Psychological Impact and Risk of Suicide in Hospitalized COVID-19 Patients, During the Initial Stage of the Pandemic: A Cross-Sectional Study

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Objectives: This study aimed to assess the psychological impact and risk of suicide in patients hospitalized for COVID-19.

Methods: A cross-sectional study was conducted on a representative sample of patients hospitalized for COVID-19 at the “San Cecilio” University Hospital (Granada, Spain) between March and May 2020. Sociodemographic and clinical variables were collected. All participants were evaluated using the Gijon’s Social-Familial Evaluation Scale to assess social problems, the Impact of Event Scale-6 and the Hospital Anxiety-Depression Scale to assess psychological impact, the Columbia Suicide Severity and Beck Hopelessness scales to assess risk of suicide, and the List of Threatening Experiences questionnaire to control for confounding bias.

Results: Thirty-six COVID-19 patients were evaluated. Of them, 33.3% had a significant psychological impact; 13.9% showed symptoms of anxiety, 13.9% showed symptoms of depression, and 47.2% showed symptoms of anxiety-depression. Moderate and severe risk of suicide were found in 75% and 2.8% of the patients, respectively. Suicidal ideation was observed in 16.7% and suicide behaviors in 5.6% of the patients. Psychological impact was associated with previous psychological treatment, a greater degree in 16.7% and suicide behaviors in 5.6% of the patients, respectively. Suicidal ideation was observed in 13.9% of the sample of patients hospitalized for COVID-19.

Conclusions: Psychological impact and risk of suicide were significant in patients admitted for COVID-19. Although the risk of suicide was not associated with increased psychological impact, both should be assessed, especially in patients at higher risk based on significantly associated factors.

Key Words: psychological impact, suicide, stress, COVID-19

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On March 11, 2020, the World Health Organization declared the COVID-19 infection a pandemic.1 By then, a total of 118,319 cases had been reported in 113 countries since the initial detection of 27 cases in the Chinese city of Wuhan on December 31, 2019,2 despite track studies are still ongoing and “patient zero” yet to be determined. In Spain, the figures reached 1639 confirmed cases and 36 deaths. Since then, it has become one of the most affected countries; between January 31 and May 31, 2020, 247,542 confirmed cases and 29,618 deaths have been reported, with a peak incidence of 9222 confirmed cases on April 1 and 950 deaths on April 3.3

Like previous outbreaks of coronavirus4 and other epidemics or pandemics,6,7 the COVID-19 pandemic is proving to be a major stressor in the general population, with significant emotional impact and linked risk factors that could increase suicide risk. The main reasons for such psychological distress and suicide risk include the perceived severity of the disease, which lacks effective vaccines or treatments (in that moment), the containment and quarantine measures adopted to prevent its spread,7 and increased alcohol consumption,8 all of which could be amplified by media if unreliable information is communicated in a sensationalist way.9,10

As a result, feelings of loneliness, hopelessness, grief, stigma, guilt, or fear can be developed, especially in subjects vulnerable because of predisposing factors such as history of psychiatric illness12 or social and occupational risk. Recent studies conducted in Spanish general population analyzed the perception of threat during confinement,13 the psychological impact,14 and mental health consequences15 during the early stages of the COVID-19 pandemic.14 According to these studies, women with children in their care and with low educational level,13 young women, and those who lost their job during the health crisis14 are particularly vulnerable. In these groups, the stress associated with the COVID-19 pandemic can induce psychological changes and increase the likelihood of triggering mental disorders such as schizophrenia, reactive psychosis,16 depression, anxiety, or post-traumatic stress disorder,17 as well as the risk of suicide, both in the short and long terms.18,19

In patients admitted to the hospital for COVID-19 infection, the perceived severity of the disease becomes a real threat. Confinement measures involve extreme isolation of patients due to a number of reasons, including the use of personal protective equipment, minimization of physical contact with healthcare staff, and prohibition of visits by family members. In addition, treatments for COVID-19 have potential neuropsychiatric adverse effects.20,21 Particularly, the use of hydroxychloroquine was associated with an increased risk of reporting psychiatric disorders, ranging from sleep disorders, anxiety, and depression, to mania and psychotic disorders, which might be complicated by suicidal attempts and death by suicide; in fact, completed suicide was reported to be the main cause of death among all adverse drug reactions with hydroxychloroquine,22 especially in women and elderly.23 Furthermore,
discharge from hospital can lead to feelings of grief or stress resulting from fear of recurrence of the disease or infecting others, and stigma. Therefore, hospital admission can be a precipitating stressor that triggers suicidal ideation in patients who are vulnerable because of predisposing factors (in an environment with access to harmful means). The incidence of suicide in the general (i.e., nonpsychiatric) hospital population is 4 to 5 times higher than in the general population, with an estimated prevalence of 1.8 cases per 100,000 admissions. The main factors associated with suicide are chronicity, severity of symptoms, personality of the patient, and psychiatric comorbidity. In the United States, suicide is the 10th most frequent cause of death in hospitalized patients; thus, suicide prevention is a strategic goal in quality care systems. However, little research on the risk of suicide in patients admitted for COVID-19 has been conducted.

The aim of this study was to conduct a cross-sectional analysis of the emotional impact and risk of suicide in a sample of patients admitted to our hospital for COVID-19 infection. The secondary objective was to determine which sociodemographic and clinical factors were associated with greater psychological impact and a higher risk of suicide.

**METHODS**

**Study Design and Flow Diagram of Participants**

A cross-sectional study was conducted on a representative sample of patients hospitalized for COVID-19 at the Hospital Clínico San Cecilio of Granada (Granada, Spain) between March and May, 2020. Participants were consecutively included in the study after obtaining appropriate informed consent. Each patient was assessed by completing an electronic questionnaire (Google Forms). The study was approved by the Research Ethics Committee of Hospital Clínico San Cecilio of Granada.

**Sample Size**

Our target population comprised 524 patients. The sample size, calculated with the StatGraphics Centurion software (version XVII), resulted in 36 patients, corresponding to a 95% confidence level in the estimation of event occurrence and an absolute error of 0.713. The estimated event occurrence in the sample (a priori unknown) was set at 50%, that is, the most unfavorable value that, statistically, can be established: minimal or normal (0–3 points), mild (4–9 points), moderate (9–14 points), and severe (15–20 points). Accordingly, 4 ranges of hopelessness intensity can be established: minimal or normal (0–3 points), mild (4–9 points), moderate (9–14 points), and severe (15–20 points). Although the main purpose of the scale is to provide a measurement of hopelessness, studies have shown that this instrument is a good predictor of risk of suicide and completed suicide.

**Inclusion Criteria**

A. Patients admitted to the Hospital Clínico San Cecilio of Granada for COVID-19 infection (diagnosed by Polymerase Chain Reaction) between March and May, 2020.
B. Age equal to or greater than 18 years.
C. Voluntary participation and providing informed consent for the study.

**Exclusion Criteria**

A. Moderate-severe cognitive impairment.
B. Inability to complete the evaluation form.

**Variables and Instruments**

**Sociodemographic Data**

Information was obtained regarding sex, age, family and personal history of psychiatric illness, and social-familial risk, measured by the Hospital Anxiety and Depression Scale (HADS)35 and the Beck Hopelessness Scale (BHS). The HADS allows the detection of situations of social problems or high social risk. It can specifically measure social functioning and be implemented in the practice of professionals working in social or health care. It is an interviewer-administered scale for evaluating social and familial risk. The scale consists of 5 items or variables (family, economy, residence, social contacts, and social support) with 5 categories for each of them, resulting in a gradient that ranges from the ideal social situation (i.e., absence of social problems) to the evidence of social problems or needs. The cutoff for social risk detection is 16 points.

**Clinical Data**

Information on smoking, alcohol use, and level of physical function based on the Barthel Index was obtained.31

The severity of COVID-19 was categorized according to 4 criteria: (a) pattern of pneumonia in the computed tomography (CT) scan, that is, mild, moderate, moderate-severe, and severe; (b) presence of cytokine release syndrome (CRS) produced by COVID-19; (c) corticosteroid treatment; and (d) admission to the intensive care unit (ICU).

**The Psychological Impact Was Assessed by the Impact of Event Scale-6 and the Hospital Anxiety and Depression Scale**

**The Impact of Event Scale-6**

The Impact of Event Scale-6 (IES-6)33 is an abbreviated version designed for fast identification and quantification of the psychological impact resulting from a stressful event. Compared with the 22-item version, this instrument has been simplified into a 6-question scale assessing cognitive and affective symptoms that usually occur as posttraumatic stress reactions. The score for each item ranges from 0 (the symptom is not present) to 4 (the symptom is extremely present) points. The cutoff was set at 8 points, which showed a good level of sensitivity (0.92) and specificity (0.84).

**The Hospital Anxiety and Depression Scale**

The Hospital Anxiety and Depression Scale (HADS)35 has been the most widely used self-rating instrument to assess symptoms of anxiety and depression in hospitalized patients in Spain. It consists of 14 items distributed in 2 subscales, one for anxiety (7 items) and another one for depression (7 items). Each item score ranges from 0 (symptom not present) to 3 (symptom markedly present). A score greater than 10 on the HADS total score and each of the HADS subscales indicates a likely case.

**The Risk of Suicide Was Assessed by the Beck Hopelessness Scale and the Columbia-Suicide Severity Rating Scale**

**Beck Hopelessness Scale**

The Beck Hopelessness Scale (BHS)37 is one of the few instruments for assessing the risk of suicide that has been validated in Spanish. It consists of 20 “true or false” questions related to negative expectations regarding the immediate and long-term future. Items indicating hopelessness are scored as 1 point, and the rest are scored as 0 points; thus, the overall score ranges from 0 to 20 points. Accordingly, 4 ranges of hopelessness intensity can be established: minimal or normal (0–3 points), mild (4–8 points), moderate (9–14 points), and severe (15–20 points). Although the main purpose of the scale is to provide a measurement of hopelessness, studies have shown that this instrument is a good predictor of risk of suicide and completed suicide.
The Columbia-Suicide Severity Rating Scale
To assess the risk of suicide, an exploratory version of the
Columbia-Suicide Severity Rating Scale (C-SSRS), which has
been translated and validated in Spanish, was used. This instru-
ment includes 6 questions on ideation and behaviors related to sui-
cide. The first question asks if the respondent had wished to be
dead during hospital stay. The second question, which is more di-
rect, asks if the respondent had wished to commit suicide during
hospitalization. If the answer to the second question is affirmative,
the respondent must answer the last 4 questions of the C-SSR; oth-
erwise, they move directly to the last question. The questionnaire
uses clear and direct language, which has proven to be the most
effective method for obtaining honest answers and therefore iden-
tifying and preventing suicidal ideation and behaviors.

The Brugha’s List of Threatening Experiences
Questionnaire Was Introduced to Control
Confounding Bias
The Brugha’s List of Threatening Experiences (BLTE) is an
instrument designed and validated to evaluate stressful life experi-
ences that can be considered as risk factors for the development
of psychological disorders such as depression or suicide. The ques-
tionnaire contains a section with a list of 12 stressful experiences
with “yes” or “no” answer options, depending on whether or not the
subject has experienced them. It also contains a section with ques-
tions about personal and family history of psychiatric illness.

Statistical Analysis
First, a descriptive analysis of the sample and a frequency analy-
sis of the psychological impact and risk of suicide were carried
out. Then, correlation analyses between the scales measuring the
psychological impact and risk of suicide were performed using the
Pearson correlation coefficient. In addition, the association be-

TABLE 1. Demographic and Clinical Characteristics of the Sample

| Variable | Results |
|----------|---------|
| Age, y   | Mean (SD) 69.8 (14.31) |
| Sex, n (%) | Male 19 (52.78) |
|          | Female 17 (47.22) |
| Family history of psychiatric illness, n (%) | No 29 (88.55) |
|          | Yes 7 (19.44) |
| Previous treatment for psychiatric illness | No 25 (69.44) |
|          | Yes 11 (30.56) |
| Current treatment for psychiatric illness | No 32 (88.89) |
|          | Yes 4 (11.11) |
| Previous attempt of suicide | No 33 (91.67) |
|          | Yes 3 (8.33) |
| GSFES Total score, mean (SD) 9.41 (3.28) |
|          | <16 points, n (%) 35 (97.22) |
|          | ≥16 points, n (%) 1 (2.78) |
| History of smoking, n (%) | Never smoked 25 (69.44) |
|          | Ex-smoker >5 y 7 (19.44) |
|          | Ex-smoker <5 y 2 (5.56) |
|          | Active smoker 2 (5.56) |
| History of alcohol use, n (%) | Never or moderate user 30 (83.33) |
|          | Ex-alcohol user <5 y 2 (5.56) |
|          | Ex-alcohol user >5 y 7 (19.44) |
|          | Active alcohol user 1 (2.78) |
| Barthe Index for activities of daily living, n (%) | Score >90 29 (80.56) |
|          | Score 60–90 7 (19.44) |
|          | Score <60 0 |
| Duration of symptoms before admission, d | Mean (SD) 6.22 (3.88) |
| Interquartile range 3.25 |
| CRS, n (%) | Yes 24 (66.67) |
|          | No 12 (33.33) |
| CT severity index, n (%) | Not performed 18 (50) |
|          | Not compatible 2 (11.11) |
|          | Mild 1 (5.56) |
|          | Moderate 3 (16.67) |
|          | Moderate-severe 7 (38.89) |
|          | Severe 5 (27.78) |
| Corticosteroids, n (%) | Yes 26 (72.22) |
|          | No 10 (27.78) |

RESULTS

Descriptive Analysis of the Sample
Thirty-six patients were included (Table 1), with a mean age of
69.8 years and an SD of 14.3 years (range, 38–92 years). Seventeen
patients (47.2%) were women. Twenty-nine patients (88.5%) had
no family history of psychiatric illness, 25 (69.4%) had not previ-
ously received treatment for psychiatric illness, 32 (88.9%) were
not currently receiving treatment for psychiatric illness, and 33
(91.7%) had never made a suicide attempt. The social-familial eva-
uation (GSFES) showed an average (SD) score of 9.4 (3.28) points,
with 35 patients (97%) not being at significant social-familial risk.
Regarding the clinical factors, 34 patients (94.5%) never smoked or were ex-smokers, and 35 (97%) had no history of alcohol use, consumed alcohol in moderation, or were ex-alcohol users. Twenty-nine patients (80.6%) were independent (Barthel). The average (SD) duration of symptoms before hospital admission was 6.2 (3.9) days. Twenty-four patients (66.7%) presented CRS, 26 (72.2%) underwent corticoid treatment, and 10 (27.8%) were admitted to the ICU. Computed tomography was performed in half of the cases, identifying mainly patients with moderate to severe forms of COVID-19.

**Frequency Analysis of the Psychological Impact and Risk of Suicide**

Regarding the psychological impact, 33.3% of patients had significant psychological impact according to the IES-6. In addition, 13.9% of patients showed anxiety symptoms according to the HADS-Anxiety subscale, and 13.9% had depression symptoms according to the HADS-Depression subscale. Overall, 47.2% of the patients presented anxiety-depression symptoms according to the total HADS score.

With regard to the risk of suicide, according to the BHS, 75% and 2.8% of patients had a moderate and severe risk of suicide, respectively. According to the C-SSRS, 16.7% of patients had suicidal ideation and 5.6% had active suicidal thoughts.

According to the BLTE questionnaire, at least one confounding factor was present in almost 70% of patients.

**Correlation Analyses Between the Scales of Psychological Impact (IES-R6 and HADS) and Risk of Suicide (BHS and C-SSRS)**

Pearson linear correlation coefficients related to psychological impact showed a positive correlation between all the HAD scales (HADS-Total/HADS-Anxiety: \( r = 0.91, P < 0.001 \); HADS-Total/HADS-Depression: \( r = 0.91, P = 0.00 \); HADS-Anxiety/HADS-Depression: \( r = 0.66, P = 0.00 \)) and a positive correlation between the HADS and the IES-6 (HADS-Total/IES-6: \( r = 0.55, P = 0.00 \); HADS-Depression/IES-6: \( r = 0.52, P = 0.001 \); HADS-Anxiety/IES-6: \( r = 0.48, P = 0.003 \)).

The C-SSRS of suicidal ideation or behavior showed a negative correlation with the IES of psychological impact (\( r = -0.410, P = 0.013 \)). The BHS did not significantly correlate with any other scale.

**Analysis of Dependence Between the Psychological Impact (IES-6 and HADS) and Sociodemographic and Clinical Factors**

Regarding the IES-6 (Table 2), having received previous psychological treatment was the only significantly influential factor according to the ANOVA results (\( P = 0.010 \)).

**TABLE 1. (Continued)**

| Variable          | Results |
|-------------------|---------|
| ICU admission, n (%) |         |
| Yes               | 10 (27.78) |
| No                | 26 (72.22) |

\( n, \) number; \%: percentage of cases with respect to the total sample size.

| Variable                                      | Results |
|-----------------------------------------------|---------|
| IES, \( \chi^2 \) (P Value)                  |         |
| Total, \( \chi^2 \) (P Value)                 |         |
| HADS Anxiety, \( \chi^2 \) (P Value)          |         |
| HADS Depression, \( \chi^2 \) (P Value)       |         |

**TABLE 2. Analysis of Dependence Between the Psychological Impact (IES-6 and HADS) and Sociodemographic and Clinical Factors**

**HADS**

| IES, \( \chi^2 \) (P Value) | Total, \( \chi^2 \) (P Value) | HADS Anxiety, \( \chi^2 \) (P Value) | HADS Depression, \( \chi^2 \) (P Value) |
|------------------------------|---------------------------------|-------------------------------------|--------------------------------------|
| Sociodemographic factors     |                                 |                                     |                                      |
| Age 0.058 (0.809)            | 1.217 (0.270)                   | 0.872 (0.350)                      | 0.003 (0.956)                       |
| Sex 2.731 (0.098)            | 0.472 (0.492)                   | 2.503 (0.114)                     | 0.122 (0.727)                       |
| Family history of psychiatric illness |                        |                                     |                                      |
| Father 2.057 (0.151)        | 1.150 (0.284)                   | 6.377 (0.012)                     | 6.377 (0.012)                       |
| Mother 2.057 (0.151)        | 0.920 (0.337)                   | 0.166 (0.684)                     | 0.166 (0.684)                       |
| Spouse 0.514 (0.473)        | 0.920 (0.337)                   | 0.166 (0.684)                     | 0.166 (0.684)                       |
| Sibling 1.636 (0.201)       | 0.253 (0.615)                   | 1.035 (0.309)                     | 0.528 (0.468)                       |
| Children 0.116 (0.733)      | 0.122 (0.727)                   | 0.181 (0.670)                     | 3.310 (0.069)                       |
| No. relatives with history of psychiatric illness 5.775 (0.056) | 4.847 (0.089) | 10.44 (0.005) | 10.44 (0.005) |

**Personal history of psychiatric illness**

| Previous psychological treatment 6.545 (0.011) | 0.341 (0.559) | 6.690 (0.010) | 0.244 (0.621) |
| Current psychological treatment 0.563 (0.453) | 0.014 (0.906) | 4.906 (0.027) | 0.465 (0.496) |
| Suicide attempt 1.636 (0.201) | 0.253 (0.615) | 0.528 (0.468) | 0.528 (0.468) |
| GS FES 2.057 (0.151) | 1.150 (0.284) | 6.377 (0.012) | 6.377 (0.012) |

**Clinical factors**

| Smoking 2.893 (0.408) | 1.218 (0.749) | 2.555 (0.465) | 3.725 (0.293) |
| Alcohol use 4.650 (0.199) | 3.366 (0.339) | 1.016 (0.672) | 3.704 (0.015) |
| Barthel 0.12 (0.912) | 0.054 (0.817) | 7.543 (0.006) | 2.146 (0.143) |
| Duration of symptoms, d 12.536 (0.251) | 7.555 (0.672) | 18.23 (0.051) | 17.19 (0.070) |
| CRS 0.563 (0.453) | 0.223 (0.637) | 1.858 (0.173) | 0.116 (0.733) |
| CS 0.277 (0.599) | 0.043 (0.836) | 3.005 (0.083) | 0.432 (0.511) |
| ICU 0.277 (0.599) | 0.290 (0.590) | 2.233 (0.135) | 0.175 (0.676) |
| CT 3.686 (0.595) | 4.654 (0.325) | 7.930 (0.160) | 8.394 (0.136) |

CS, corticosteroids.
Age was the only factor associated with the total HADS score (ANOVA; \( P = 0.009 \)). Results of the HADS-Anxiety subscale were associated with the following: father’s history of psychiatric illness (ANOVA; \( P = 0.011 \)), number of relatives with history of psychiatric illness (ANOVA; \( P = 0.004 \)), having received previous psychological treatment (ANOVA; \( P = 0.009 \)), receiving psychological treatment currently (ANOVA; \( P = 0.027 \)), social risk measured by the GSFES (ANOVA; \( P = 0.011 \)), and the Barthel Index (ANOVA; \( P = 0.005 \)). Results of the HADS-Depression subscale were associated with the following: age (ANOVA; \( P < 0.001 \)), father’s history of psychiatric illness (ANOVA; \( P = 0.011 \)), number of relatives with history of psychiatric illness (ANOVA; \( P = 0.004 \)), and the GSFES (ANOVA; \( P = 0.011 \)).

### Analysis of Dependence Between the Risk of Suicide (BHS and C-SSRS) and Sociodemographic and Clinical Factors

The analysis of dependence between the risk of suicide and sociodemographic and clinical factors using tests of independence based on the Pearson \( \chi^2 \) statistic (Table 3) showed that, for the BHS, the risk of suicide was only associated with having received previous psychological treatment (ANOVA; \( P = 0.013 \)). In addition, the only factor associated with the C-SSRS was smoking (ANOVA; \( P = 0.047 \)), although a trend toward significance was found for the variable “receiving psychological treatment currently” (ANOVA; \( P < 0.1 \)). Overall, the following associations of sociodemographic and clinical factors with the scales of psychological impact and risk of suicide were found (Table 4).

The binary logistic regression models for each scale based on the associated factors, with at least one statistically significant coefficient, were the following (Table 5): in the IES-6, previous psychological treatment was significant for the model (odds ratio [OR], 7 [95% confidence interval [CI], 1.454–33.696]; \( P = 0.015 \)). In the HADS-Anxiety subscale, the significant variables for the model were previous psychological treatment (OR, 16 [95% CI, 1.105–231.571]; \( P = 0.042 \)) and the Barthel Index (OR, 13.5 [95% CI, 0.987–184.577]; \( P = 0.051 \)); although slightly higher than the 0.05 limit for the \( b \) coefficient, this variable was included in the model because of its large contribution to the percentage of variability explained and for not exceeding the Wald’s stepwise regression criteria, being significant at a 10% level. In the HADS-Depression subscale, the GSFES was significant for the model (OR, 1.609 [95% CI, 1.028–2.519]; \( P = 0.038 \)), and a trend toward significance was found for the variable “number of relatives with psychological history” (OR, 5.060 [95% CI, 0.827–30.972]; \( P = 0.079 \)), being significant at a 10% level and therefore included in the model. In the BHS, the coefficient of the only independent variable in the model was not significant, so it is not possible to predict the probability of risk of suicide according to the binary logistic regression model. In the C-SSRS, the resulting variables in the model were current psychological treatment (OR, 59.089 [95% CI, 3.046–1146.231]; \( P = 0.007 \)) and smoking (OR, 6.462 [95% CI, 1.589–26.278]; \( P = 0.009 \)).

### DISCUSSION

Our results show that 33.33% of the patients had significant psychological impact according to the IES-6 and 47.2% showed symptoms of anxiety-depression according to the HADS-Total score, with 13.89% having symptoms of anxiety according to the HADS-Anxiety subscale and 13.89% having symptoms of depression according to the HADS-Depression subscale. Similar results were obtained in 2 studies\(^4\,15\) conducted on Spanish general adult population during the early stages of the outbreak, although higher levels of anxiety and depression symptoms were reported. This was probably because depression and anxiety were evaluated using a different scale. Specifically, we used the HADS, whereas the authors from the aforementioned study used the Depression, Anxiety, and Stress Scales\(^14\) and the other study used the Patient Health Questionnaire-2 and the Generalized Anxiety Disorder Scale-2.\(^15\) Furthermore, their target population differs from our study (i.e., general population versus in-hospital COVID-19 patients). Comparable results were also observed in previous pandemics with instruments similar to those used in our study, for example, the HADS or the IES-6.\(^4\) For instance, in the previous severe acute respiratory syndrome pandemic, high levels of anxiety and depression\(^45\) and increased number of suicides\(^46\) were reported. In our study, 75% and 2.8% of the patients were at moderate and severe risk of suicide, respectively, according to the BHS. In addition, 16.67% of the patients had suicidal ideation and 5.6% had suicide behaviors according to the C-SSRS.

Regarding the sociodemographic and clinical factors, previous psychological treatment, a greater degree of dependency (Barthel), and increased social-familial risk (GSFES) were associated with a greater psychological impact. These findings reinforce the idea that the psychological impact is increased in patients who are more vulnerable, less resilient, and with difficulties to connect with others.\(^47\)

The development of suicidal ideation or behavior was not exceptional and agrees with the predictions made by several authors.\(^18,19\) Our results indicate that such thoughts are not related to the type of infection or the duration of the disease or hospital.
admission, but rather to being treated for a psychiatric illness and active smoking. Accordingly, special care should be taken with this population group, particularly in the elderly.26 The development of thoughts of hopelessness was not related to any of the variables analyzed in this study, perhaps because the development of such feelings and cognitive distortions is mediated by certain personality traits that could not be addressed in the present work.48

No significant correlation was found between psychological impact scales and suicide risk scales. In fact, the scale of suicidal ideation and behavior (C-SSRS) showed a negative correlation with the scale of psychological impact (IES-6; $r = -0.410$), indicating that patients with higher suicidal behavior did not show significant psychological impact because of the disease. These findings, along with the fact that smoking (an addictive disorder) was associated with an increased risk of suicide, seem to fit better into a model of suicidal impulsivity than a stress-diathesis model.25

In addition to the known adverse effects of treatment and the psychological impact of treatment on vulnerable and predisposed patients, a primary effect of the disease itself could be supported and partially explain the lack of correlation found between psychological impact and suicide scales. Described pathogenic mechanisms involving the central nervous system include lung damage causing subsequent neuronal insult, hemogenous, and neural virus dissemination from the olfactory nerve via olfactory bulb and orofacial sensory fibers via cranial ganglia, causing neuroinflammation, endothelial injury, and/or coagulopathy that might lead to neuropsychiatric manifestations, even reaching the behavior-related limbic area.49,50

Finally, on the one hand, because patients are retired, already infected, and at the hospital, concerns about job or financial losses,6,9 the fear of being infected, and social isolation related to quarantine, reported6 as main factors associated with suicide, might not be that prominent in our targeted population. On another hand, our study is framed in the early months of the COVID-19 pandemic, where no risk of suicide has been found in previous studies, attributed to protective measures such as good health care response and factors as the pulling-together effect,18,51 both of which are also present in our healthcare system and society.

Our article can be also useful to highlight that having reliable knowledge about psychological interventions was a protective factor against the severity of suicidal ideation (during the COVID-19 pandemic)11 and to make sure that we communicate our findings to governments and communities in safe, nonsensationalist ways.10

### TABLE 4. Associations of Sociodemographic and Clinical Factors With the Scales of Psychological Impact and Risk of Suicide

| Scale         | Factor                                      | $\chi^2$ (P Value) | Pearson r Coefficient (P Value) |
|---------------|----------------------------------------------|--------------------|---------------------------------|
| IES-6         | Previous psychological treatment             | 6.545 (0.011)      | 0.345 (0.039)                   |
| HADS-Total    | Age                                          |                    |                                 |
| HADS-Anxiety  | Father with history of psychiatric illness   | 6.377 (0.012)      |                                 |
|               | No. relatives with history of psychiatric illness |                |                                 |
|               | Previous psychological treatment             | 10.44 (0.005)      |                                 |
|               | Current psychological treatment              | 6.690 (0.010)      |                                 |
|               | GSFES                                         | 4.906 (0.027)      |                                 |
|               | Barthel Index                                 | 6.377 (0.012)      |                                 |
|               |                                             | 7.543 (0.006)      |                                 |
| HADS-Depression| Age                                         |                    | 0.519 (0.001)                   |
|               | Father with history of psychiatric illness   | 6.377 (0.012)      |                                 |
|               | No. relatives with history of psychiatric illness | 10.44 (0.005)     |                                 |
|               | GSFES                                         | 6.377 (0.012)      |                                 |
| BHS           | Previous psychological treatment             | 6.327 (0.042)      |                                 |
| C-SSRS        | Current psychological treatment              | 11.049 (0.04)      |                                 |
|               | Smoking                                      | 20.235 (0.003)     |                                 |
|               | Alcohol use                                   | 13.943 (0.030)     |                                 |

### TABLE 5. Binary Logistic Regression Models for Each Scale Based on the Associated Factors

| Scales        | Factors                                      | Coefficients (P Value) | OR (95% CI)          | Nagelkerke's $R^2$ Value |
|---------------|----------------------------------------------|------------------------|----------------------|--------------------------|
| IES-6         | Previous psychological treatment             | $b_0 = -1.386 (0.006)$ | OR$_{b_0} = 7.000$ (1.454–33.696) | 0.226                    |
|               |                                              | $b_1 = 1.946 (0.015)$  |                      |                          |
| HADS-Anxiety  | 1. Previous psychological treatment          | $b_0 = -3.989 (0.002)$ | OR$_{b_0} = 16.000$ (1.105–231.571) | 0.489                    |
|               | 2. Barthel Index                              | $b_1 = 2.773 (0.042)$  | OR$_{b_1} = 13.500$ (0.987–184.577) |                          |
|               |                                              | $b_2 = 2.603 (0.051)$  |                      |                          |
| HADS-Depression| 1. Number of relatives with psychological history | $b_0 = -7.627 (0.011)$ | OR$_{b_0} = 5.060$ (0.827–30.972) | 0.342                    |
|               | 2. GSFES                                      | $b_1 = 1.621 (0.079)$  | OR$_{b_1} = 1.609$ (1.028–2.519) |                          |
|               |                                              | $b_2 = 0.476 (0.038)$  |                      |                          |
| C-SSRS        | 1. Current psychological treatment           | $b_0 = -3.286 (0.001)$ | OR$_{b_0} = 59.089$ (3.046–1146.231) | 0.584                    |
|               | 2. Smoking                                    | $b_1 = 4.079 (0.007)$  | OR$_{b_1} = 6.462$ (1.589–26.278) |                          |
|               |                                              | $b_2 = 1.866 (0.009)$  |                      |                          |
Strengths and Limitations

The high number of recent articles pointing to the growing impact that the COVID-19 pandemic would have on mental health warranted a study to analyze the psychological impact of COVID-19 in patients admitted to the hospital. To our knowledge, this is one of the few—if not the only—publications analyzing psychological impact in a sample of patients hospitalized for COVID-19. So far, we only found case reports in the literature, but no actual sample-based studies. The main strength of this study lies in having collected a sample of patients admitted to the hospital for COVID-19 with psychological impact and risk of suicide. The fact that the data were analyzed using multivariate analyses, which allow adjustments for a number of confounding variables, is another strength that should be highlighted.

Nevertheless, this study has some limitations. It is a single-center study with a small sample size and a cross-sectional design without control group, which prevents from making causal inferences. The results found may have internal validity but may not be extrapolated to other clinical samples with different characteristics. Moreover, because job loss and economic impairment are known to be relevant factors in psychological impact and suicide, it should be noted that data were collected in the early stages of the pandemic, when unemployment and the economic situation were not as bad as they are now in Spain.

Conclusions and Future Perspectives

The COVID-19 infection has been a real challenge for public health systems of all countries affected by the pandemic. The psychological impact on patients admitted for COVID-19 must be considered, with special focus on depression in those at increased social-familial risk (GSFES) and on anxiety in those who have previously received psychological treatment and are more dependent (Barthel). Risk of suicide should be assessed in patients who are actively receiving psychological treatment and are smokers, regardless of the perceived psychological impact, because suicidal ideation and behavior would not be directly related to an increased risk of suicide.

The development of specific psychological strategies that prove to be effective in preventing and detecting mental health problems that patients may have is required to relieve their mental suffering. Our research group intends to carry out a longitudinal follow-up of all patients who have been admitted to our hospital for COVID-19.

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