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Implementation of a suicide risk prevention program in the Autonomous Community of Madrid. The ARSUIC experience

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Introduction. This study evaluates the degree of compliance and effectiveness of the ARSUIC Suicide Risk Care Program. ARSUIC seeks to reduce the relapse risk that follows a suicide attempt by scheduling a high priority outpatient visit following hospital discharge.

Method. Hospital-based retrospective study conducted between years 2012 and 2015. We included every suicide attempt treated at the La Paz University Hospital's mental healthcare resources network. We estimated the time between hospital discharge and the first outpatient visit; the proportion of visits that fulfill the program's objective – a follow-up within a maximum of 7 days; the suicide attempt rate; and the percentage of attempts corresponding to relapses, by study year.

Results. After program deployment, median time between discharge and the first visit decreased from 8.5 to 6 days, and the percentage of visits that fulfill the program's objective increased from 32 to 48.5%. Between years 2012 and 2015, the suicide attempt rate per person and year decreased from 1.20 to 1.08 and the proportion of attempts corresponding to relapses from 26.6% to 12.8%.

Conclusion. Implementing the ARSUIC Program lowered the time between discharge and the first outpatient visit following a suicide attempt. The proportion of suicide attempts due to relapses and the suicide attempt rate per person decreased progressively. The program fulfilment proportion was under 50%, suggesting between-user differences regarding their effective access to the program.

Key words: Suicide, Mental health, Program evaluation, Implementation
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Implementación de un programa de prevención del riesgo de suicidio en la Comunidad Autónoma de Madrid. La experiencia ARSUIC

Introducción. Este estudio evalúa el grado de cumplimiento y efectividad del programa ARSUIC de Atención al Riesgo Suicida, cuyo objetivo es reducir el riesgo posterior al intento de suicidio facilitando una cita ambulatoria de alta prioridad después del alta hospitalaria.

Metodología. Estudio retrospectivo de base hospitalaria conducido, entre 2012 y 2015, en todos los casos de intento de suicidio atendidos en la red de recursos de psiquiatría del Hospital Universitario La Paz. Se obtienen estimadores del tiempo hasta la primera consulta después del alta, de la proporción de citas que cumple el objetivo del programa de ser atendidos en un máximo de 7 días, de la tasa de intento de suicidio y del porcentaje de intentos que corresponde con un reintento, en cada year de estudio.

Resultados. Después de la implementación del programa, la mediana de tiempo entre el alta y la primera consulta baja de 8,5 a 6 días y el porcentaje de citas que cumplen el objetivo aumenta de 32 a 48,5%. Entre 2012 y 2015, la tasa de intentos de suicidio por paciente y year se reduce de 1,20 a 1,08, y el porcentaje de intentos que corresponde con reintentos de 26,6 a 12,8%.

Conclusión. La implementación del Programa ARSUIC ha reducido el tiempo entre el alta después de un intento de suicidio y la primera cita ambulatoria. Han disminuido los intentos de suicidio debidos a reintentos y la tasa de intentos por paciente y year. El porcentaje de cumplimiento menor al 50% sugiere diferencias interindividuales en el acceso efectivo al programa.

Palabras clave: Suicidio, Salud mental, Evaluación de programas, Implementación

INTRODUCTION

Almost 1 million people die by suicide every year[1], and it is the second most frequent cause of death among youth[2]. In Spain, suicide is the most frequent external cause of death, with an annual incidence rate ranging between 11.88 per 100,000 men and 4.05 per 100,000 women[3]. Suicide risk factors interact in complex hierarchical networks[4,5]. Among them, a personal history of suicide attempting stands out as the main clinical predictor of subsequent reattempt and death by suicide[6]. It is estimated that having attempted suicide increases lifetime risk of death by suicide by 30 times, and antecedes 1 in 2 deaths by suicide[7-9]. In addition, suicide attempt, an entity up to 30 times more frequent than death by suicide[10], constitutes itself an identifiably clinical challenge, with remarkable direct and indirect costs and an increasing incidence across the globe[11,12].

Suicide prevention can be exercised at different intervention levels[13]. At the population-level, several measures have proved protective: in general terms, these strategies seek to limit the access to potentially lethal methods. Examples include limiting the content in the packaging of drugs commonly used in overdose, such as acetaminophen or benzodiacepines[14], or limiting the access to suicide by jumping hotspots[15]. Individual-level prevention is exercised through clinical interventions directed towards individuals at high risk of suicide. The healthcare setting is considered adequate for risk detection, since up to 45% who die by suicide have been seen by a physician during the previous month[16]. Among high-risk patients, those with a prior suicide attempt stand out[17], in particular immediately after hospital discharge, a period that entails an extraordinary reattempt risk[11]. Best available evidence corresponds to contact maintenance with high-risk individuals, usually using "gatekeepers" – people who can be accessed during suicidal crises[18]. A recent meta-analysis of randomized controlled trials found that WHO-BIC (Brief Intervention and Contact), a program aimed at enhancing contacts between practitioners and suicidal clients, is effective at lowering suicide reattempts and death by suicide[19]. The same meta-analysis found psychotherapeutic interventions not effective. The ED-SAFE randomized trial, conducted in the United States, concluded that an Emergency Department-initiated intervention that clarified potential resources for suicidal crises effectively reduced new attempts and deaths[20].

In the Autonomous Community of Madrid, the 2010-2014 Strategic Mental Health Plan highlighted suicide as a fundamental line of work, and selected the following related objectives: establishing an epidemiologic surveillance system of suicide, developing a clinical gold-standard for people at high risk, and enhancing research on suicidal behaviors[21]. The Suicide Risk Care Program (ARSUIC for its Spanish acronym) was specifically deployed to prioritize the care of suicidal attempters, in order to reduce their reattempt risk. Although the ARSUIC program is active in all hospitals in the Autonomous Community of Madrid, results have not been reported yet. The objective of this study is to evaluate the program by estimating the degree of implementation, fulfillment and effectiveness.

METHODS

Study design, context and subjects

Observational, retrospective, hospital-based study. La Paz University Hospital serves a catchment area of 525,501 people in the North of Madrid. The mental healthcare system includes a variety of outpatient and inpatient resources, such as the Emergency Department (ED), the psychiatric inpatient unit, and several Community Mental Healthcare Centers (CMHC). Between Jan 1st 2012 and Dec 31st 2015, 1,633 patients received medical and mental healthcare at the ED due to a suicidal attempt. Patients admitted to the ED following a suicide attempt can be either discharged from the ED or admitted to the hospital. If the attempt leads to relevant medical damage, the patient will require admission to a medical ward, where an interconsultation-liaison psychiatrist will provide psychiatric care after somatic stabilization. If suicide risk remains substantially high after ED/medical ward discharge, the patient can be admitted to the psychiatric inpatient unit. This study featured all suicide attempters discharged from the ED, a medical ward or the psychiatric inpatient unit. In the context of psychiatric emergency care, any self-harm with at least some intention to die as a result is considered a suicide attempt. Hence, we excluded all patients with suicidal ideation who had not committed self-harm. Also, and given the study aim of evaluating the degree of program fulfillment within a specific catchment area, we excluded all subjects seen in our ED who pertained to different areas – these patients are usually referred to their correspondent ED for clinical management before discharge or admission to an inpatient ward. In addition, we excluded patients who officially pertained to the studied area but received treatment at external mental healthcare resources, such as those admitted to a different psychiatric inpatient unit due to a shortage of beds in the studied area's unit or to their personal preference. The study complied with the Declaration of Helsinki and was authorized by La Paz University Hospital's Clinical Research Ethical Committee.

The ARSUIC Suicide Risk Attention Program

ARSUIC ensures priority specialized mental healthcare for subjects who have suffered a suicide attempt, by en-

hancing contact with mental healthcare providers during the days following the attempt. The program was implemented during the last trimester of year 2012, when priority specialized medical appointments took a mean 19 days in the Autonomous Community of Madrid[22]. ARSUIC's main measure consists on scheduling all suicide attempters to see an outpatient psychiatrist, who does not have specific suicide prevention training, within a maximum of 7 days following discharge. After the appointment, patients go on to their usual periodic appointments. Hence, ARSUIC does not feature further additional follow-ups, or specific psychotherapeutic/pharmacologic treatments. The key outpatient visit is scheduled before hospital discharge, and the attending physician details the location and date of the visit in the discharge report.

Study variables

Information regarding dates of admission and discharge was obtained from the hospital's electronic healthcare records (EHR). These records are filed as a requirement before any discharge, and they also include sociodemographic variables: (gender, age), and whether the suicide attempt was an index attempt or a reattempt. Information regarding the first outpatient visit following discharge, and whether the patient complied with it, was retrieved from each CMHC's EHR. To evaluate the degree of implementation, we computed the time between hospital discharge and the first CMHC outpatient visit within the first 30 days. By doing so, we prevented other visits, most likely unrelated to the suicide attempt, from biasing our estimates. This bias would have favored most recently registered cases, because their follow-up periods encompass shorter time windows. We studied time-to-first outpatient visit as a continuous variable, as well as an implementation dichotomous variable (proportion of patients actually seen within a maximum 7 days). In addition, we computed the proportion of subjects who did not had an outpatient visit after the attempt. Using the dates of hospital admission and discharge, we were able to calculate the interval of time between attempts in those patients who had more than a suicide attempt during the study period. Then, to estimate the effectiveness of the program, we obtained the time between attempts within the first follow-up year after each attempt, and the suicide attempt rate per person-year in each of the study years.

Statistical analyses

We obtained descriptive statistics of the study population's sociodemographic variables. They were summarized as percentages in categorical variables, and as the median±–standard deviation in continuous ones. Then, we calculated: time between discharge and the first outpatient visit; time between different attempts; and suicide attempt rate per person-year. We tested that continuous variables were followed a parametric distribution using Kolmogorov-Smirnoff's test, we studied temporal trends using Pearson's R coefficients, and we tested before-after implementation differences using Student's t-test for repeated measures. Last, we studied time trends in suicide attempt rates per person-year by fitting a generalized linear model (GLM). Inter-annual rate logarithm comparisons were adjusted for multiple comparisons using Bonferroni's method. We conducted all analyses using SPSS v.22 for Windows[23], with the collaboration of La Paz University Hospital's Biostatistical consultants. Graphics were programmed using Stata v. 13 for Mac[24].

RESULTS

During the study period, a total 886 suicide attempts fulfilling inclusion criteria received medical assistance at La Paz University Hospital. The majority of them corresponded with females (68.2%). Table 1 summarizes the demographic characteristics of the study population, divided by study year.

Time between discharge and the first outpatient visit

Studying the distribution of the intervals of time between hospital discharge and first outpatient visit within 30 days, we found that year 2012's median±standard deviation 8.5±7.6 days were reduced, after the implementation of the program, to 6±7.3 in 2013 (p=0.03). We found an inverse correlation between study year and time between discharge

Table 1 Demographic characteristics and distribution of cases per study year

	N	Age P50 (DS)	Men N (%)	Women N (%)
2012	199	42.66 (14.59)	53 (26.6%)	146 (73.4%)
2013	242	42.85 (17.46)	82 (33.9%)	160 (66.1%)
2014	265	39.08 (15.89)	76 (28.7%)	189 (71.3%)
2015	180	39.86 (15.93)	71 (39.4%)	109 (60.6%)
2012-15	886		282 (31.8%)	604 (68.2%)

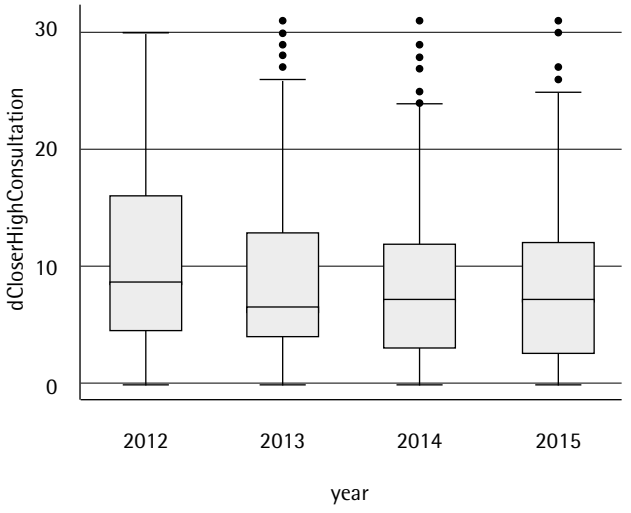

Figure 1 — *Time between discharge and first outpatient visit, within a maximum 1-month follow-up, per study year. Results in median±standard deviation are P50±SD 2012: 8.5±7.57; 2013: 6±7.31; 2014: 7±6.91; 2015: 7±6.54; p=0.03*

Table 2 — **Percentage of suicide attempts with time to first outpatient visit following discharge ≤ or > 7 days (p=0.002) and percentage of cases with no outpatient follow-up (p<0.001)**

	Total	Follow-up ≤7 days	Follow-up >7 days	No follow-up
2012	197	63 (32%)	134 (68%)	1%
2013	231	112 (48.5%)	119 (51.5%)	4.5%
2014	242	110 (45.5%)	132 (54.5%)	8.7%
2015	160	77 (48.1%)	83 (51.9%)	11.1%
Total	830	362 (43.6%)	468 (56.4%)	

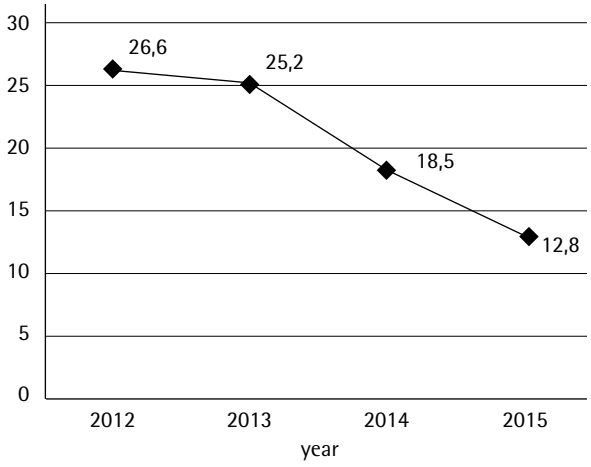

Figure 2 — *Percentage of suicide attempts that correspond to a reattempt per study year. p=0.002*

and first visit, indicating a progressive increase in the program's real uptake (R=-0.11; p<0.001). Figure 1 represents this association. Table 2 displays the percentage of cases who were compliant with the program's main goal – having a consultation within 7 days, per study year. It also features the proportion of cases with no outpatient consultation. Given that a longer follow-up period increases the odds of having at least one visit after the index suicide attempt, this variable increased slightly as the study advanced.

Proportion of suicide reattempts, attempt rate per person-year and time between attempts

The distribution of suicide attempts per year was as follows: 199 cases in 2012, 242 cases in 2013, 265 cases in 2014, and 180 cases in 2015. Figure 2 shows the evolution in the proportion of attempts that corresponds to reattempts, a figure that decreased every study year. Figure 3 represents the evolution of the attempt rate per person-year throughout the study period. The rate decreased from 1.20 attempts in 2012 to 1.08 attempts in 2015 (p=0.01). Figure 4 shows the distribution of the intervals of time to reattempt, within a maximum 1-year follow-up, per study year: time between attempts progressively increased as the study advanced.

DISCUSSION

This retrospective study analyzed the degree of implementation and fulfillment of the ARSUIC Suicide Risk Care Program, as well as its effectiveness. Our results show that, after ARSUIC was implanted, the median time wait between a suicide attempt and the first outpatient follow-up was reduced from 8.5 to 6 days, and then it stabilized in 7

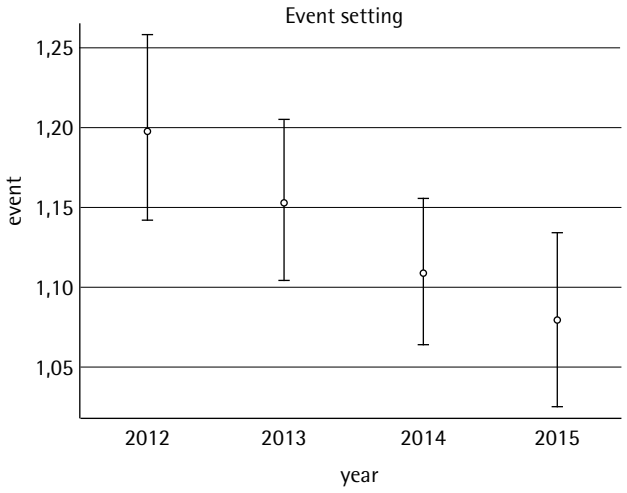

Figure 3 — *Suicide attempt rate per person-year. The difference between the logarithms of the rates 2012-2015 is statistically significant at an adjusted p-value level=0.017*

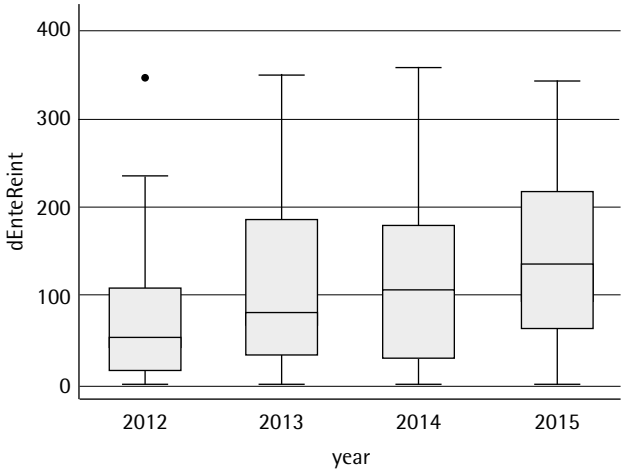

Figure 4 — *Time between hospital discharge following a suicide attempt and a subsequent suicide attempt, within a maximum 1-year follow-up, per study year. p=0.01*

days – the exact maximum that the program allows for. Moreover, the proportion of suicide attempts seen at the ED that correspond to reattempts decreased, and time between attempts in patients with multiple attempts increased. This is the first study to evaluate this program, adopted in all hospitals across the Autonomous Community of Madrid since 2013.

Since the establishment of the program, a number of voices have rightfully pointed out the need for an evaluation of its results[25]. In fact, implementing suicide prevention programs that are innovative and effective, and evaluating such programs with observational designs in real-world settings, are two global priorities[26]. According to our results, median time to follow-up, considering only the first 30 days after discharge, has decreased until becoming compliant with the study's objectives. In addition, our study shows high adherence to follow-ups after suicide attempting – over 88% patients were seen at a CMHC at some point, following discharge. Notwithstanding, there is a marked proportion of patients who do not turn up to these outpatient visits within the maximum 7 days established in the program. During the study period, this proportion has lowered from 68% to roughly 50%. The figure is in keeping with a study from Barcelona, where up to 50% did not comply with a suicide risk reduction protocol based on telephone calls[27]. Hence, while central tendency indicators suggest that ARSUIC's goals have been fulfilled, there seem to exist substantial between-subject differences in effective access to care. The marked increase of absolute suicide attempts we observed between 2012 and 2014 is in line with trends reported elsewhere[12]. Our ecological assessment of the program's effectiveness is promising: the proportion of attempts corresponding to reattempts and the suicide attempt rate per person-year have decreased every year since the program was implemented.

Our study includes several limitations that may somewhat affect its validity, and the applicability of our results. First, a proportion of all patients seen at the ED was under long-term treatment in a different catchment area, indicating the possibility that some suicide attempts pertaining to our studied area were, in turn, seen at other EDs, and are not included among our study population. Other authors, from comparable healthcare settings[28], maintain that, in Spain, most attempts are derived to the correspondent catchment area's ED. Overall, Madrid's healthcare planning has not suffered major changes during the study period, and we consider unlikely the possibility that this limitation affects between-study year differences. Thus, we believe that our findings are valid. Second, due to technical and ethical limitations, our effectiveness assessment is based on suicide reattempt, rather than death by suicide, as the measure of effect. Most authors agree that suicide attempt, as a relatively frequent event that can be registered in the clinical setting, is a useful proxy for death by suicide, an infrequent and difficult-to-detect outcome[7-9,29]. Notwithstanding, other studies have reported profile differences between people who attempt suicide and those who die by suicide[30], and we consider that including suicide as an outcome should be a

priority in future assessments of the program. Last, our study uses an ecological and historical design to evaluate the program's effectiveness, two characteristics that limit our ability to draw causal inferences. The retrospective design increases the possibility of a potential undetected historical artifact affecting our results. For example, some authors have reported an association between the 2000s decade's economic downturn and suicide rates in Europe[31]. The ecological approach somewhat limits our study's applicability to the clinical practice, in terms of individual-level decision-making.

Our study's main strength is its naturalistic character that allows for the assessment of a recently implemented intervention in unselected patients. There is a growing demand for pragmatic intervention studies for comparative effectiveness research that favor the generation of external rather than internal validity and expedite the implementation of evidence-based programs[32]. The age and gender distribution of our study population are in line with those observed in comparable settings[27]. We believe that our implementation estimates can be generalized to the rest of the Autonomous Community of Madrid, and that the effectiveness estimates are valid for other universal coverage healthcare systems. In addition, evidence suggests that, just as other subpopulations of patients under mental healthcare, people who attempt suicide have lower rates of adherence to outpatient care, as well as other inequities in access to care, than the general population[20,33]. Hence, hospital contexts such as the ED are an opportunity to enhance their access to effective interventions[20,33]. Our study contributes with novel information to the field of hospital-initiated interventions for suicide prevention in high-risk individuals. Last, the ecological approach to estimating the program's effectiveness makes our results especially useful for decision-making at the healthcare policy and management level. Although most clinical studies opt for an individual-level approach, it should be noted that suicide is, by definition, a complex problem that requires the assessment of ecological-level factors and how these interact with individual-level ones[12,34].

Further research is needed for a deeper understanding of the ARSUIC Suicide Risk Care Program. Clarification of the barriers and facilitators that suicidal individuals face in the process of accessing the program is a priority, in order to reduce access inequality. Also, building on other authors' findings that similar, early contact enhancement programs might not be effective in the long-run[35], future repetitions of this evaluation will be required. Last, Lopez-Castroman and colleagues have pointed out that most suicides take place in low and middle income countries, while research in mainly conducted in high income countries[36]. Direct comparisons to programs deployed in the same and other contexts will allow for the identification of common components, to estimate is the program is adaptable and scalable[37].

AUTHORS' CONTRIBUTION

- Idea and design: EJ, GMA, ER, PS, BRV, MBO.
- Data collection, analysis, interpretation: EJ, GMA, ER, PS.
- Manuscript writing: EJ, GMA, ER, PS.
- Manuscript review with important intellectual insights: CD, BRV, MBO.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest in regarding this article.

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