

Clinical profiles of serious suicide attempters consecutively admitted to a university-based hospital: a cluster analysis study

Perfis clínicos de indivíduos que fizeram tentativas graves de suicídio internados em um hospital universitário: análise de agrupamento

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Abstract

Objective: To verify the presence of different groups of medically serious suicide attempters who had more clinical or surgical seriousness and required admission to a general hospital. **Methods:** 121 patients admitted consecutively were assessed. A questionnaire containing items on the patient characteristics and psychometric scales to assess the suicidal intent and lethality were used. A cluster analysis was performed using the K-means method. **Results:** Three groups were identified: 1) 43 subjects (mostly female) characterized by self-poisoning with medication and low suicidal intent, with highly impulsive suicide attempts; 2) 53 subjects (mostly males) who ingested pesticides and presented both moderate degrees of lethality and suicidal intent; 3) 17 subjects (predominantly males) who used more violent methods and presented high levels of lethality and suicidal intent. **Conclusions:** Grouped data of these inpatients could be misleading for follow-up research purposes as our findings indicate that there are relatively distinct clinical profiles among suicide attempters admitted to a general hospital.

Keywords: Suicide; Suicide, attempt; Depression; Cluster analysis; Length of stay; Hospitals, general

Resumo

Objetivo: Verificar a existência de diferentes grupos entre os indivíduos que tentaram o suicídio com maior gravidade clínica ou cirúrgica e que necessitaram de internação no Hospital das Clínicas da UNICAMP. **Métodos:** Avaliaram-se 121 pacientes admitidos consecutivamente. Foram utilizados um questionário para avaliar características dos indivíduos e escalas psicométricas para avaliar a intencionalidade suicida e o grau de letalidade da tentativa de suicídio. Para a análise de agrupamento usou-se o método K-means. **Resultados:** Três grupos foram identificados: 1) 43 sujeitos (maioria de sexo feminino) que utilizaram como principal método o envenenamento com medicação. Este grupo caracterizou-se por apresentar menor intencionalidade suicida e maior impulsividade na tentativa de suicídio; 2) 53 sujeitos (maioria do sexo masculino) que tomaram pesticidas e apresentaram graus moderados de letalidade e de intencionalidade suicida; 3) 17 sujeitos (predominantemente do sexo masculino) que valeram-se de métodos mais violentos e que apresentaram maior grau de letalidade e de intencionalidade suicida. **Conclusões:** Estudos que agrupem esses pacientes podem conduzir a erros, uma vez que nossos achados indicam a existência de perfis clínicos distintos entre os pacientes internados devido a uma tentativa de suicídio.

Descritores: Suicídio; Tentativa de suicídio; Depressão; Análise por conglomerados; Tempo de internação; Hospitais gerais

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Financing: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)

Conflict of interests: None

Submitted: 10 August 2004

Accepted: 6 December 2004

Introduction

Suicide attempts are a significant problem for public healthcare.¹⁻² However, people who attempt suicide frequently lack adequate psychiatric assistance. In the most serious cases, or rather in those involving risk of death, there is a trend to emphasize physical injuries; in cases of lower seriousness, patients can be discriminated by healthcare workers.

In many cases, studies on suicide attempts may cause interpretation problems due to the variety of behaviors denominated under the same term.³⁻⁴ There have been efforts to identify categories for suicide attempts according to the patients' clinical and demographic characteristics (e.g.: the magnitude of the suicide attempts, the degree of lethality, the motivation and the type of method utilized). Such a characterization has been based on clinical⁵⁻⁶ or psychometric criteria, involving the use of *cluster analysis*, the latter most notably related to personality traits,⁷⁻¹⁰ amongst other variables. The discrimination of distinctive profiles of patients has implications for acute treatment plan, follow-up, and prevention of suicidal behavior.

The patients whose self-inflicted injuries are serious enough to demand admission for medical treatment, comprise a group of some interest to the clinical practice.^{1,11-13} In these cases, designated here as 'medically serious', the greater prevalence of psychiatric disorders, allied to other psychosocial factors, increases the risk of a future suicide.^{5,12-14} This group of patients accounts for approximately 15% of the suicide attempts seen at the emergency room in the institution where the present study was carried out.¹⁵⁻¹⁶ Nevertheless, although the common denominator in these cases has been the necessity of admission, our psychiatric clinical experience shows that such patients differ in clinical terms.

We hypothesized that by taking into account the suicide attempters' characteristics we could demonstrate different sub-groups and that might be important for the management and follow-up research. The aim of this study was to differentiate and characterize distinct groups of a subset of patients admitted to a general hospital due to a medically serious suicide attempt.

Methods

1. Subjects

All consecutive 124 cases of suicide attempts who required admission, for medical or surgical reasons, to one of the wards at the Hospital das Clínicas, Universidade Estadual de Campinas, Brazil, within a 35-month period, were evaluated. At the emergency room, each patient was physically assessed by a member of the medical/surgical staff who determined whether and to which unit the patient should be admitted. Suicide attempt was considered as *medically serious* only if the patient's condition was considered life-threatening enough and required: hospital-stay for over than 24 hours, treatment in specialized units (intensive care unit, emergency ward) or surgery under general anaesthesia. Three people tried to commit suicide a second time during the period of the study. In these cases, only the first attempt was considered, resulting in a final sample of 121 patients. All the patients who were contacted agreed to participate in the study and gave their informed consent.

2. Research instruments

A modified version of the 'European Parasuicide Standardized Interview Schedule – EPSIS'¹⁷ was used. It is composed of 16 sections which range from social-demographic information to

clinical characteristics comprising the levels of suicidal intent and lethality. The sections associated with the objectives of the present study are:

1) Social and demographic data: age, gender, marital status and educational level.

2) Characterization of the suicide attempt. We used the ICD – 10, incorporating the circumstances of the current suicide attempt.¹⁸ Information on previous suicide attempts were also obtained.

3) Beck's Suicide Intent Scale (SIS). This instrument enables a quantitative evaluation of the intention that the patient had of dying.¹⁹ The items of the SIS include whether or not the participant stated that he/she hoped to die, whether or not the participant left a suicide note, the patient's final acts in anticipation of death, and his/her reactions after having survived. The scale contains 15 items, and the final score ranges from 0 to 30 points. In the present study we used a version of the scale which was previously tested in Brazil.¹⁵ The median was used to define two groups: the group with a lower suicide intent (score < 18) and the group with the higher suicide intent (score equal or higher than 18).

4) Lethality. As there could be differing degrees of lethality even amongst those seen as 'serious suicide attempts' by the emergency department team, we measured lethality on a 0-5 Likert scale. Rates were based on an examination of the patients' physical condition, the procedures accomplished during their stay in the hospital (e.g. endotracheal intubation, nasal-gastric catheterization, stomach pumping, throat drain, artificial ventilation and tracheotomy, hemodynamic support and length of admission) and consultation with the attending physician. In the present study, patients were divided into two groups: zero to 2 points (lower lethality) and 3 to 5 points (higher lethality).

5) Hospital Anxiety and Depression Scale (HAD). It is composed of two sub-scales for anxiety and depression (seven items each) designed to be applied to non-psychiatric patients of a general hospital.²⁰ The score range on each sub-scale varies between zero to 21. The cut-off point equal to or greater than 8 on each sub-scale was used to determine probable cases of anxiety/depression, as suggested in a national validation study.²¹

6) Syndromic Diagnostic Hypothesis. The information obtained from the medical records, family members and the patient's mental status examination was integrated in a diagnostic conference which included both authors of this report. This produced a best-estimate diagnosis according to axis I of the ICD-10 criteria.¹⁸

3. Data analysis

We used the Chi-Square test or the Fisher Exact test to compare the proportions of categorical variables and the Kruskal-Wallis test to compare ordinal or continuous variables. The cluster analysis was used to identify relatively homogeneous groups of individuals based on a set of defined characteristics (variables). For the cluster analysis, SIS, Lethality and HAD we used continuous variables. The statistical software used was the SAS.²²

The method used in the cluster analysis was the K-means, which uses Euclidian distances to determine the center of the possible groups of individuals.²³ This procedure intends to decrease the variance within a group and to maximize the inter-group variance (the Euclidian distance between the group centers). The statistic R^2 , which was calculated for each

variable, is an index of disparity between subjects within the groups and varies from zero to 1. The closer the R² was to 1, the greater the homogeneity of the subjects and, consequently, the more distinct the characterized clinical profiles of the groups. The number of clusters, after various possible solutions suggested by the statistical program, was defined *post-hoc* by the investigators. The rationale adopted in this procedure took into account what seemed to be, clinically, the most plausible.

Results

Social-demographic and clinical data from the 121 patients are in Table 1. Eight patients died during the hospital stay. All

of them were males, with an average age of 27.5 years (range: 18-38). Four of the patients who died used a firearm and four patients, poisoning (3 with paraquat).

It was possible to calculate the suicide intent of 101 (84%) patients (in 20 cases there was at least one SIS item which had not been filled in). The mean score for the sample was 17 (range: 0-28; median = 18). Comparing the suicide intent between genders, the difference was not statistically significant. The averages in the lethality scores were 3.6 points for men and 2.7 points for women (p = 0.0001). Thirty-three patients composed the group of lower lethality and 84, of higher lethality.

The cluster analysis produced three groups based on the patients' socio-demographic and clinical variables (the eight cases of death were excluded from the analysis). The homogeneity of the groups was evaluated by the index of disparity between the variables (R²; see method).

Table 2 summarizes the profile of the groups. The first group, which might be denominated *impulsive-ambivalent*, comprises 43 patients, predominantly females. Forty-two patients (98%) used poisoning as the method of committing suicide, 60.4% of which used medications (anticonvulsants: 52%; antidepressants: 20%; benzodiazepines: 28%). Those with moderate depressive disorders (26%) and those with adjustment disorders (31%) comprised the majority of this group. Fifty-one per cent of the patients had previously attempted suicide. The majority (61%) exhibited a lower suicide intent.

The second group which might be called *marked intent*, is composed of 53 patients, predominantly males. All of them used poisoning as a method and these poisonings (56.6% with pesticides) were of greater lethality. Twenty-nine per cent of patients were diagnosed as having adjustment disorders, 21%, moderate depressive disorder and 14%, severe depressive disorder. Twenty-nine per cent of the patients had previously attempted suicide. Around half (53%) of the patients displayed a greater suicide intent.

The third group which might be called *definite*, comprised 17 patients, the majority of whom are males (94%). Seventy-one per cent of the patients aged 30 to 59 years and 65% were single. Fifty-nine per cent of the patients had no previous suicide attempt. In terms of psychiatric diagnosis, 23% of patients were identified as having severe depressive disorder and 18% as having moderate depressive disorder. In 29% of patients the diagnosis was adjustment disorders. All of the patients used more violent methods to attempt suicide and

Table 1 – Characteristics of patients admitted for attempted suicide

Variable	Male (n = 78)	Female (n = 43)	p
Age (n = 121)			0.8 **
Mean (Standard Deviation)	32.4 (13)	33.1 (15.2)	
Median	31	31	
Minimum – Maximum	13 – 79	14 – 74	
Marital status (n = 118)			0.4 *
Single with no partner	28 (38%)	11 (26%)	
Single with partner	16 (21%)	8 (19%)	
Married	22 (29%)	14 (32%)	
Widowed	2 (3%)	3 (7%)	
Separated	7 (9%)	7 (16%)	
Years of education (n = 109)			0.1 **
Mean (SD)	6.7 (4)	5.5 (3.2)	
Median	6	5	
Minimum – Maximum	0 – 18	0 – 13	
Diagnostic Groups, ICD – 10 (n = 110)			0.01 *
F31-33 (Depression)	27 (37%)	21 (55%)	
F40-48 (Neurotic, stress and somatoform disorders)	24 (33%)	15 (39%)	
F10-19 (Alcohol and drug related disorders)	13 (18%)		
F20-29 (Schizophrenia and other psychotic disorders)	4 (6%)	1 (3%)	
F60-61 (Personality disorders)	4 (6%)	1 (3%)	
Method used in the suicide attempt (n = 121)			0.004 *
Poisoning	58 (74%)	41 (95%)	
Violent methods***	20 (26%)	2 (5%)	

* Chi-square Test

** Kruskal-Wallis Test

*** Violent method = fire arm, cutting, hanging, being run over

Table 2 – Profile of the patients in the three groups obtained by cluster analysis

Variable	R ²	Impulsive-ambivalent (n = 43)	Marked Intent (n = 53)	Definite (n = 17)	p *						
Male gender	0.8	5%	98%	94%	< 0.0001						
Method	0.9	98% poisoning	100% poisoning	100% Violent Method **	< 0.0001						
Prior suicide attempt	0.05				0.2						
None		49%	71%	59%							
1		28%	21%	29%							
2 or more		21%	8%	12%							
		Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	
Beck's Suicide Intent Scale	0.08	15.1	16	6.6	17.9	18	4.9	19.5	20	3.4	0.02
Age	0.09	32.7	31	14.9	30.0	30	10.6	42.7	35	17.2	0.02
Lethality	0.1	2.5	3.0	1.2	3.6	4.0	1.2	3.5	3.0	1.4	0.0002
Length of Hospital Stay (days)	0.06	7.9	4	8.6	9.6	7	8.5	16.5	7	20.5	0.08

* Kruskal-Wallis test

** Violent Method = fire arm, cutting, hanging, being run over

SD = Standard Deviation

82% had great medical lethality. The majority of the patients (80%) displayed greater suicide intent. Most patients (82.4%) needed surgical procedures.

The statistical comparison of the three groups of attempted suicides shows that the third group (*definite*) is statistically different from the other two groups, being very distant from the profile of the first group (*impulsive-ambivalent*), with an infinite distance between its centroids. The third group (*definite*) is characterized by its predominance of males. Its members tended to be older; the majority (71%) aged between 30 and 59 years, with an average of 42.7 years. Their scores for depression (HAD) were above the cut-off point (93%, compared to 61% in the first group and 63% in the second; $p = 0.07$). In terms of anxiety (proportion scoring above the cut-off point on the HAD sub-scale), there were no significant differences between groups (78.6%, on average, were above the cut-off point).

Discussion

Categories of attempted suicides have already been defined by other authors based on a wide range of patient samples.^{5-8,10} In contrast to these studies, we analyzed here a subset of attempted suicides of greater medical or surgical seriousness who needed admission for treatment. The current investigation shows that there are at least three statistically and clinically distinct subgroups within this subset.

Some methodological limitations of this study must be highlighted. The clinical state of the subjects, which was always respected, arose as a worry during the interview process. Concerns could be raised on the reliability of the information collected at such a stressful time for the patient. On the other hand, bearing in mind the small proportion of cases which appeared for clinical after-care,¹⁵ the moment of emergency assistance is the only one we have in our environment to collect data. Due to the considerable extension of the questionnaire used we decided not to use a further standardized instrument to obtain psychiatric diagnoses as it would have been advisable. However the best-estimate diagnosis was carefully carried out taking into account several sources of information on the patient's clinical status. Another methodological restriction was that we considered only the main axis I diagnosis, not the comorbidity.

In order to classify a suicide attempt as *medically serious*, we used a standardized measure according to clinical criteria, as did e.g. Beautrais¹³ and Baca-Garcia et al.²⁴ instead of using standardized instruments.¹⁴ Though clinicians may differ in their estimate of suicide risk for the individual patient, they are likely to recommend admission to patients whose condition is considered serious enough to demand further treatment. In a context where there is a lack of hospital beds for admissions, our patients were certainly admitted because they had been appraised as at considerable risk of losing their lives. Our measure of lethality consisted of a rating of medical (non-psychiatric) management of the patient. This measure was chosen rather than others for being closer to the clinical appraisal routinely performed by doctors.

The cluster analysis identified three groups which were differentiated by their social-demographic and clinical characteristics. The first group, named here for didactic reasons as *impulsive-ambivalent*, was predominantly female. The variable degrees of lethality associated, to a large extent, with a lower intent of suicide, possibly reveals an unawareness of the lethal capability of the method used by the patients, as

well as an ambivalence about living or dying in that moment of crisis. Their clinical characteristics are close to those who are seen in the emergency room and who are generally discharged. A similar category of patients was described by Hankoff.⁵ This author denominated this group of patients as 'crises'. Usually, these patients manifest anxiety, depression, tension or panic and may report a crisis situation. Engstrom et al., when classifying the clusters according to temperament, called this group 'neurotic, impulsive, aggressive'.⁹ Paykel and Rassaby noticed the existence of a group of subjects in which interpersonal difficulties seemed to be the motive for suicide, thus displaying a situation of crisis.⁶

This group of patients could be judged less serious on medical grounds. However, the relative seriousness of these patients' injuries is unusual for the impulsive attempter. They could also be taken as less serious on psychiatric grounds, as they present transient situational disturbances. The apparent harmlessness and low suicide intent of the attempt does not, however, justify lack of concern. Quite the contrary, the provision of high-quality treatment and the prevention of future suicides require that less serious suicide attempters should be treated as seriously as any other.

The second group was predominantly male. It displayed a greater lethality as compared to the first group, although these groups overlap in some characteristics. The essential difference between them was the self-poisoning by pesticide in the second group. This is a method that tends to be available in some rural, farming regions. The medical effects of pesticide ingestion were found to be significantly more serious than the medical effects involving medication ingestion. Of note, the virtual absence of women considering that in rural areas they usually work with their partners in the farming, thus also having access to pesticides. These patients had a stronger desire to die and, according to Platt et al., who described a similar group, they would be subjected to a subsequent suicide.²⁵ Due to these characteristics we called this group *marked intent*.

Many of the survivors of the second group would have died if there had been no specialized medical care in the hospital, with equipment to support heavily sedated patients, pesticide antidotes, as well as professionals capable of dealing with the consequences of pesticide poisoning. Thus, the factor determining whether the result would be 'suicide' or 'non-fatal self-poisoning' was the availability of adequate medical treatment. On the other hand, effective pesticide regulation and improved medical management would be essential strategies to prevent suicide, especially in rural areas of developing countries. Pesticide regulation could comprise restriction of access, deregistering a highly toxic pesticide when equally effective and less toxic pesticides are developed, or even determining specific individuals in each community who are given permission to handle and apply toxic pesticides (thus taking pesticides out of most households) or providing lockers for the storage of pesticides away from houses.²⁶

Subjects of the third group had a greater risk of actually becoming suicide cases. They could have died if there had not been timely medical intervention. For that reason, they can be considered as 'aborted' suicides. Clinically, it makes intuitive sense that there is a probable overlap between those patients with more severe suicide attempts and those who eventually kill themselves. In fact, the characteristics of this group and the circumstances of their suicide attempt are similar to those patients who were admitted to the hospital and

were eventually 'successful' suicides. We labeled the subjects in this group *definite*. Some of their characteristics are similar to those in the second group, although the high suicide intent appears much more strongly. The option for the violent method (firearms, hanging, cutting, being run over) also suggests awareness that death would be an end. As Beck et al. pointed out, suicidal intent correlates highly with medical lethality when the attempter has sufficient knowledge to properly assess the probable outcome of his/her attempt.²⁷ In fact, death was only prevented because the patient received intense medical assistance.

Long-term risk of suicide in people who performed potentially lethal attempts appears to be higher than that reported among attempted suicides in general. In a five-year follow-up study, accomplished by Rosen, involving 886 patients, those who had had a serious suicide attempt (21%, resulted from ratings of medical danger and of preparations to avoid discovery) showed a suicide rate two-fold than the others.¹¹ Henderson and Lance described a similar group, among the six groups they found in a cluster analysis study. After two-years follow-up, 9 (35%) of the 26 subjects who had seriously attempted suicide died.⁸ Beautrais followed-up 302 individuals making medically serious suicide attempts. Within 5 years, over one third had made a further suicide attempt, and nearly 7% had died by suicide.¹³

This illustrates how patients who compose the group of those who have more seriously attempted suicide need to be carefully analyzed in terms of distinct clinical profiles and the risk of new attempts as well as their need to receive intensive psychiatric care. The finding of distinct groups identified by this study raises concern on the extent to which treatment and prevention can be improved by adding information derived from distinct clinical profiles.

Conclusions

The definition of distinct groups of patients admitted to a general hospital after attempting suicide is a step beyond the simplistic notion that this subset of suicide attempters represent a mixture of people who might have been successful suicides and people who were closer to other impulsive suicide attempters, rapidly discharged from the emergency room. When performing a prospective study, grouped data of these inpatients could be misleading, as our findings indicate that they may be seen as distinct groups. This may have important implications for specific management and preventive efforts.

Acknowledgement

We are grateful to Mrs. Cleide Moreira Silva for the statistical advice.

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