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# Risk Factors for Reattempt and Suicide Within 6 Months After an Attempt in the French ALGOS Cohort: A Survival Tree Analysis

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## ABSTRACT

***Objective:*** Understanding the cumulative effect of several risk factors involved in suicidal behavior is crucial for the development of effective prevention plans. The objective of this study is to provide clinicians with a simple predictive model of the risk of suicide attempts and suicide within 6 months after suicide attempt.

***Methods:*** A prospective observational cohort of 972 subjects, included from January 26, 2010, to February 28, 2013, was used to perform a survival tree analysis with all sociodemographic and clinical variables available at inclusion. The results of the decision tree were then used to define a simple predictive algorithm for clinicians.

***Results:*** The results of survival tree analysis highlighted 3 subgroups of patients with an increased risk of suicide attempt or death by suicide within 6 months after suicide attempt: patients with alcohol use disorder and a previous suicide attempt with acute alcohol use (risk ratio [RR] = 2.92; 95% CI, 2.08 to 4.10), patients with anxiety disorders (RR = 0.98; 95% CI, 0.69 to 1.39), and patients with a history of more than 2 suicide attempts in the past 3 years (RR = 2.11; 95% CI, 1.25 to 3.54). The good prognosis group comprised all other patients.

***Conclusions:*** By using a data-driven method, this study identified 4 clinical factors interacting together to reduce or increase the risk of recidivism. These combinations of risk factors allow for a better evaluation of a subject's suicide risk in clinical practice.

***Trial Registration:*** ClinicalTrials.gov identifier: NCT01123174


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With approximately 800,000 deaths by suicide throughout the world every year, including 10,000 in France, preventing suicide is a major public health issue.[1] In 2013, the World Health Assembly adopted the first-ever Mental Health Action Plan of the World Health Organization (WHO).[2] This plan aimed to reduce the rates of suicide by 10% from 2013 to 2020. Nonetheless, worldwide suicide rates have been declining over recent decades except in the United States.[3] For example, the standardized mortality rate in France has decreased from 16.86 per 100,000 inhabitants in 2011 to 13.21 per 100,000 inhabitants in 2016 according to the national French death register "CépiDc."[4]

## Clinical Points

- Flexible data-mining methods derived from computer science, such as survival trees, have been developed to detect interactions among risk factors of suicide reattempt, allowing for identification of homogeneous subgroups of individuals with simple groupings of clinical features.
- Three subgroups of patients presented with an increased risk of suicide reattempt within 6 months after suicide attempt: patients with alcohol use disorder and a previous suicide attempt with acute alcohol use, patients with anxiety disorders, and patients with a history of more than 2 suicide attempts in the past 3 years.
- Risk factor combinations highlighted by a data-driven method of analyzing risk factors allow for a better evaluation of a subject's suicide risk in clinical practice.

The understanding of risk factors involved in suicidal behavior is crucial for the development of effective prevention plans. Interestingly, one of the most robust risk factors for death by suicide is a history of previous suicide attempts,[5–7] as a substantial number of patients who attempt suicide ultimately die by suicide. According to a recent systematic review and meta-analysis,[8] the pooled estimated incidence rate of subsequent fatal self-harm after an index attempt was relatively high at 1 year (1.6%) and even higher at 10 years (4.2%). Moreover, a recent exhaustive study[9] of 2 national French registers including 45 million inhabitants highlighted that 1 year after suicide attempt, 2.6% of the subjects had died, with 34.4% of those deaths by suicide. According to that study, the period of greatest risk of death by suicide corresponds to the first 6 months after suicide attempt. In addition, if a previous suicide attempt is a risk factor for subsequent suicide, suicide attempt is also a strong predictor for suicide reattempt. For instance, after 1 year, nonfatal repetition rates are approximately 15%.[10] Similar results were found in France, with a recurrence of suicide attempt estimated at 12% within the first year after nonfatal self-harm, with the vast majority (75%) of recurrence of suicide attempt occurring within the first 6 months.[9]

Beyond the risk related to a previous suicide attempt, several other factors seem to be involved in death by suicide in patients with a history of self-harm. A cohort study[7] defined from Danish registers showed that individuals who jumped from a high place or in front of traffic form a high-risk group for suicide. Another Danish cohort study[11] highlighted that age over 35 years as well as hanging, strangling, or suffocation as the method of the index attempt and receiving psychiatric hospitalization for that attempt were also risk factors for future suicide.[11] Finally, an exploration of Swedish registers[12] demonstrated that suffering from severe mental illness such as bipolar or psychotic disorder and a previous attempt by hanging were the most important risk factors for subsequent suicide.

To summarize, repetition of suicide attempt, the use of a violent method for a previous suicide attempt (jumping from a high place or in front of traffic, hanging, strangling, and suffocation), and a severe mental illness are the main factors involved in death by suicide according to different national registers. Moreover, the first 6 months after suicide attempt seem to be a particularly high-risk period for reattempt and subsequent suicide.

Notably, it has been suggested that a subject's suicide risk was not limited to one event but would rather correspond to the interplay of different factors occurring throughout life from pre-birth (eg, low birth weight and genetic predisposition) to adulthood (socioeconomic factors, severe mental illness, substance abuse).[1] In the same way, it has recently been indicated that the lifetime cumulative effect of several risk factors should be considered instead of individual risk factors for suicide.[3]

While the current scientific literature can determine the extent to which an individual or environmental factor increases the risk of suicide attempt or death by suicide through the use of conventional statistical methods, the published results encounter many drawbacks. The methods employed rarely produce simple tools that can be used by clinicians and hardly explore the interactions between variables.[3] Conversely, flexible data-mining methods derived from computer science, such as survival trees, have been developed to detect interactions among variables that best explain a time-dependent variable of interest by means of recursive partitioning.[13] The objective of this study is to use such data-miming methods to provide clinicians with a simple predictive model of the risk of suicide attempt and suicide within 6 months after suicide attempt.

## METHOD

### Study Design

A prospective observational cohort of 972 subjects from the ALGOS study was used for the analysis. The ALGOS study was a multicentric, prospective, single-blind, randomized, and controlled clinical trial with 2 parallel groups conducted from January 26, 2010, to February 28, 2013. Participants in the intervention group received a brief contact intervention for 6 months,[14] and control participants received no intervention. Both groups were included in the present study, which was conducted in 23 French emergency services. After subjects were chosen for inclusion by an emergency physician, the ALGOS algorithm combines brief contact interventions such as the delivery of a crisis card (with emergency department phone number) for the first suicide attempts and a telephone contact between the 10th and 21st day after suicide attempt for those with previous attempts. Handwritten postcards were also sent at months 2, 3, 4, and 5 to patients with previous suicide attempts who were not available for a phone call or experiencing a suicidal crisis. These interventions were conducted by a team of trained psychologists from the University Hospital of Lille. Patients included were men and women of legal age (ie, at least 18 years old) who survived an suicide attempt in the 7 days prior to inclusion, regardless of the method used for the suicide attempt. Patients who had no suicidal

intent, were homeless, were under guardianship, or were multirepeaters (more than 4 suicide attempts in the last 3 years) were excluded from the study. Multirepeaters were excluded from this trial since a lower impact of the brief contact interventions has been demonstrated for these subjects.[15] Further details are available in the initial trial report.[16] All participants in the ALGOS study provided signed consent.

This study received authorization from AFFSAPS (number NCT01123174) and was approved by the Committee for the Protection of Persons in the North-West Region (CPP North-West decision 09/63). The ALGOS study was registered in ClinicalTrials.gov (identifier: NCT01123174).

### Collected Data

At inclusion, data on sociodemographic characteristics (age, sex, family and work status) and number of previous suicide attempts and method of suicide attempt (drug overdose, acute alcohol use), as well as responses to a questionnaire based on the Beck Suicide Intent Scale,[17] were collected for all subjects. This questionnaire explored the circumstances related to the suicide attempt (expression of suicidal ideations, suicidal project, testamentary precautions, suicide note), predisposing factors (family history of mental illness, chronic pain, chronic medical condition, social isolation), and precipitating factors (self-medication, poor adherence to treatment, negative life events). All participants were also assessed via a screening question or questions from the Mini-International Neuropsychiatric Interview (MINI)[18] corresponding to the *DSM-IV* and *ICD-10* criteria for major depressive disorder, anxiety disorder (generalized anxiety disorder or panic disorder), alcohol use disorder (AUD), and eating disorder.

At 6 months, the number of suicidal recurrences and the date of the first recurrence were ascertained for all participants through a standardized telephone interview by trained psychologists.

### Statistical Analysis

***Descriptive analyses.*** Descriptive statistics were calculated for the variables of interest. Continuous variables are presented as means and standard deviations (SDs). The 95% confidence intervals (CIs) were calculated using the central limit theorem. Discrete variables are expressed as frequencies and percentages.

***Automated risk prediction.*** To explain the risk of suicide reattempt within 6 months after an index suicide attempt, we performed a survival tree analysis with data for all of the variables available at inclusion (age, sex, family and work status, randomization group [ALGOS or control group], number of previous suicide attempts, suicidal method used for the index suicide attempt, acute alcohol use during index suicide attempt) and clinical data. Survival trees are predictive data mining and decision support tools that allowed us to obtain homogeneous classes of individuals with regard to the time-dependent variable of interest, based on recursive partitioning, by handling interactions between covariates.[13] Then, survival curves estimated by the Kaplan-Meier method were drawn corresponding to the leaves of the tree. Tree performance was assessed through a receiver operating characteristic curve and area-under-the-curve (AUC) estimation.

***Predictive algorithm for clinicians.*** Finally, the results of the decision tree were used to define a simple predictive algorithm for clinicians. Kaplan-Meier curves were also drawn, and the AUC was computed. The hazard ratio and its 95% CI were computed using a Cox model.

Only complete cases were analyzed. Tests were 2-sided, and $P$ values $< .05$ were considered significant. The Rpart package from R software version 3.6.1 was used for the analysis.[19]

**Table 1. Baseline Characteristics of Participants**

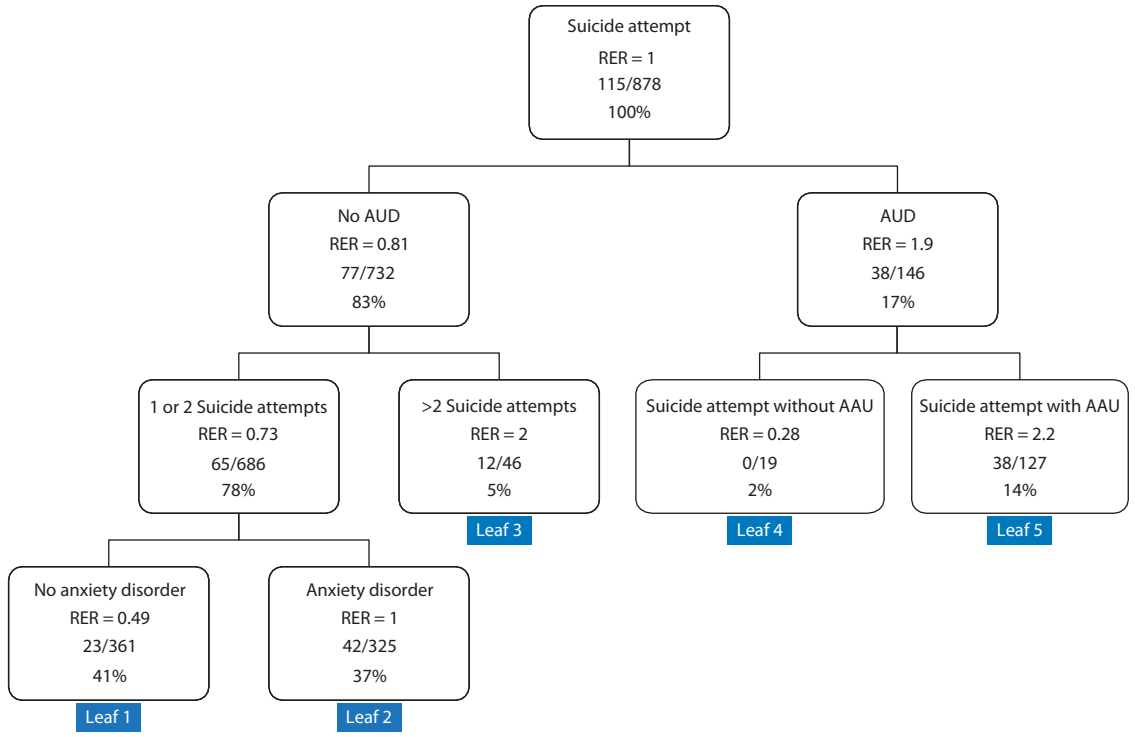
| Characteristic | All Patients (N = 972), n (%) |
|---|---|
| Intervention group | |
| ALGOS[a] | 480 (49.4) |
| Control | 492 (50.6) |
| Age, y[b] | |
| 18–35 | 226 (23.3) |
| 36–55 | 558 (57.4) |
| > 55 | 188 (19.3) |
| Women | 618 (63.6) |
| Men | 354 (36.4) |
| Living alone | 515 (53.0) |
| Employed | 619 (63.7) |
| First attempter | 518 (53.3) |
| Lifetime diagnosis (per the MINI) | |
| Major depressive disorder | 412 (42.4) |
| GAD or panic disorder | 455 (46.8) |
| Alcohol use disorder | 166 (17.1) |
| Eating disorder | 47 (4.8) |
| Method of suicide attempt | |
| Suicide attempt by medication overdose | 912 (93.8) |
| Suicide attempt with AAU | 417 (42.9) |
| Circumstances related to the suicide attempt | |
| Expression of suicidal ideations | 334 (34.4) |
| Suicidal project | 141 (14.5) |
| Testamentary precautions | 18 (1.9) |
| Suicide note | 125 (12.9) |
| Predisposing factors | |
| Family history of mental illness | 320 (32.9) |
| Chronic pain | 139 (14.3) |
| Chronic medical condition | 195 (20.1) |
| Social isolation | 197 (20.3) |
| Precipitating factors | |
| Self-medication | 189 (19.4) |
| Poor adherence to treatment | 172 (17.7) |
| Negative life events in the last 6 months | 616 (63.6) |

[a]Received a brief contact intervention for 6 months.
[b]Mean ± SD age was 38 ± 13.3 years.
Abbreviations: AAU = acute alcohol use, GAD = generalized anxiety disorder, MINI = Mini-International Neuropsychiatric Interview.

## RESULTS

A total of 972 participants were included (Table 1). Regarding the number of previous suicide attempts, more than half of the patients were first-time attempters (53.3%). In addition, a high proportion of patients suffered from major depressive disorder and anxiety disorder (42.6% and 47.2%, respectively) at inclusion.

**Figure 1. Survival Tree for Suicide Reattempt and Suicide at 6 Months After Suicide Attempt[a]**




[a]Each n/total n value represents the number of patients with a repeated suicide attempt from among all patients noted in the current box; each percentage indicates the proportion of the percentage in the preceding box constituted by the patients in the current box.
Abbreviations: AUD = alcohol use disorder, AAU = acute alcohol use, RER = relative event rate compared to the root (proportion of events in the node divided by the proportion of events in the root).

For 880 participants (90.5%), the complete status at 6 months was known. Of these patients, 117 (13.3%) had repeated suicide attempts, 11 (1.1%) of whom completed suicide. On those who completed suicide, 6 were female, 8 were non–first-time attempters, 9 were randomized to the control group, and most were suffering from major depressive disorder (7 participants) or anxiety disorder (9 participants). Ninety-two patients (9.5%) were lost to follow-up at 6 months (47 women and 45 men). Fifty-two (56.5%) of them were between 26 and 50 years old, and 53 (57.6%) were first attempters.

### Automated Risk Prediction

Of the 878 (90.3%) patients with complete cases (ie, the root node of the tree) that were used for the analysis, 115 (13.1%) had repeated suicide attempts (see Figure 1). The classification and regression trees (CART) algorithm highlighted 5 leaves (ie, defining subgroups), among which 3 presented an increased risk of suicide attempt or suicide.

The first subgroup (Figure 1, leaf 1) was composed of 361 individuals without AUD, with fewer than 2 previous suicide attempts in the past 3 years, and without anxiety disorder. Twenty-three of these participants repeated suicide attempt during the 6 months. The relative event rate (RER) compared to the root was 0.49, and the risk ratio (RR) (95% CI) was 0.36 (0.23 to 0.55).

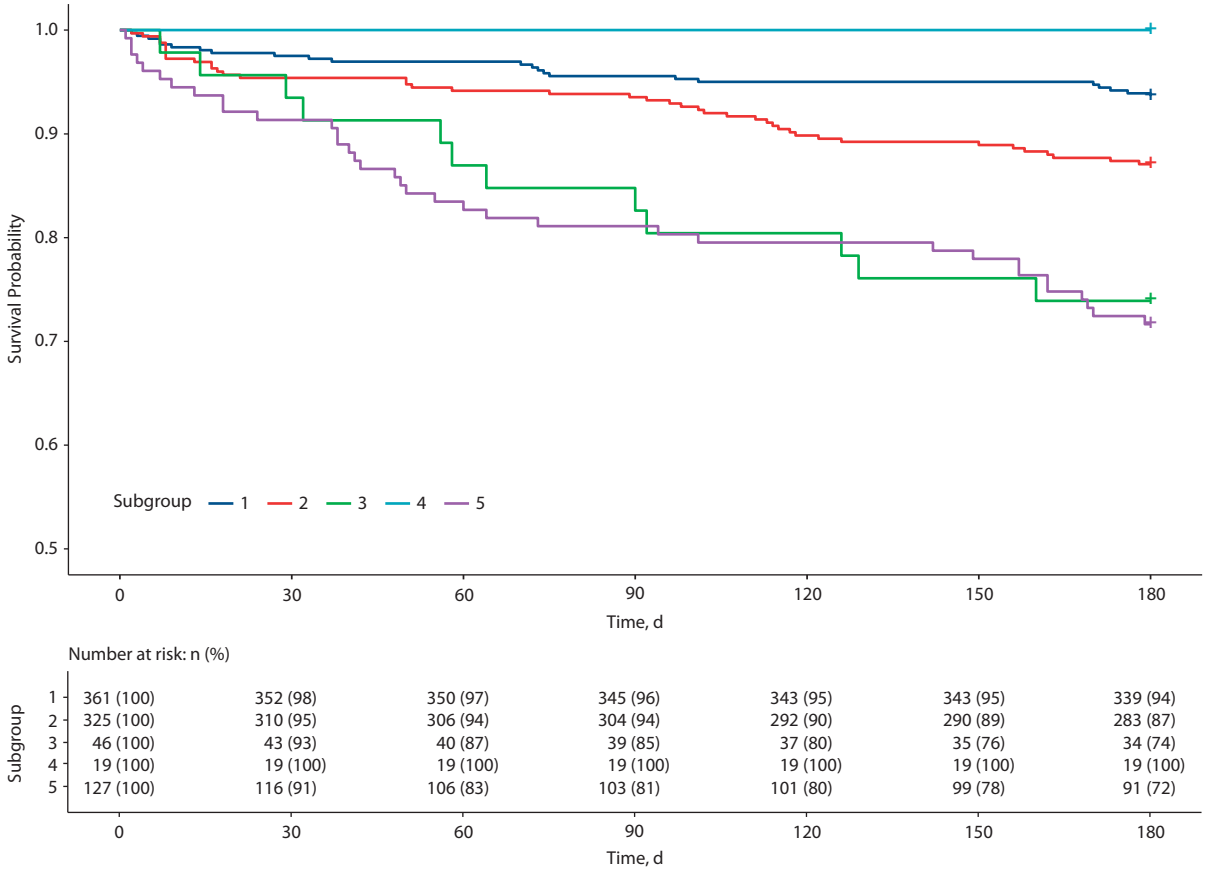
The next subgroup (Figure 1, leaf 2) was composed of 325 individuals without AUD, with a history of 1 or 2 previous suicide attempts in the past 3 years, and anxiety disorder. Forty-two of those 325 subjects repeated suicide attempt during the 6 months. Suffering from an anxiety disorder (generalized anxiety or panic disorder) nonsignificantly increased the risk of suicide attempt and suicide for these patients: the RER was 1, and the RR (95% CI) was 0.98 (0.69 to 1.39).

In the third subgroup (Figure 1, leaf 3), composed of 46 individuals without AUD and with a history of more than 2 suicide attempts in the past 3 years, 12 individuals repeated suicide attempt. Furthermore, recurrence of suicide attempt was associated with an increased risk of suicide reattempt and suicide: the RER was 2, and the RR (95% CI) was 2.11 (1.25 to 3.54).

The fourth subgroup (Figure 1, leaf 4) was composed of 19 individuals with AUD and without acute alcohol use during their last suicide attempt. None of them repeated suicide attempt. Therefore, the RER was 0.28, and the RR was close to 0.

Finally, the last subgroup (Figure 1, Leaf 5) was composed of individuals with AUD and acute alcohol use (AAU). Among those 127 patients, 38 (29.9%) repeated suicide attempt or died by suicide. The RER was 2.2 in regard to the root, and the RR (95% CI) was 2.92 (2.08 to 4.10).

**Figure 2. Kaplan-Meier Survival Curves of the 5 Terminal Subgroups Generated From the Default CART Analysis[a]**




[a]Subgroups are defined as follows: 1: subjects with 1 or 2 previous suicide attempts and no anxiety disorder, 2: subjects with 1 or 2 previous suicide attempts and an anxiety disorder; 3: subjects with more than 2 previous suicide attempts; 4: subjects with alcohol use disorder and a previous suicide attempt without acute alcohol use; 5: subjects with alcohol use disorder and a previous suicide attempt with acute alcohol use.
Abbreviation: CART = classification and regression trees.

The survival curves of each terminal leaf representing the time before the first recurrence of suicide attempt within 6 months, estimated by the Kaplan-Meier method, are rendered in Figure 2.

### Predictive Algorithm for Clinicians

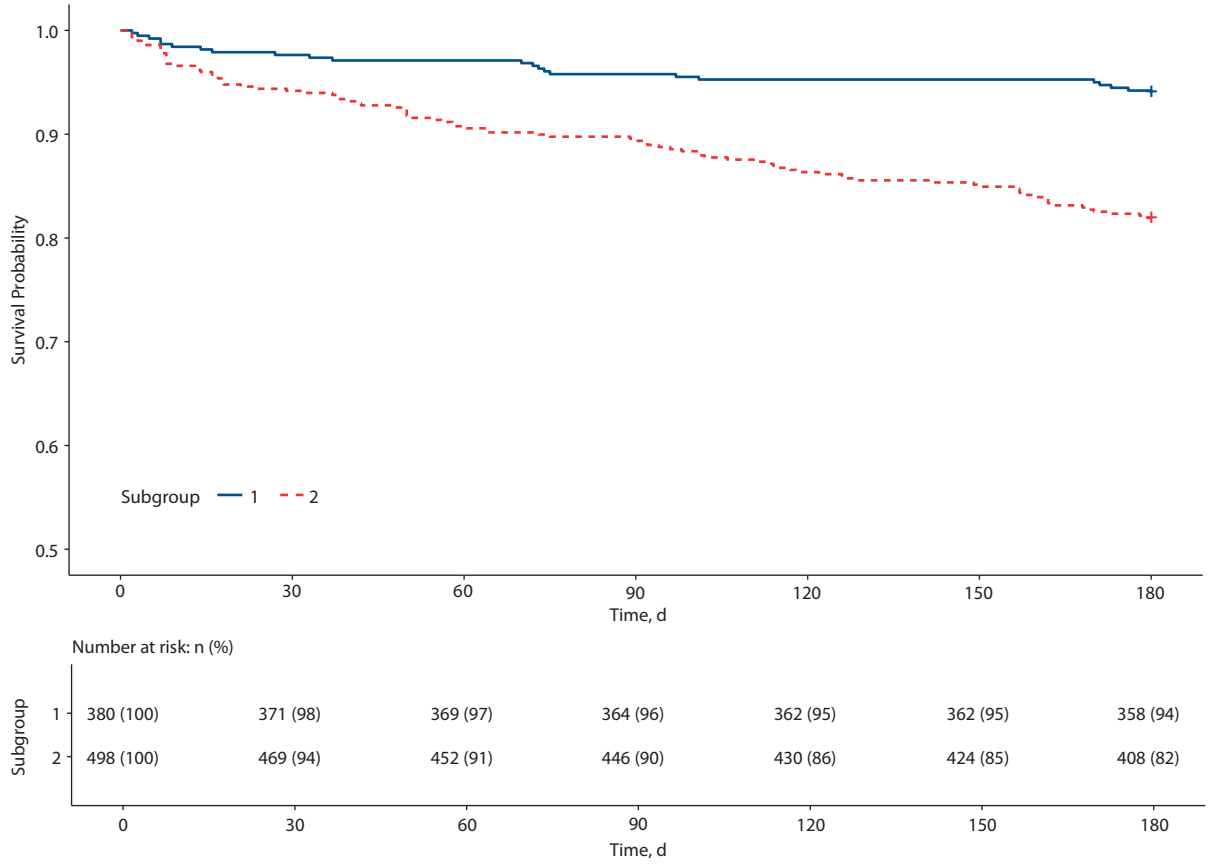
Based on the previous results, we separated the patients into 2 groups of good or poor prognosis to provide clinicians with a simple predictive algorithm. The poor prognosis group is composed of participants with alcohol use disorder who had acute alcohol use during their last suicide attempt, with anxiety disorder, or with a history of more than 2 suicide attempts in the past 3 years. The good prognosis group comprised all other patients. The survival curves with the 95% CI corresponding to the good and bad prognosis groups are rendered in Figure 3. The poor prognosis group appears to be a risk factor for suicide reattempt (HR = 1.78; 95% CI, 1.42 to 2.24; $P < .01$). This predictive algorithm obtains an AUC of 0.63. It renders a specificity of 0.47 (95% CI, 0.42 to 0.50), a sensitivity of 0.8 (95% CI, 0.73 to 0.87), a positive predictive value of 0.19 (95% CI, 0.15 to 0.22), and a negative predictive value of 0.94 (95% CI, 0.92 to 0.96).

## DISCUSSION

Through this study, a very simple algorithm to predict suicide reattempt or suicide was proposed. This algorithm was based on 4 simple clinical factors and still had good predictive power. Indeed, 2 groups of good or poor prognosis of suicide reattempt were identified according to the sociodemographic or clinical data collected after their previous suicide attempt. The poor prognosis group is composed of participants suffering from AUD with AAU during their last suicide attempt, those with anxiety disorders such as generalized anxiety or panic disorder, and those with a history of more than 2 suicide attempts in the past 3 years. This predictive algorithm can be easily used by clinicians assessing patients who have attempted suicide to provide the most appropriate medical care.

The results of our survival tree analysis highlighted 3 subgroups of patients with an increased risk of suicide attempt or death by suicide within 6 months after suicide attempt. The first subgroup was composed of patients with an alcohol use disorder and a previous suicide attempt with acute alcohol use. Moreover, subjects with AUD for which

**Figure 3. Kaplan-Meier Survival Curves and 95% Confidence Intervals of the Terminal Prognosis Subgroups Generated From the Default CART Analysis[a,b]**




[a]Subgroup 1, good prognosis group: subjects with no acute alcohol use during last suicide attempt, 1 or 2 previous suicide attempts, and no anxiety disorder; subgroup 2, poor prognosis group: subjects with acute alcohol use during last suicide attempt, more than 2 previous suicide attempts, or an anxiety disorder.
[b]Log rank test: $P < .01$; belonging to a poor prognosis group appears to be a risk factor in survival analysis (hazard ratio = 1.78; 95% CI, 1.42 to 2.24).
Abbreviation: CART = classification and regression trees.

previous suicide attempt was associated with an AAU had an even greater risk of suicide reattempt (RER = 2.2), while those without AAU had a lower risk (RER = 0.28). Thus, AAU during the last suicide attempt appears to be a determining factor in the future prognosis. The second subgroup included patients with a history of more than 2 previous suicide attempts in the past 3 years. Finally, the last subgroup was composed of patients with generalized anxiety or panic disorder, without AUD and with less than 2 previous suicide attempts in the past 3 years. Therefore, the increased risk of suicide attempt or death by suicide is best explained by one of these conditions: AUD associated with acute alcohol use during the last suicide attempt, an anxiety disorder, and the recurrence of suicide attempt.

Notably, we used a survival tree analysis to explore the possible interaction between a great number of sociodemographic or clinical variables. Although this method is rarely used in medical research, it allows us to identify the most relevant factors in a dataset without establishing a specific hypothesis and to study the association of different factors regarding a time variable of interest (ie, the risk of suicide/reattempt after suicide attempt). In contrast, traditional methods to analyze survival data are based on the Cox proportional hazard regression model to test a specific link between the covariates and the response. In this type of model, any interaction between variables must be specified beforehand.

Very few studies have focused on the association among risk factors using data-driven methods. Among decision trees, a regression tree was used in a study[20] aiming to build a dynamic clinical decision-support system (CDSS) for suicide prevention in 2,802 suicide attempters. Compared to our results, that study identified impulsivity aspects and some interactions of factors that pose a particular risk of recidivism, such as eating disorders for women or a history of familial suicidal behavior and employment status for men. Another study[21] that used a decision tree based on the chi-square automatic interaction detection (CHAID) algorithm in 2,754 middle and high schools also found different explanatory factors, including the severity of depression, which seems to be the strongest variable predicting suicide attempt, interacting with greater delinquency and lower family

intimacy to increase the risk of suicide attempt. In addition, a classification tree developed to predict a high risk of suicide attempt in 6,686 Chinese high school students indicated interactions among depression, anxiety, social support, gender, self-esteem, family cohesion, and adaptability as predictors of high suicide attempt risk (eg, female adolescents with low social support and low depression scores were at high risk of suicide attempt).[22] Therefore, anxiety seems to be the only risk factor found in all 3 studies. Finally, among 218 patients discharged from psychiatric hospitalization after an suicide attempt, a recursive partitioning classification tree highlighted that previous suicide attempt characteristics (such as definite plans or extensive preparation) posed a high risk of reattempt.[23] In fact, studies investigating the interactions of factors to assess suicidal risk are rare. However, these emerging methods based on computer science have shown particularly good results to evaluate high-risk groups for suicide in a study comparing different statistical or computer-based methods.[24]

Studies that used more conventional methods (such as logistic regressions or Cox models) and that focused on few risk factors that are hypothesis-driven have often shown that certain factors are powerful in predicting suicide. According to our results, having an AUD or anxiety disorder (generalized anxiety or panic disorder) appears to be a determining factor in the prognosis after suicide attempt. Regarding psychiatric disorders, a meta-analysis[25] obtained similar results. with an increased risk of suicide in patients with opioid use or women with alcohol use disorder. In contrast, a more recent study[26] found the highest rates of suicide in subjects with substance use disorder but also the lowest rates in those with anxiety disorders.

Our findings also indicate an interaction between AUD and a previous suicide attempt with acute alcohol use, thus increasing the risk for these patients. Nevertheless, a recent review[27] on risk factors for suicide attempt and suicide in patients with substance use disorder did not show any interaction with acute alcohol use during last suicide attempt but did show an association with environmental factors (marital and interpersonal relationship disruption, occupational and financial stressors, recent heavy substance use) as well as a history of previous suicide attempt. Similar results were found in the Australian Treatment Outcome Study[28] among subjects suffering from heroin dependence, with high odds ratios for sociodemographic factors (female sex, younger age, less education) and acute substance use (polydrug use, benzodiazepine use, recent heroin overdose).[28]

Alcohol use disorder is a well-known risk factor for suicidal behavior.[29] Regarding AUD, a Korean study[30] confirmed an increased risk of suicide attempt with a logistic regression for students who used alcohol daily (odds ratio = 8.00). Moreover, in a recent study[31] using logistic regression, an increased risk of suicide attempt was associated alcohol-related deaths following self-harm in addition to unemployment, sickness, or disabled status, among other factors; interestingly, suicide attempt was also associated with alcohol use during previous self-harm. Conversely, our study also found a significant reduction in the risk of recurrence in patients suffering from AUD who had not consumed alcohol during their previous suicidal act. It could be suggested that a reduction or cessation of alcohol consumption or the medical management of the AUD may decrease the risk of suicidal behavior.

Additionally, statistical methods such as multivariate Cox regression models used to predict the risk of recidivism have also shown an increased risk in patients who have made at least 1 attempt in their lifetime.[32] Nevertheless, our method suggested an increased risk of reattempt for patients with more than 2 suicide attempts in the past 3 years, thus indicating the need to pay more attention to these patients.

### Strengths and Limitations

One of the strengths of our study is that among the large number of variables studied, a small number of factors are ultimately involved in suicide reattempts and suicide and are brought to light by the CART method. The terminal nodes are clinically pertinent and based on simple combinations of medical risk factors. Moreover, the survival curve estimated by the Kaplan-Meier method corresponding to each terminal node showed very different prognoses depending on the subgroup to which they belonged. Another strength is the simple and intuitive nature of the CART algorithm, which allows for easy reading and captures much of the relevant covariate structure of the data.

One of the limitations of this study is the relatively high number of patients lost to follow-up at 6 months (9.5%). Nonetheless, the ALGOS study was composed of a sufficient number of patients, and most of the patients lost to follow-up were younger than 60 years old and were first attempters and thus were at lower risk for suicide attempt and death by suicide. In addition, baseline assessment investigated only 4 psychiatric disorders from the MINI. However, focusing on these common disorders appears to be convenient in clinical practice, especially during a first psychiatric interview in an emergency department setting. Finally, alcohol use disorder is common in France and may affect a large proportion of the subjects in our study. This fact could limit the extrapolation of our results to other parts of the world.

## CONCLUSION

In this study, we suggested that the medical history and the method used for the previous suicide attempt were the most important risk factors for suicidal behavior. Indeed, by using a data-driven method, we found that alcohol use disorder and acute alcohol consumption during the last suicide attempt were associated with an increase in the risk of recidivism, including anxiety disorder and recurrence of suicide attempt. The absence of these factors was related to a decrease in this risk, and the interaction of these various factors contributed to reducing or increasing the risk of recidivism. To better understand the risk factors associated with suicide, we need to consider what happens with

combinations of risk factors rather than examining them one by one or by using classical methods such as logistic regression. Suicide prevention should therefore also take place at several levels with better management of psychiatric disorders and increased secondary prevention of suicidal patients, with a focus on those with an alcohol use disorder.

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For the CME Posttest, see next page.

## POSTTEST

**To obtain credit, go to PSYCHIATRIST.COM to take this Posttest and complete the Evaluation.** A $10 processing fee is required.

1. **According to the scientific literature, which of the following is *not* a main risk factor for a future suicide?**
   a. The use of a violent method for a previous suicide attempt (eg, entering traffic, jumping from a high place)
   b. Repetition of suicide attempt
   c. Severe mental illness (eg. schizophrenia, bipolar disorder)
   d. Adolescence

2. **Antoine, who is 54 years old, has been admitted to the intensive care unit after a suicide attempt by suffocation and acute alcohol use. He has a history of one previous suicide attempt by drug overdose, but no psychiatric disorder has been diagnosed. Using the predictive algorithm presented in this study, you determine that Antoine's prognosis for recidivism is *best* reflected by which statement?**
   a. Antoine belongs to a poor prognosis group with a high risk of recidivism due to the acute alcohol use during his last suicide attempt.
   b. He belongs to a poor prognosis group with a high risk of recidivism due to his history of a previous suicide attempt.
   c. He belongs to a good prognosis group with a lower risk of recidivism because he has no psychiatric disorder (no alcohol use disorder and no anxiety disorder) and less than 3 previous suicide attempts.
   d. He belongs to a good prognosis group with a lower risk of recidivism because he is more than 50 years old.

3. **Beatrice, a 26-year-old woman, has a history of a suicide attempt by drug overdose and acute alcohol use. She has no history of other suicide attempts and does not have anxiety or mood symptoms. You diagnose an alcohol use disorder. Using the predictive algorithm presented in this study, you determine that Beatrice's prognosis for recidivism is *best* reflected by which statement?**
   a. She belongs to a good prognosis group because of her age
   b. She belongs to a good prognosis group because she has no anxiety disorder and only 1 suicide attempt
   c. She belongs to a poor prognosis group due to drug overdose combined with acute alcohol use as the method for her suicide attempt
   d. She belongs to a poor prognosis group due to her alcohol use disorder and the acute alcohol use during her suicide attempt