A Technological Platform to Support Monitoring of Patients with Schizophrenia

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ABSTRACT

Mental health from the pandemic generated in 2019 with SARSCOV19, has increased, likewise contributed to relapse and exacerbation of mental health symptoms in diagnosed patients. In addition, individuals with a recent diagnosis of a mental disorder were found to have a higher risk of COVID-19 infection and also a higher frequency of adverse outcomes, representing an additional risk factor for worsening mental health. The aim of this research is to develop a technological solution is the development and implementation of a web platform and a mobile application to assist and support the therapeutic work related to schizophrenia, both in its aspect of continuous assessment, as well as intervention in different areas. A mobile application is developed to be used to send the tests to the patients in order to evaluate their mental state and, in this way, to foresee possible relapses. A web application was developed for doctors to administer users and ask questions together with the consultation of test results. As result, an average of 87.11 was obtained in the SUS test of the application and 78.54 in the web test. This test evaluates usability and a score higher than 68 is considered good.

CCS CONCEPTS

• **Applied computing** → Life and medical sciences; Health informatics.

KEYWORDS

Technological platform, intervention, mental health

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1 INTRODUCTION

Mental health is an increasingly important topic and one that is not always easy to manage. As such, research continues to identify predictors of disease progression and to better understand the relationship between risk factors and mental illness. This has led to the development of targeted mental health interventions and the need to identify biomarkers and assessment tools that can be used to detect disease onset, disease course, and efficacy of interventions in different populations [1]. Significant progress has been made in identifying biomarkers and behavioral indicators for major mental illnesses [2, 3], and this research is expected to continue in the coming years. As mental health science advances, so do methods for predicting the onset, course, and response to intervention for mental illnesses. This is likely to lead to more effective treatments and management of mental health conditions in the future. Mental illness is considered a major public health problem, with a large impact on morbidity and mortality, quality of life of patients and families, and use of health system resources. As a whole, mental disorders constitute the most frequent cause of disease burden worldwide and their impact on quality of life is greater than that of chronic diseases such as arthritis, diabetes or heart and respiratory diseases [4, 5]. One in four people suffer from a mental illness in their lifetime. Some 450 million people worldwide suffer from mental illness. One third of the years lived with disability can be attributed to neuropsychiatric disorders. Globally, 12% of these are due to depression alone. Mental illness accounts for 40% of chronic diseases and the largest cause of years lived with disability [6, 7]. By 2030, depression is expected to be the number one cause of illness in the developed world. According to data from the World Psychiatric Association, 83% of the general population is unaware of schizophrenia [8].

2 METHODS

The methodology used in this project is phased [9, 10], a comparative analysis was carried out between categorical and continuous variables. Categorical variables are frequency rate, percentage and continuous variables are mean and standard deviation values. Student's t-tests were used in the analysis to compare the means of the variables [11, 12Lakens,]. The proportions of categorical variables were compared with the X2 test, as well as analysis with ANOVA [13]. The following module presents a sample of 28 subjects, the family members of the subjects involved signed the informed consent form to participate in this research, to validate the developed technological tool. The inclusion criteria for the subjects were to be of legal age and already diagnosed with schizophrenia. the study

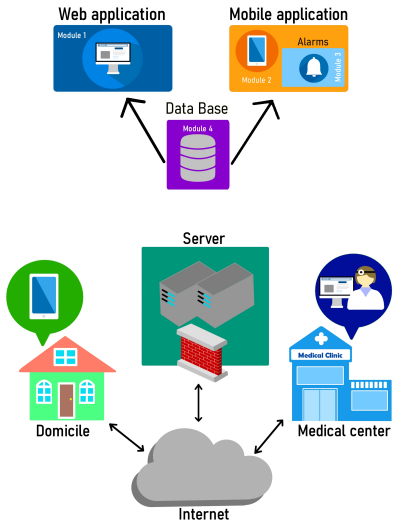

Figure 1: General Diagram

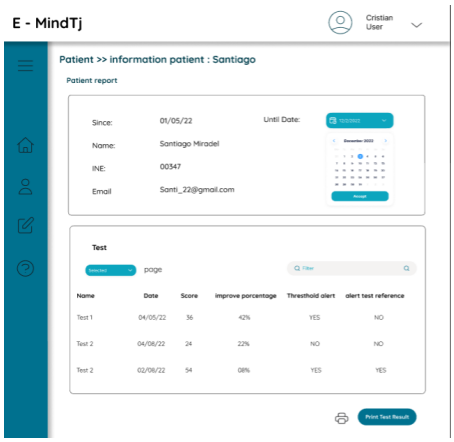

Figure 2: Patient Information

lasted three months, during this time the treating physician followed up with his patients every 15 days to have an acceptable history and to see their evolution.

Figure 1 shows the general scheme of the project.

Figure 2 shows the patient information, as well as the tests assigned by date and results. In the rows of this table you can see the score obtained in each test, the percentages of evolution and whether or not the alarms have been triggered. In addition, it is possible to filter by a certain period of time.

Figure 3 shows the graph of the evolution of the test responses, which helps the physician to review the history of the results.

Figure 4 shows the patient's relative or caregiver assignment information. This section allows us to associate family members to a given patient or vice versa. The window shows the users who are already associated to the patient and allows us to associate other family members who are not.

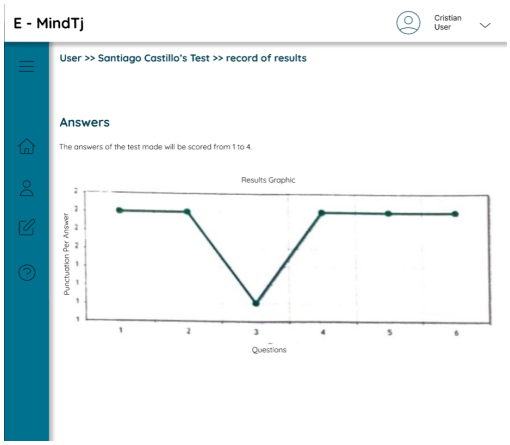

Figure 3: Record of results

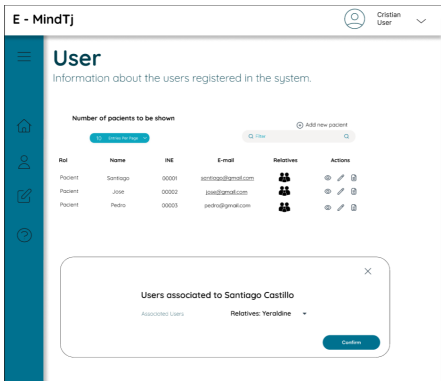

Figure 4: Patient-family relationship

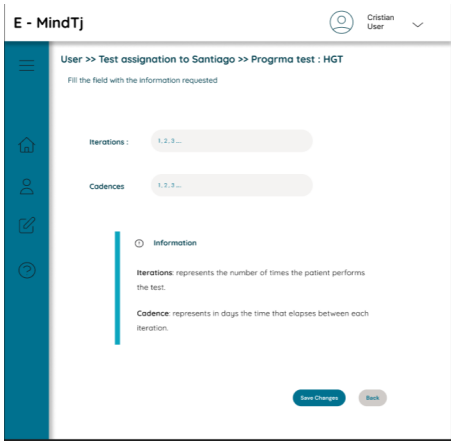

Figure 5: Test assignment

Figure 5 shows the test assignment to the patients, where the number of times the patient must perform the test (iterations) and the number of days that must elapse between each iteration (cadence) are selected.

Table 1: Sample test results

Group	Mean	Standard deviation	Max	Min
Control	31.73	31.39	39	27
Patients	20	3.21	27	16
Total	28	6.35	39	16

3 RESULTS

When evaluating the application, a test with ten questions was created. This test consisted of simple questions that could be answered by both the members of the control group and those belonging to the patient group.

The test performed by both groups was based on achieving the highest possible score in order to seek a state of "improvement" on the part of the user (see Table 1) [14, 15]. The thresholds set were as follows:

- Between 10 and 19 points: the user is in an aggravated state.
- Between 20 and 29 points: the user is in a normal/stable state.
- Between 30 and 40 points: the user is in a state of marked improvement.

Knowing the thresholds, it can be clearly seen that the control group has obtained results clearly superior to those of the group of patients, thus confirming the functioning behind the idea that the higher the score the healthier the person is. As can be seen, the control group obtained an average of 31.73, which would be within the threshold of improvement, which is normal in a healthy person who does not suffer from schizophrenia. It is also worth mentioning that the minimum score of this group was 27, which belongs to the second threshold. This may mean either that the member of the control group may not be feeling well on the day of the test or that the thresholds between the second and third groups may have to be modified. In any case, the second group is considered to be stable or even on the way to an improved state so it is not an alarming matter that certain members of the control group score that way.

As for the group of patients, it is clearly seen that the scores are lower, reaching a minimum of 16. Since the group of patients was told that they could answer as if they were patients in a relapse or in an improvement, these results are to be expected. Even so, this serves more than to test the efficacy of the tests, to see how well the test questions have been created. The results of the use of the application have been favorable, fulfilling the requirements imposed at the time of designing it. We obtained an average of 87.11 in the SUS test of the application and 78.54 in the web test. This test evaluates usability and a score higher than 68 is considered good. In addition, in the mobile application in particular we have obtained a score of 100 out of 100 in our own test and in the web application a score of 87.5.

4 CONCLUSIONS

Thanks to the tests carried out with a control group and another group of patients, it has been proven that the application is viable and that it has a favorable impact on patients, who, together with the members of the control group, have found the application easy to use. The results of the evaluations of the tool, in the case of the SUS, are, in their totality, above what is considered the average score, 68. When evaluating the validity of the theses created in the web application, the results were satisfactory within the test group in which they were tested, so that in principle it would be a system to follow and perfect in the future.

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