–0.88)***	***0.88 (0.85–0.90)***
Friday	***0.87 (0.85–0.90)***	***0.81 (0.79–0.83)***
Saturday	***1.04 (1.01–1.08)***	***0.92 (0.89–0.95)***
Month of year		
Jan	Ref.	Ref.
Feb	0.99 (0.95–1.03)	0.97 (0.93–1.01)
Mar	0.98 (0.94–1.03)	0.97 (0.93–1.00)
Apr	1.00 (0.96–1.04)	0.98 (0.94–1.02)
May	1.02 (0.98–1.06)	1.02 (0.98–1.06)
Jun	1.03 (0.99–1.07)	1.04 (1.00–1.08)
Jul	1.02 (0.98–1.06)	1.00 (0.96–1.04)
Aug	1.03 (0.99–1.07)	***1.05 (1.01–1.09)***
Sep	0.99 (0.95–1.03)	***1.07 (1.03–1.11)***
Oct	1.01 (0.97–1.06)	***1.08 (1.04–1.12)***
Nov	0.99 (0.95–1.03)	***1.07 (1.03–1.11)***
Dec	1.04 (1.00–1.08)	***1.10 (1.06–1.14)***
Holidays		
New Year's day	1.06 (0.90–1.25)	1.01 (0.87–1.19)
MLK day	1.13 (0.96–1.32)	1.10 (0.94–1.28)
Valentine's day	1.09 (0.93–1.28)	0.95 (0.81–1.12)
President's day	0.93 (0.79–1.11)	1.11 (0.96–1.29)
Easter	1.07 (0.90–1.29)	1.07 (0.90–1.27)
Memorial day	1.05 (0.90–1.24)	***1.16 (1.00–1.33)***
Independence day	***1.22 (1.05–1.43)***	1.11 (0.93–1.31)
Labor day	***1.33 (1.15–1.54)***	1.10 (0.95–1.27)
Columbus day	0.95 (0.81–1.11)	1.04 (0.90–1.19)
Veteran's day	1.06 (0.91–1.23)	1.00 (0.87–1.15)
Thanksgiving day	0.94 (0.78–1.13)	1.12 (0.96–1.31)
Christmas day	1.11 (0.93–1.32)	1.02 (0.86–1.20)

Note: Statistically significant IRR's are in bold and italics.

moderate- and high-risk contacts was significantly higher in August through December than it was in January. Thus, there were not increases in emergency dispatches during the five months of late summer, fall, and early winter during which moderate-and high-risk calls were highest.

Holidays

Labor Day and Independence Day had a higher incidence of emergency dispatches when compared to the 2 weeks preceding and following the holiday, with Labor Day having the highest incidence of dispatches on all holidays examined (Table 1). Corresponding differences in moderate- and high-risk contacts were not observed on these holidays, but the incidence of moderate- and high-risk contacts was highest on Memorial Day.

DISCUSSION

To our knowledge, this is the first study examining associations between temporal factors and the initiation of emergency dispatches by VCL responders and contacts rated as high risk by responders. As expected, at least one statistically significant variation was observed for most comparisons, indicating that there are temporal variations in the incidence of emergency dispatches much as there are temporal variations in the risk of suicide (Beauchamp et al., 2014; Corcoran et al., 2004; Kim et al., 2019; Kposowa & D'Auria, 2010; Massing & Angermeyer, 1985; Morselli, 1883). Given the public health relevance of suicide prevention and the growing reliance on crisis lines as a prevention and intervention strategy (116th Congress, 2020), the observed variations provide critical information to VCL responders who are tasked with addressing risk during contacts, crisis line policy makers who ensure adequate resources are available to meet public health demands, and health care policy makers who are responsible for creating and maintaining the infrastructure needed to facilitate referral processes.

Holidays

Increases in the incidence of emergency dispatches were observed for holidays, with Labor Day having the highest incidence of emergency dispatches closely followed by Independence Day. Neither of these holidays has been found previously to have a higher incidence of suicide (Beauchamp et al., 2014). Importantly, these elevations do not appear to be a result of an increase in moderate- and high-risk contacts. Labor Day and Independence Day are holidays of celebration, with picnics, contact with friends and family, and may be associated with high levels of alcohol consumption, whereas family-oriented holidays such as Thanksgiving and Christmas are not (Patrick & Azar, 2018). Celebrations increase the probability of interpersonal conflict enhanced by intoxication or conversely reminders of isolation and lost relationships, and the suicide literature has consistently identified acute alcohol consumption as a risk factor for suicidal behavior, providing support for this notion (Borges et al., 2017; Cherpitel et al., 2004). Veterans have also reported that fireworks, commonly used to celebrate Independence Day, can trigger their PTSD symptoms, which could also potentially contribute to crises (Gersons & Carlier, 1992; Williamson et al., 2019). There is also reduced health care availability during holidays and responders may have fewer options for warm handoffs and immediate referrals, which could also be an important contributing factor. However, there were not increases in emergency dispatches during other holidays when presumably health care services are closed.

Time of day, weekly and monthly patterns

Because this is the first known analysis of patterns of crisis line use and dispatches by day, week, and month, it is difficult to integrate findings with the extant literature. However, the patterns are dissimilar to those observed for suicides (Beauchamp et al., 2014; Corcoran et al., 2004; Kim et al., 2019; Kposowa & D'Auria, 2010; Massing & Angermeyer, 1985; Morselli, 1883) or to increases in moderate- and high-risk contacts. Specifically, the incidence of emergency dispatches was highest from 6 pm to11:59 pm, a time frame that did not show high rates of moderate- and high-risk contacts. VCL responders may be more likely to initiate emergency dispatches at this time because many health care services are closing, and they know that it could be more than 12 h before they reopen. Weekends saw the highest incidence of emergency dispatches and moderate- and high-risk contacts, though the incidence of emergency dispatches was highest on Saturday and the incidence of moderate- and high-risk contacts was highest on Sunday. Responders may also be more likely to initiate emergency dispatches on Saturday when they know that it will be another day before health care services reopen.

Moderate- and high-risk calls

Analysis of moderate- to high-risk VCL calls indicate that fluctuations in dispatches seemed to be unrelated to changes in overall call severity. Contacts made after midnight and on Sunday, time frames immediately preceding the opening of services, appear to have higher suicidal risk than those who can wait until regular working hours to call. Evenings are recognized as a time frame of high risk (Perlis, Grandner, Brown, et al., 2016; Tubbs et al., 2020), which has been hypothesized to be associated with reduced executive functioning, emotion regulation, and social connection (Britton et al., 2019; Chu et al., 2017;

Perlis, Grandner, Chakravorty, et al., 2016). The monthly time frame of highest risk appears to be August through December, which is consistent with the myth that suicide risk is higher in the winter, especially around winter holidays (Annenberg Public Policy Center, 2022) but which has not been found to be a time frame associated with increased suicide deaths, with the exception of August (Beauchamp et al., 2014; Corcoran et al., 2004; Massing & Angermeyer, 1985; Morselli, 1883). It may be that veterans and other contacts at high risk are more likely to reach out for help and/or share their risk during the winter months but may be more likely to engage in suicidal behaviors during summer months. The U.S. holiday associated with the highest volume of high-risk calls was Memorial Day, the holiday that commemorates those who lost their lives to combat. Importantly, these fluctuations in suicide risk among help-seekers appear to be different than temporal fluctuations in U.S. suicides (Beauchamp et al., 2014; Kposowa & D'Auria, 2010).

Policy implications and future research

It is possible that there are less invasive and costly interventions than emergency dispatches that can be made available for those at moderate risk who make contact during low resource time frames. Programs, for example, have been developed to provide a residential "respite" for suicidal individuals during high-risk periods (Briggs et al., 2007), and may provide a lower cost alternative to the traditional model of mobile mental health check by police and/or emergency care teams, emergency department visit, and psychiatric hospitalization during hours of low service availability (i.e., early mornings, weekends, and key holidays). Resources are also needed to ensure that emergency dispatches are successful in linking the highest risk contacts with immediate care during these time frames. Additional research may be needed to examine the reasons for and content of contacts, as well as rate of intoxication in contacts receiving emergency dispatches to determine whether protocols need to be developed or tested for managing contacts who are calling during these high incidence time frames. Perhaps most importantly, the use of emergency dispatches with high-risk contacts highlights the need for research into their effectiveness, including identifying the callers for whom they are most and least effective. Research is also needed to establish temporal stability over additional years of data and generalizability of these findings to callers of lifeline and other suicide prevention crisis lines within and outside of the United States. Such investigations are critical to providing empirical guidance.

Limitations

This is an observational study and causality cannot be inferred from the results. There may also be other variables that are driving these temporal findings that were not accounted for in the analyses. To increase generalizability, all contacts were included. We were not, however, able to identify unique contacts or utilize medical records to identify demographics. Time stamps were based on the time the responder opened a new call in the Medora platform, which may not be identical to when the call was answered. There is also no reliability data on responder suicide risk ratings.

CONCLUSIONS

Crisis lines are a core component of the National and VA suicide prevention strategies, and use may grow due to the development of the easy to remember, destigmatizing call-in number 988 (116th Congress, 2020). This is the first study to examine emergency dispatches that were initiated by VCL responders, which is the final intervention for contacts at the highest risk for suicide. Findings show that incidence of emergency dispatches peak during the celebratory holidays of Labor Day and Independence Day and is also higher from 6 pm 11:59 pm and on Saturdays. They also suggest that the incidence of emergency dispatches may be a result of a combination of factors associated with celebratory holidays such alcohol intoxication and reduced access to noncrisis mental health services rather than a being a simple response to increases in high-risk calls. Future research is needed to examine the temporal stability of these findings for VCL, generalizability of these findings to other crisis lines, potential causes of the increase of the incidence of emergency dispatches during these time frames, as well as the impact of emergency dispatches on risk for suicide.

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CONFLICT OF INTEREST STATEMENT

P.C.B., K.M.B., L.M.D., D.G., and M.A.I. have no conflicts of interest.

DISCLAIMERS

Prior to publication, the manuscript was reviewed by Lisa Kearney, Ph.D., ABPP, Executive Director—VCL, Office of Mental Health and Suicide Prevention at the VA to ensure that the manuscript correctly represented the VCL and VA structure and policy. The publication was also reviewed by the data use agreement (DUA) Committee to ensure that it remained within the DUA. Neither review impacted the analysis and interpretation of data; the writing of the report; or the decision to submit the article for publication.

ETHICS STATEMENT

This project was approved by the Department of Veterans Affairs (VA) Central Institutional Review Board (CIRB).

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