



Research article

Predictors of drug-drug interactions of medications prescribed to patients admitted due to suicidal behavior



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ABSTRACT

Introduction: Drug-drug interactions among people with suicidal behavior is a challenging topic, considering the harm it poses for patients already vulnerable and the lack of literature on the thematic. This aspect must not be neglected in research and clinical practice, and thus requires thorough investigation.

Objective: to investigate predictors of drug-drug interaction of prescribed drugs and the prescription of two or more drugs for people admitted due to suicidal behavior in a psychiatric emergency department (short-stay hospital ward).

Method: A cross-sectional study with retrospective approach, carried out in a Brazilian psychiatric emergency unit in 2015. Data about first and last medical prescriptions were collected from 127 patients' files. Descriptive statistics and the Zero Adjusted Logarithmic Distribution (ZALG) model were adopted, with the significance level $\alpha = 0.05$.

Results: Potential drug-drug interactions were found in most of the first and last prescriptions. The sample majority were female, with previous suicide attempts, being discharged from the hospital with three drugs (or more) prescribed, and without referral to any health service. Age and comorbidities were predictors of more drug prescriptions and the amount of prescribed drugs was the most important predictor of drug-drug interactions (quantity and severity).

Conclusions: the variables associated with drug-drug interactions and prescription of two or more drugs among people with suicidal behavior needs to be investigated in different contexts and addressed in interventions with the aim to promote patient safety.

1. Introduction

It is estimated that every 40 s a person dies from suicide worldwide (World Health Organization, 2014) and the high suicide attempt and death rates highlights the need for improvements in health care for this vulnerable population. Emergency services are crucial to caring for people with suicidal behavior (Kawashima et al., 2014) and are often their first and only place of contact with mental health care, since the lack of patient follow-up after emergency services discharge is an important issue that needs to be overcome (Lin et al., 2014).

In Brazil, the health system offers free, universal, and integrated health care access for all citizens. Therefore, after a suicide attempt, the

person is commonly admitted to an emergency room (short-stay hospital-ward) and subsequently must be referred to follow-up services (Ferreira et al., 2019). A Brazilian study on emergency nursing experiences in assisting people with suicidal behavior showed that the professionals did not feel prepared or supported in this regard and pointed to the gap of specific training, staff support, supervision, guidelines, protocols, and monitoring indicators (Vedana et al., 2017).

It has been previously established that people admitted for suicidal behavior are highly vulnerable to further suicide attempts and death. Prior research emphasized that a previous suicide attempt is the major predictor of future death by suicide (Owens et al., 2002). It is also worth noting that self-intoxication with drugs available at home is the most

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accessible and frequently used method for attempting suicide (Lovisi et al., 2009). Even the distinction between intentional and accidental intoxication deaths can be complex in the deaths of people with a history of suicidal behavior (Rahikainen et al., 2018).

To exacerbate this scenario, previous research has shown that drug interactions are not uncommon in hospital admissions (Carmona-Huerta et al., 2019) and can lead to severe and preventable patient harm. Moreover, the number of prescribed drugs in admissions can prolong hospitalization, supporting drug interactions (Carmona-Huerta et al., 2019) associated with psychiatric readmissions (Shameer et al., 2018), poor patient safety, and prognostic impairment. Thus, health professionals must be prepared to promote safe treatment concerning pharmacotherapy (Scheife et al., 2016).

Suicide attempts and drug interactions can cause significant harm to individuals. However, there is still an important literature gap regarding drug interactions among people with suicidal behavior. These challenging aspects confer high patient vulnerability and must not be neglected in clinical research and practice, thus requiring further investigation (Rahikainen et al., 2018).

This scenario reinforces the importance of better understanding drug interaction predictors and associated factors among people admitted for suicidal behavior in emergency care services in order to avoid drug interactions that increase the lethality of suicide attempts (already occurring and future ones). Considering that these factors can impair patients' clinical condition and expose them to longstanding risk (mainly the drug-drug interactions from discharge prescriptions).

Thus, this study aimed to investigate predictors of drug-drug interaction in prescribed drugs for people admitted due to suicidal behavior in a psychiatric emergency department (short-stay hospital ward). To achieve this aim, we analyzed the first medical prescription (defined by the first medical prescription received right after admission at the treatment facility) and the last prescription (prescription received prior to hospital discharge).

Given this situation, we tested the hypothesis that age, sex, having a partner, comorbidity presence, number of prescribed drugs, previous suicide attempts, and referral to healthcare service could predict the quantity and severity of drug-drug interactions in the first medical prescription and in the last one. We also tested the hypothesis that age, sex, having a partner, comorbidity presence, previous suicide attempts, and referral to healthcare services can predict two or more drugs' prescriptions (first medical prescription and the last prescription prior to discharge). For the analysis of outcomes related to drug-drug interactions, only the individuals with two or more drug prescriptions were included, as this is a necessary condition for the occurrence of drug-drug interactions. For the outcome assessment "Prescription of two or more medications", we included all patients.

2. Method

2.1. Study design

Cross-sectional study with a retrospective approach. This study was presented according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations (Vandenbroucke et al., 2014).

2.2. Place of study

The study was developed in a psychiatric emergency unit of a municipal public hospital in the state of São Paulo, Brazil. The service is a reference short-stay hospital care for psychiatric emergencies. Psychiatrists and residents (under attendants' supervision) make the prescriptions without support from softwares or clinical pharmacists, counting on daily case discussions to address prescriptions and other medical decisions. This unit is located in an area with approximately 119,000 inhabitants. The city has a high demographic density of 995.3

inhabitants/km², and in 2016, the estimated population was 674,405 inhabitants, predominantly living in urban areas.

2.3. Sample

The study included all patients admitted for suicidal behavior (admission reason compatible with diagnoses X60 to X84, according to the 10th International Classification of Diseases (ICD) (OMS - Organização Mundial da Saúde, 2008), at the place of study from January 1 to December 31, 2015. When the patient had more than one admission in 2015, only the information regarding first admission was included in the sample.

Therefore, in 2015 there were 446 admissions at this psychiatric emergency unit, 176 of which met the criteria for suicidal behavior and 127 were included in the sample (49 were excluded for being readmissions).

2.4. Data collection

Firstly, a list with all admissions made in 2015 was obtained at the Medical File Service to apply the selection criteria. All printed medical records included were analyzed, and the secondary data extraction guided by a script containing sociodemographic as well as clinical information designed by the researchers.

Then, prescribed drugs were translated into English, and the Thompson Healthcare System Drug-Reax program was used to verify the possible drug interactions occurrence and their severity. The Drug-Reax system is suitable for detecting interactions, being applicable in clinical practice and scientific research (Vonbach et al., 2008).

We used the PubChem database to check the names of medications and the Anatomical Therapeutic Chemical (ATC) to classify drugs. The ATC is a classification system proposed by the World Health Organization that divides active substances in fourteen groups, based on the bodily organ and therapeutic, pharmacological and chemical properties (<https://www.who.int/tools/atc-ddd-toolkit/atc-classification>). We used this classification to characterize the prescribed drugs.

2.5. Measures, data processing and analysis

The collected data were entered into a database in the Microsoft Excel program and analyzed using software programs. Descriptive statistics were used to present sociodemographic and clinical variables.

In order to investigate the predictors of outcome variables, we adopted the Generalized Additive Models for Location, Scale, and Shape (GAMLSS) class, introduced by Rigby and Stasinopoulos (2001, 2005). The selection of independent variables, in all adjustments was carried out by the GAIC model with a penalty equal to 4 ($k = 4$) as suggested by Bastiani et al. (2018). To assess the adequacy of the adjusted model, the Shapiro-Wilk Normality test was applied to "Z-Scores" residual adjustment (Dunn and Smyth, 1996). Data analysis was performed using the program R (R Core Team, 2020) with the adoption of the 5% significance level ($\alpha = 0.05$).

We considered as study outcome variables: prescription of two or more medications in the first prescription (yes or no); prescription of two or more medications in the last prescription (yes or no); drug-drug interactions in the first prescription (count); drug interactions in the last prescription (count); severe drug interaction in the first prescription (classified as "yes" - grouping important and contraindicated levels—or "no" for no for moderate, secondary and unknown); and severe drug interaction in the last prescription (classified as "yes"—grouping important and contraindicated levels—or "no" for no for moderate, secondary and unknown).

As independent variables for the models of drug-drug interactions (count) and severe drug interaction, we considered: Age (years), Sex (male/female), Partner (yes/no), Number of Comorbidities (quantity), Referral for service health (yes/no), Suicide Attempt (yes/no), and

Number of Prescribed Drugs (quantity). For Number of Prescribed Drugs, we considered: Age (years), Sex (male/female), Partner (yes/no), Number of Comorbidities (quantity), Referral to health service (yes/no), and Suicide Attempted (yes/no).

Therefore, using a count model for modelling the number of drug-drug interactions (patients who presented at least one drug interaction), the RI ($RI = \exp(\beta) - 1$) was calculated (considering the μ significant parameters). The Odds Ratio ($OR = \exp(\beta)$) was calculated to evaluate the chance of occurring two or more medications (first and last prescription) and severe drug interaction (first and last prescription). In addition, the probability of drug-drug interaction non-occurrence if any zero inflated parameter in the count model was adjusted (considering the model's significant σ parameters).

2.6. Outcome variables' selection

Table 1 shows the values of the BIC criteria calculation used to select the distribution of the outcome variable for the variables: Number of Interactions, Severity, and Number of Drugs.

For the Severity and Number of Drugs variables, a distribution was selected and used to adjust the logistic regression model – the Binomial distribution (BI). For the Number of Interaction variable, the Zero Adjusted Logarithmic distribution (ZALG) was used.

An A Y variable has a ZALG distribution ($Y \sim ZALG(\mu, \sigma)$) when its probability density function is given by

$$pY(y|\mu, \sigma) = \begin{cases} \sigma, & \text{if } y = 0 \\ (1 - \sigma) \frac{\alpha \mu^y}{y}, & \text{if } y = 1, 2, 3, \dots \end{cases} \quad (1)$$

where $\alpha = [\log(1 - \mu)]^{-1}$ for $0 < \mu < 1$ e $0 < \sigma < 1$. The corresponding link functions for the parameters μ and σ are given respectively by $g_1(\mu) = \text{logito}(\mu)$ and $g_2(\sigma) = \text{logito}(\sigma)$. The model's functions in GAMLSS format for the ZALG distribution are given by:

$$\begin{aligned} g_1(\mu) &= X_1\beta_1 \\ g_2(\sigma) &= X_2\beta_2 \end{aligned} \quad (2)$$

where μ and σ are the parameters of the ZALG model, β_1 and β_2 are the respective parameter vectors of μ and σ , and X_1 and X_2 are the respective independent variable matrices of the parameter vectors β_1 and β_2 .

The μ parameter of the Zero-fitted Logarithmic distribution aims to model the number of drug interactions in cases where drug interactions were observed (at least 1) while the σ parameter assesses the probability of non-occurrence of drug interactions.

2.7. Ethical issues

The study followed the Declaration of Helsinki recommendations and was approved by the research institution and the Research Ethics Committee (2.390.744). The facility obtained a patient agreement for using the medical records in the research.

3. Results

3.1. Sociodemographic and clinical characteristics of patients admitted for suicidal behavior

Of the 127 patients admitted for suicidal behavior at the unit studied in 2015, ages ranged from 12 to 77 years old (Mean = 34.5 years) and (Median = 33.6 years). The majority of the patients were female (58.3%), without a partner (67.8%), with comorbidities (76.4%), with a previous suicide attempt history (71.7%), and 48.8% were discharged with three or more prescribed drugs, without referral to any health service (66.9%). The most common comorbidities found were CID codes: F30-39 Mood [affective] disorders (64.6%), F60-69 Disorders of adult personality and behavior (41.7%), and F10-19 Mental and behavioral disorders due to psychoactive substance use (36.2%).

Potential drug-drug interactions were present in 56.7% of the first prescription. We found the majority of interactions were between two drugs classified as ATC N, i.e., drugs related to the nervous system (84.7% of the interactions). Interactions between the ATC N (nervous system) and other ATCs corresponded to 13.1% of the interactions and only 2.2% of interactions did not involve at least one ACT N.

For last prescription, potential drug-drug interactions were found in 63.8% of the sample and most of them (64.1%) were between ATC N and ATC N, followed by 28.8% that involved an ATC N and other ATCs, and 7.7% of the interactions did not involve at least one ACT N. Furthermore, severe interactions (important or contraindicated) were found in first and last prescriptions as well (51.2% and 51.2%, respectively).

3.2. Count of potential drug-drug interactions in the first and last prescriptions

In the multivariate regression models for both first and the last prescriptions, the number of drugs prescribed was the only predictive variable for the quantity of potential drug interactions (Table 2). For each drug prescribed, there was an estimated increase of 229% [$\exp(3.29) - 1$] in the mean of interactions in the first prescription and an increase of 177% [$\exp(2.77) - 1$] in the mean of interactions in the last prescription.

3.3. Severe potential drug-drug interactions in the first and last prescriptions

We calculated the odds ratio (OR) of the occurrence of severe drug interaction from the first and last prescription through multivariate models. The number of drugs variable was the only variable with statistical significance in the first prescription. For each additional prescribed medication, the chance of severe interactions increased by 2.10 times. In the last prescription, the increase was 3.29 times for each additionally consumed medication. The number of comorbidities showed statistical significance (as a protective factor) in the last prescription. For each additional comorbidity, a relative reduction in the chance of occurrence of severe interactions is expected (Table 3).

Table 1. Selection of the response variable by BIC Criteria.

Number Interactions			Severity			Drugs					
First	BIC	Last	BIC	First	BIC	Last	BIC	First	BIC	Last	BIC
ZALG	331.8	ZALG	370.1	BI	145.3	BI	139.6	BI	112.6	BI	122.1
ZANBI	336.5	ZANBI	374.2	BB	147.3	BB	141.6	ZIBI	114.6	ZABI	124.1
PIG	337.4	ZAPIG	374.9	DBI	147.3	DBI	141.6	ZABI	114.6	ZIBI	124.1
ZAPIG	337.4	PIG	376.1	ZIBI	147.3	ZABI	141.6	DBI	114.6	DBI	124.1
GPO	338.1	GPO	377.6	ZABI	147.3	ZIBI	141.6	BB	114.6	BB	124.1

ZALG: Zero Adjusted Logarithmic distribution; ZANBI: Zero Adjusted Negative Binomial; BB: Beta Binomial; ZIBI: Zero Inflated Binomial; ZABI: Zero Adjusted Binomial; PIG: Poisson Inverse Gaussian; ZAPIG: Zero Adjusted Poisson Inverse Gaussian; DBI: Double Binomial; GPO: Generalized Poisson.

Table 2. Predictors of quantity of potential drug-drug interactions in the first and last prescriptions (zero adjusted logarithmic distribution - ZALG).

Variables	RI(CI)	p value	OR (CI)	p value
First Prescription				
Age	0.99 (0.94–1.04)	0.710	1.01 (0.98–1.05)	0.402
Sex (female)	1.62 (0.37–7.09)	0.524	0.30 (0.11–0.80)	0.018
Partner (no)	1.07 (0.26–4.50)	0.921	0.98 (0.34–2.75)	0.963
Comorbidities	1.00 (0.59–1.69)	0.994	1.09 (0.70–1.68)	0.717
Referral to health service (no)	0.91 (0.24–3.52)	0.893	0.50 (1.19–1.31)	0.163
Attempted Suicide (yes)	0.79 (0.17–3.67)	0.761	1.51 (0.52–4.34)	0.441
Number of Prescribed Drugs	3.29 (1.66–6.51)	0.001	0.45 (0.29–0.73)	0.001
Last Prescription				
Age	0.98 (0.94–1.03)	0.422	1.02 (0.97–1.07)	0.384
Sex (female)	0.97 (0.33–2.85)	0.954	0.65 (0.18–2.37)	0.519
Partner (no)	1.70 (0.48–6.09)	0.416	0.93 (0.22–3.98)	0.929
Comorbidities	0.90 (0.56–1.45)	0.671	1.70 (0.93–3.13)	0.088
Referral to health service (no)	1.58 (0.51–4.87)	0.426	3.36 (0.77–14.75)	0.111
Attempted Suicide (yes)	0.67 (0.22–2.09)	0.492	0.98 (0.25–3.79)	0.972
Number of Prescribed Drugs	2.77 (1.67–4.57)	0.001	0.19 (0.08–0.41)	0.001

Zero adjusted logarithmic distribution (ZALG); RI: relative increase (μ); OR: odds ratio (σ); CI: confidence interval; Bold values indicate significance level ($p \leq 0.05$).

3.4. Prescription of two or more medications

At the multivariate regression model regarding the first prescription, for each additional year of life, the chance of receiving two or more medications prescribed increased by 1.05 times. At the last prescription, for each additional comorbidity, we estimated a 2.29-fold increase in the chance of receiving two or more prescribed medications (Table 4).

4. Discussion

This study revealed the number of prescribed drugs as a predictor of the quantity and severity of potential drug-drug interaction, corroborating with existing literature that highlights it as a relevant predictor (Jankovic et al., 2018; Ribeiro et al., 2019; Yasu et al., 2018). Thus, previous research points out that the more drugs an individual uses, the greater the increase in the risk of a drug interaction occurrence (Day

Table 3. Predictions of potential severe drug-drug interaction at the first and last prescriptions (Logistic Regression - BI).

Variables	First Prescription		Last Prescription	
	OR (CI)	p value	OR (CI)	p value
Age	1.00 (0.96–1.03)	0.827	0.98 (0.94–1.02)	0.225
Sex (female)	2.25 (0.90–5.63)	0.086	1.79 (0.62–5.14)	0.281
Partner (no)	0.75 (0.28–2.03)	0.577	1.24 (0.40–3.84)	0.711
Comorbidities	0.93 (0.62–1.40)	0.744	0.57 (0.36–0.90)	0.018
Referral to health service (no)	2.06 (0.80–5.26)	0.135	0.81 (0.28–2.30)	0.689
Attempted Suicide (yes)	0.65 (0.24–1.78)	0.404	1.45 (0.48–4.33)	0.509
Number of Prescribed Drugs	2.10 (1.37–3.21)	0.001	3.29 (1.93–5.60)	>0.001

OR: odds ratio; CI: confidence interval; p value: ≥ 0.05 ; Bold values indicate significance level ($p \leq 0.05$).

Table 4. Predictors of two or more medications prescribed at the first and last prescriptions (Logistic Regression - BI).

Variables	First Prescription		Last Prescription	
	OR (CI)	p value	OR (CI)	p value
Age	1.05 (1.01–1.10)	0.027	1.04 (1.00–1.08)	0.085
Sex (female)	0.66 (0.23–1.93)	0.455	0.56 (0.20–1.60)	0.283
Partner (no)	0.69 (0.19–2.52)	0.575	0.97 (0.30–3.13)	0.965
Comorbidities	1.37 (0.86–2.17)	0.187	2.29 (1.35–3.86)	0.002
Referral to health service (no)	0.41 (0.12–1.37)	0.148	1.06 (0.38–2.95)	0.914
Attempted Suicide (yes)	0.64 (0.22–1.87)	0.417	0.50 (0.17–1.44)	0.204

OR: odds ratio; CI: confidence interval; bold values indicate significance level ($p \leq 0.05$).

et al., 2017). According to Day et al., (2017), one of the possible causes for polypharmacy is the existence of several prescribing medical professionals (without effective communication between them) for a single patient. In the healthcare unit studied, this represents a possible explanation, considering the fact that it belongs to a university hospital with rotational medical residency programs. However, future studies are needed to explore this hypothesis.

Moreover, the larger number of drug interactions present in the last prescription (prior to hospital discharge) than at the first prescription (immediately after admission) highlights a relevant issue of this study. Few studies have compared patients' first and last prescriptions, and those which addressed it revealed an increase in drug interactions before hospital discharges, corroborating with our results (Fokter et al., 2010; Straubhaar et al., 2006). This is a worrying finding, especially considering the shortage of referrals to further healthcare services after patients' discharge from emergency care units, which may lead to a possible lack of direct patient care by the healthcare team within such a short time period.

Significantly, this emphasizes the necessity of greater attention to drug prescription safety provided after hospital discharge, as well as the necessity of providing psychoeducation and subsequent patient monitoring (Riblet et al., 2017; Solmi et al., 2020; Yanagina et al., 2017; Zhao et al., 2015). Psychoeducation is an important strategy for providing patients with necessary information on safe drug use, and thus prevent suicide attempts and deaths (Riblet et al., 2017; Solmi et al., 2020; Yanagida et al., 2017; Zhao et al., 2015). One of the key recommendations is adequate orientation of patients to ensure drug safety after hospital discharge, performed by the healthcare team during patient hospitalization (especially for those with potential drug interaction presence and previous suicide attempts), considering the high risks related to health problems. Literature also highlights the relevance of strong caregiver engagement in the care planning and in effective communication between the treatment services (Fulmer, 2016).

The study shows that most patients had potential severe drug-drug interactions from the first and last prescriptions. Other research revealed the association between the presence of at least one potential drug interaction with an increased risk of death of almost three times, regardless of the global number of drugs (Pardo-Cabello et al., 2019). Furthermore, drug interactions can cause severe harm to patients (Scheife et al., 2016), increasing damage suffered after suicide attempts (leading to hospitalizations), thus worsening prognosis and the quality of life of vulnerable people, considering the difficulty of treatment adherence associated with suicide attempt survivors (Berrouiguet et al., 2018).

Furthermore, drug interactions may potentiate the risks of self-intoxication with prescribed drugs, as suicide attempts with drugs available at the individual's home are common, accessible and recurrent (Lovisi et al., 2009). Another relevant piece of literature shows that people who survive a self-intoxication episode are more likely to die from suicide (Stenbacka et al., 2017) and may gradually increase the lethality of the employed method (Chen et al., 2016). Such a scenario may lead to the

inference—beyond the drug interactions identified in this study—that other potential interactions exist between prescription drugs and drugs previously used in self-intoxications by individuals of this population. These aspects highlight the importance of taking actions to increase the safety of patients with suicidal behavior in relation to drug therapy.

Finally, although describing the medication classes and comorbidities was not an aim of this study, considering the more reoccurring comorbidities and their characteristic of continuous treatment with psychotropic drugs (with narrow therapeutic index), an increase in severity was expected. Literature shows the association of narrow therapeutic index drug use with more serious drug interactions (Balén et al., 2017; Moura et al., 2014). However, the association between comorbidity presence and less severe drug interactions was revealed in our study and further research is needed to elucidate this finding. People with suicidal thoughts require more rigorous follow-up to avoid treatment failures and drug interactions that have proven to be so harmful to survivors of drug suicide attempts (Rahikainen et al., 2018).

Drug-drug interactions are preventable and are one of the main contributors of patient morbidity and mortality (Day et al., 2017). In addition, drug-drug interactions are associated with increased hospital stay and costs (Moura et al., 2009). The literature shows important strategies for drug interaction and harm prevention, such as Software use for automatic drug interactions check (i.e., the Micromedex used in present paper); implementing computer prescription systems with electronic drug interaction alerts (Nuckols et al., 2014; Westbrook et al., 2013); multidisciplinary actuation (with an on-staff clinical pharmacist) (Jankovic et al., 2018; Ribeiro et al., 2019; Yasu et al., 2018); psycho-education (Rible et al., 2017; Solmi et al., 2020; Yanagida et al., 2017; Zhao et al., 2015); drug reconciliation (Day et al., 2017); the caregivers' involvement in patient treatment (Fulmer, 2016); as well as improvements in the qualification of health professionals.

Furthermore, it is worth noting that even with the strategies pointed out in this study, the necessity of combining drugs that may potentially interact is not uncommon, considering its risk-benefit for treating patients with complex conditions (Gimenes et al., 2019). Therefore, individualized and rigorous evaluation of the risk-benefit of drug therapy is needed, especially for patients with previous suicide attempts with a greater potential of drug use as a suicide method attempt.

In this study we evaluate the predictors of prescription of two or more drugs (a necessary condition for the occurrence of drug-drug interactions). In the first prescription received upon admission, older age increased the chance of receiving two or more prescribed medications. For the last prescription issued just before discharge, only comorbidities increased the chance of receiving two or more prescribed medications. Older people may be more propense to receiving more drug prescriptions upon hospital admission while people with comorbidities may receive more drugs upon discharge. This issue requires further investigation in other contexts.

Polypharmacy among people with suicide behavior may be dangerous considering that Brazilian studies have shown that the most common method and most frequent scenario for attempting suicide is using drugs available at home (Ferreira et al., 2019; Lovisi et al., 2009). Studies have also shown the follow-up gap for people with suicidal behavior is a common problem (Berrouguet et al., 2018; Lin et al., 2014). We also found other aggravating factors for this situation, as the major prevalence of patients with previous suicide attempt histories are discharged with more than one drug prescription and without referral to any health service. Thus, it is necessary to invest in the continuous monitoring and safe care of patients admitted due to suicidal behavior.

Brazilian studies suggest that assistance for people with suicidal behavior may not always be explained purely by clinical judgment and scientific knowledge (Ferreira et al., 2019). These aspects reinforce the importance of investing in staff support, training, self-assessment, and supervision of professionals working in emergency care units as well as the need for reviews of the health care practices themselves (Vedana et al., 2017).

5. Limitations

The limitations of this study are related to its cross-sectional design, the sample (of convenience and referring to a single service), and the collection of secondary data to the investigation of potential drug interactions. The absence of multiple-testing correction was another limitation of this study, although we employed the multivariate analysis through the generalized additive models for location, scale, and shape (GAMLSS). Additionally, patients with lethal or severe clinical outcomes (which required monitoring and stabilization) were not included in this study because they were not transferred to the investigated clinic.

6. Conclusions

Our research identifies that the amount of prescribed drugs was the most important predictor of the quantity and the severity of drug-drug interactions from drug prescriptions upon hospital admission and discharge in individuals with suicidal behavior in a psychiatric emergency department. Age and comorbidities were predictors of the prescription of two or more medications in the first and last prescriptions, respectively.

This study is innovative because it researched drug interactions in a population that is specific and vulnerable to severe physical consequences due to the possibility of simultaneous intoxication and suicide attempts. These issues deserve to be investigated in different contexts and addressed in interventions aiming to promote the safety of people with suicidal behavior.

7. Implications for practice

It is important that drug prescription practices be reviewed in order to avoid potential drug interactions among people admitted for suicidal behavior.

Researchers and caregivers need to investigate, in different contexts, the factors associated with drug interactions of prescriptions for people with suicidal behavior.

Actions related to the rational and safe use of drugs need to be implemented among people with suicidal behavior.

Further investment in resources that promote the tracking of drug interactions and patient safety in pharmacotherapy is recommended, as well as additional training, staff support, and supervision for professionals working in emergency care units.

Declarations

Author contribution statement

Amanda Sarah Vanzela, Adriana Inocenti Miasso, Ana Carolina Guidorizzi Zanetti and Kelly Graziani Giaccherio Vedana: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Aline Conceição Silva: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Tatiana Longo Borges and Ellen Carolina Dias Castilho: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

Jonas Bodini Alonso: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data included in article/supplementary material/referenced in article.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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