The intervention of the emergency psychologist: the SIPEM SoS Emilia Romagna during the first lockdown from COVID-19. A retrospective study

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Abstract. Background and purpose of this work: WHO 11 March 2020 declares that Sars-Cov-2 infection is not only a health emergency but must be considered a pandemic. Covid-19 required the urgency of a new psychological intervention model to better address the crisis and ensure a direct support response to the people involved in the pandemic. The present study aimed to detect the symptoms and reactions of the population with respect to the event. The survey was carried out by describing the clinical symptoms that emerged from the triage card used by SIPEM SoS Emilia Romagna (Italy), connoting the criteria of emergency psychology.

Methods: A retrospective quantitative study was conducted on 288 psychological triage cards.

Results: only 11% of users who ask for support say they are positive while 85% report not having contracted the virus. Of the total, 40.9% call for psychological support in the management of anxiety symptoms, a need also reported by 55% of the subsample who declared previous psychological problems. In reaction to the pandemic event, 51.1% of the total refers to coping resources and availability for help.

Discussions: the need for support of the population to manage symptoms highlights the need for early interventions, also to facilitate that slice of the population that does not have effective individual coping strategies and resources available to help.

Conclusions: it can be deduced that interventions during these types of emergencies must be timely and aimed not only at those affected but also at the general population. (www.actabiomedica.it)

Key words: COVID-19, psychological support, coping resources, anxiety, public health, psychological intervention, triage, emergency

Introduction

In December 2019, for the first time in Wuhan (China), severe acute respiratory syndrome from coronavirus (SARS-CoV-2) appears. On January 30, 2020, the World Health Organization declares that the coronavirus is a global health emergency and on March 11, 2020, it states that the Sars-CoV-2 infection can be considered a pandemic (1). An immediate impact on the physical and psychological health of millions of people and growing evidence emerges that it could represent a major threat to mental health in healthcare professionals, clinical populations and the general population (2-7). Indeed, the speed in accelerating transmission worldwide, its unpredictability, the need to adopt restrictive measures such as social distancing and fiduciary isolation, have transformed every aspect of daily life to the point of compromising the social and economic fabric at the global (8-12). An Italian study (13), carried out during the first week of lockdown, shows that the population experiences high psychological distress. Among the most significant
Among the most significant variables it is possible to find: the presence of positive cases in the vicinity, the days of blocking given by the restrictions and the need to move to other homes. All these factors are associated with greater distress placing themselves as risk factors for both the onset of high stress symptoms and post-traumatic symptoms. Social disconnection is among the most critical psychological implications of epidemics (14) and should not be underestimated. Both animal (15) and human (16) research have highlighted how social isolation can be dramatically critical to emotional and cognitive well-being. Consequently, the difficulties that the population is called to face are unprecedented (8,17,1) and require new ways of adapting and responding to the emergency. Observations of other epidemics or pandemics (ex, severe acute respiratory syndrome (SARS) in 2003, H1N1 pandemic in 2009 and the Ebola outbreak of 2014) showed a significant negative impact on mental health among a large population (19, 20, 21, 22). Epidemics can favor the emergence of new psychiatric symptoms, (23,24,25), increasing psychiatric morbidity among the population (26). Likewise, after the spread of Covid-19, the level of anxiety has increased in parallel with the drastic growth in news related to the pandemic and in the number of reported cases of infection (25,27,28). Covid-19, with its peculiarities, required the urgency of a new model of psychological intervention to better address the crisis and ensure a direct support response to the people involved in the pandemic (29). The importance of providing psychological first aid as an essential component of assistance for populations that have been victims of emergencies and disasters is internationally recognized (30,31,1). In fact, during the current emergency, several countries have established psychological intervention measures to support the population. Italy is the first European country affected (32), following the decree-law of 23 February 2020 of the President of the Council of Ministers - DCPM containing “Urgent measures for the containment and management of the epidemiological emergency from Covid-19”, to starting April 27 it established a nationwide psychological support hotline and there have been many independent intervention initiatives for try to respond to the population’s need for assistance. Among the first initiatives, on 3 March 2020, the Italian Society of Psychology of Emergency Social Support, Emilia Romagna Section, activates the Pronto Psy service - Covid-19 “, of emotional stabilization and psychological support, in telematic mode, which provided a maximum of three free interviews provided by the association’s volunteer psychologists. The “Pronto Psy - Covid-19” service was initially aimed at people subjected to quarantine or fiduciary isolation as a result of contact with Covid-19 patients; while, following the decree of the DCPM of 11 March 2020, the official start of the national lockdown, it was opened to the entire population. The service, built in accordance with the provisions of the Directive of 13/06/2006 “General criteria on psycho-social interventions in disasters” (published in the Official Gazette no.200 of 29/08/2006), provided for the use of a of psychological triage on which the psychosocial emergency worker relied to classify the victims of catastrophes into treatment priority classes. It seems clear, therefore, how the pandemic emergency has highlighted, given the uniqueness of the condition, the need for psychological support interventions aimed at the population. Unfortunately, however, several difficulties in identifying specific protocols have also emerged, leading to the deduction of their lack in pre-existing literature (29). Therefore, empirical research (30,3,1) emphasizes that early intervention mitigates the development of psychological symptoms of acute and traumatic stress; these symptoms could have repercussions on the person with consequent costs at a social, work and health level. Therefore it is necessary that in an emergency there are specific tools that allow a rapid evaluation for the purpose of an effective and immediate intervention. Consequently, it was considered useful to conduct a study aimed at describing the characteristics of the triage form, used by the SIPEM SoS Emilia Romagna association, in the “Pronto Psy - Covid-19” telematic support project. The tool has been adapted following the Directive of 13/06/2006 and modified in some parts to update it to the current emergency, following specific criteria of the psychology of the emergency. Thanks to the help of the triage card it was possible to discriminate and quickly identify the symptoms to be treated (33). In order to test the usefulness of this procedure and therefore of the triage, this research contribution was developed
and put into place, analysing the data that emerged from the intervention population.

**Aim**

The main purpose of this study was to describe the characteristics of the triage form used in the “Pronfo Psy - Covid-19” telematic project, during the first lockdown of the Covid-19 emergency. Specifically, we want to describe the symptoms and resources of the users, detected through the triage form during the intervention of the emergency psychologist.

**Materials and methods**

The service lasted from 3 March 2020 to 13 June 2020. At the end of the Pronto Psy service, a retrospective study on 288 psychological triage form immediately followed (see fig.1). All users who carried out the first phase of psychological triage and the first interview were included, while the incomplete triage forms were excluded. The psychological triage form were administered by the volunteer psychologists of SIPEM SoS Emilia Romagna. Subsequently, the cards were purged of all sensitive data in order to analyze the data for this research.

**Statistical analysis**

Data analysis were performed using the SPSS v.26 statistical package for Windows. An Excel matrix has been created in which all the variables detected by the checklist have been inserted. Subsequently, all the responses transcribed in the triage form were encoded and assigned to numerical values, a necessary step for the Excel matrix and for the consequent data analysis. The analysis carried out were mainly of a descriptive type based on frequency variables.

**Variable descriptions**

The descriptive analysis of the triage form was carried out on personal data, on clinical data regarding the positivity to the virus, on psychological symptoms at the time of the interview and the presence or absence of previous psychological and psychiatric problems. All sensitive data have been excluded (in red in fig. 1) Psychological symptoms were classified into anxious, depressive and decompensated/ altered condition of the normal state of psychological equilibrium. These in turn have been divided into two categories (fig. 2): mixed with two (anxious and depressive symptoms) and mixed with three (anxious, depressive and decompensated symptoms). These categories were further divided into three other sub-categories, based on the severity level of the symptom (mild, severe and mild / severe). The definition of anxiety, depressive and decompensation / alteration symptoms of the condition of the normal state of psychological equilibrium has been formulated with reference to the categorization of symptoms of the DSM-5 (34). In order to define the anxious state and you are referring to an emotional state characterized by increased motor tension (ex, agitation, restlessness, muscle tension), the presence of psychological symptoms (ex, nervousness, apprehension, worry, difficulty concentrating, memory lapses) and physical symptoms (ex, palpitations, tachycardia, dyspnoea, difficulty falling asleep and frequent awakenings, sweating, gastrointestinal symptoms). The depressive state includes: somatic symptoms (ex, fatigue, loss of energy, motor agitation and nervousness, sleep disturbance, physical pain), emotional symptoms (ex, sadness, guilt, distress, emptiness, loss of interest in any activity, irritability), cognitive symptoms (ex, impaired concentration and memory, negative thoughts about themselves, the future, the world, self-pity, decision-making difficulties) and behavioral symptoms (ex, passive behaviors, social isolation, reduced sexual activity, and reduction of daily activities). In reference to the decompensation / alteration of the condition of the normal state of psychological equilibrium, all those symptoms have been considered that have to do with the significant alteration of cognitive and behavioral functioning such as, for example, all those afinalistic behaviors including the loss of rhythm sleep-wake, disordered eating, social isolation, inadequate reading of reality. To verify the presence of psychological symptoms, the volunteer asked questions aimed at identifying the different classifications (35). Furthermore, in reaction to the event (fig. 3), the
**Figure 1.** Psychological triage form GU n.200 del 29/08/2006.
resources divided into two levels were assessed: individual and collective coping skills (36). Therefore, not only was the person's ability to reach evaluations and behaviors suitable for coping with and overcoming the emergency situation (individual coping ability) but also the ability of his family, his social network, his existential context, to develop evaluations, attitudes and behaviors useful for overcoming and coping with the emergency situation (collective coping skills). Finally, availability for help was also assessed through the elements that emerged from the interview. In this case it is important to evaluate the motivation for psychological treatment (ex, need to talk, tell, feel closeness) and resistance to psychological treatment (ex, fear of not being able to collaborate, fear of the judgment of others ...) (33). These indications were very useful in defining the subject's treatment plan.

**Ethical considerations**

Each participant was informed about the collection and processing of data according to the regulations in force in accordance with the GDPR 2016/679 and the Legislative Decree 196/2003 as amended by Legislative Decree 101/2018.

**Results**

Through these forms, it was possible to detect some variables of clinical interest for the purposes of this study. Out of the total of the 288 triage cards, a clear gender difference emerged, with a prevalence of calls received, for psychological support, by the female population (N = 72.2%) compared to the

![Figure 2. Mixed Symptoms and Classification](image-url)
The male population (27.8%). The mean age recorded was 45.52 years (SD = 16.3). From the frequency analysis referred to the work and/or study field, the figure of the employee (36%) emerges in first place, followed by the freelancer (14%), the entrepreneur (10%), the student (10%), the unemployed (9%) and, finally, 3% of the reference sample carries out the profession of worker. As regards the reason for requesting psychological support, 85% of users report that they have not contracted the virus, 11% are positive for the virus and 4% respond “maybe”. Furthermore, 79% of them declare that they have no positive family members and 19% respond in the affirmative, while 2% do not have a certain answer. From the frequency analysis on the basis of the variable “previous psychological problems”, 55% of individuals declare that they have had “previous psychological problems” while only 20% declare they have had “previous psychiatric problems”.

From the category “reactions to the pandemic event” it was possible to detect different types of reactions, among which it emerged that 40.9% of the sample reported having had an anxious-mild type reaction to the pandemic event (fig. 4).

**Figure 3.** Coping resources and strategies

**Figure 4.** Percentages of reactions to the pandemic event n = 288
From the frequency analysis on the combination of the category “past psychological problems” attached to the “reactions to the pandemic event” it emerged that: 31.4% reported symptoms of an anxious-mild type (Fig. 5).

From the variable “assessment of the individual’s resources” it was possible to detect different types of coping strategies for the pandemic event. 51.1% have individual coping and are available for help (figure 6). 29.8% show individual and collective coping skills and are willing to help; 11% declare themselves willing to receive help; 3.7% show a collective coping capacity and are willing to help; 1.8% show individual and collective coping skills, 1.8% are not available to help and, finally, 0.7% show individual coping skills.

From the frequency analysis on the combination of the category “previous psychological problems” attached “to the assessment of the individual’s resources” it was possible to detect different types of coping strategies for the pandemic event.
resources” it emerged that 53.4% has an individual coping capacity with willingness to help (Fig. 7).

From the frequency analysis on the combination of the category “past psychiatric problems” attached to the “reactions to the pandemic event” it emerged that 21.4% manifest anxious-mild symptoms; 21.4% experienced mixed to two mild symptoms (Fig. 8).

From the frequency analysis on the combination of the variable “past psychiatric problems” attached “to the assessment of the individual’s resources” it emerged that 42.6% have individual coping skills with willingness to help (Fig. 9).
Discussion

In light of the variables detected by the analysis of the data and by the guidelines in the literature to effectively assess the effects on the mental health of the individual of the population during the Covid-19 pandemic (37), it was found that 85% of the sample reported not having contracted the virus and 40.9% of the same reported a reaction to the pandemic event of an anxious type with mild intensity. These data indicate that the sample in question shows an emotional state characterized by motor tension that can be summarized as agitation, restlessness or muscle tension, a state of psychological discomfort transformed into nervousness, worry, memory lapses and physical symptoms with transpositions associated with palpitations and insomnia. However, these symptoms present themselves in a mild form and, a disorder is such, if the individual is able to compensate or to function well if provided with facilities and psychological support services. Anxiety is an emotional state characterized by feelings of tension and apprehension that are reflected in an overall emotional reaction in stressful situations. It is a completely common experience not only among Covid-19 patients but also in the general population (37, 38). However, although the middle scores of symptomatic distress obtained from our sample are not high, a proportion worthy of attention highlights past psychological problems and past psychiatric problems. This indicates that during the first months of the pandemic, a part of the sample seems to have suffered the psychological consequences deriving from the restrictions, already increasing pre-existing symptoms (anxiety, stress and possible post-traumatic outcomes). Consequently, forced social isolation and restrictions, as well as the fear of contagion, contributed to accentuate the onset of these psychopathological problems in 31.4% of cases and psychiatric problems in 20% of cases in the sample in question. Our data align with those found in the empirical literature (39,40,41,42) regarding the psychological effects of Covid-19. 51.1% of the total sample and 53.4% of the subsample with previous psychological problems, in addition to spontaneously requesting help and psychological support, also believe they have coping strategies individual and are available for help. Moreover, a good awareness of one’s coping strategies generally indicate a greater resistance to the adversities of the pandemic, also justifying our data concerning mild anxiety symptoms. In fact, a wide use of maladaptive coping strategies and an unwillingness to receive help are more conducive to the development of psychopathological symptoms (43).

Figure 9. Percentage of coping strategies and resources of individuals with previous psychiatric problems n = 58
Conclusions

Following the restrictions adopted during the first national lockdown, the prevalent request of the population examined demonstrates the need for support for the management of anxious symptoms, even from the population not affected by the Sars-Cov-2 virus. The study shows that the Pronto Psy Covid-19 service arrived in a timely manner to the population respecting the type of interventions requested in an emergency (30,31,1). However, despite having reached that part of the population able to ask for help, it did not allow to intercept that slice of the population which, instead, does not express an explicit request for help. This data leads us to reflect on the need for further empirical research aimed at investigating the factors that affect the detection of the need for support and the methods of access of the population to psychological support services during epidemic emergencies. As regards the detection tool used, it is possible to assert that the triage form not only allows you to identify the priority index early but also establish the level of severity in order to direct you towards the most useful intervention to be carried out. Despite this, there is a need to provide a more detailed description of the cluster detection criteria on the individual’s symptoms and resources.

In terms of future prospects, further empirical research is hoped to validate the triage tool, improving its effectiveness and reliability. In this sense, it is necessary to broaden the research in order to establish more adequate support protocols and to give an answer to larger sections of the population.

Acknowledgements: The voluntary psychologist members of SIPEM SoS Emilia Romagna

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

References

1. World Health Organization. Mental health and psychosocial considerations during the COVID-19 outbreak, 18 March 2020. World Health Organization; 2020. Accessed 11 April 2020
2. De Girolamo G, Cerveri G, Clerici M. Mental health in the coronavirus disease 2019 emergency—the Italian response. JAMA psychiatry. 2020 Sep 1;77(9):974-6.
3. Fiorillo A, Gorwood P. The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. European Psychiatry. 2020;63(1).
4. Horesh D, Brown AD. Traumatic stress in the age of COVID-19: A call to close critical gaps and adapt to new realities. Psychological Trauma: Theory, Research, Practice, and Policy. 2020 May;12(4):331.
5. Luo M, Guo L, Yu M, Wang H. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public—A systematic review and meta-analysis. Psychiatry research. 2020 Jun 7:113190.
6. Qiu J, Shen B, Zhao M. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. General psychiatry. 2020;33(2).
7. Vindegaaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. Brain, behavior, and immunity. 2020 Oct 1;89:531-42.
8. Brooks SK, Webster RK, Smith LE. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. The lancet. 2020 Mar 14;395(10227):912-20.
9. Giorgi G, Lecca LI, Alessio F. COVID-19-related mental health effects in the workplace: a narrative review. International journal of environmental research and public health. 2020 May;17(21):7857.
10. Maria N, Zaid A, Catrin S. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. International Journal of Surgery. 2020 Jun;78:185-93.
11. Wu P, Fang Y, Guan Z. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. The Canadian journal of Psychiatry. 2009 May;54(5):302-11.
12. Shigemura J, Ursano RJ, Morganstein JC. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. Psychiatry and clinical neurosciences. 2020 Apr;74(4):281.
13. Di Giuseppe M, Zilcha-Mano S, Prout TA. Psychological impact of Coronavirus Disease 2019 among Italians during the first week of lockdown. Frontiers in Psychiatry. 2020;11.
14. Maunder RG, Leszcz M, Savage D, Adam MA, Peladeau N. Applying the lessons of SARS to pandemic influenza. Canadian Journal of Public Health. 2008 Nov;99(6):486-8.
15. Cacioppo S, Capitania JP, Cole SW. The cognition. Trends in Cognitive Sciences 2015; 13, 447-454.
16. Cacioppo JT, Hawkley LC. Perceived social isolation and cognition. Trends in Cognitive Sciences. 2009 Oct;13(10): 447-454.
17. Carleton RN, Mulvogue MK, Thibodeau MA. Increasingly certain about uncertainty: Intolerance of uncertainty across anxiety and depression. Journal of anxiety disorders, 2012 Apr 1;26(3):468-79.
18. Rubin GJ, Wessely S. The psychological effects of quarantining a city. Bmj. 2020 Jan 28;368.
19. Blakey SM, Reuman L, Jacoby RJ, Abramowitz JS. Tracing “Fearbola”: psychological predictors of anxious responding to the threat of ebola, Cognitive Therapy and Research, 2015 Dec;39(6):816-25.
20. Bonanno GA, Ho SM, Chan JC, Kwong RS. Psychological resilience and dysfunction among hospitalized survivors of the SARS epidemic in Hong Kong: a latent class approach. Health Psychology. 2008 Sep;27(5):659.
21. Cowling BJ, Ng DM, Ip DK. Community psychological and behavioral responses through the first wave of the 2009 influenza A (H1N1) pandemic in Hong Kong. The Journal of infectious diseases. 2010 Sep 15;202(6):867-76.
22. Wu P, Fang Y, Guan Z. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. The Canadian Journal of Psychiatry. 2009 May;54(3):302-11.
23. Ko CH, Yen CF, Yen JY. Psychosocial impact among the public of the severe acute respiratory syndrome epidemic in Taiwan. Psychiatry and clinical neurosciences. 2006 Aug;60(4):397-403.
24. Lam MH, Wing YK, Yu MW. Mental morbidities and chronic fatigue in severe acute respiratory syndrome survivors: long-term follow-up. Archives of internal medicine. 2009 Dec 14;169(22):2142-7.
25. Lima CK, de Medeiros Carvalho PM. The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). Psychiatry research. 2020 May;287:112915.
26. Esterwood E, Saeed SA. Past epidemics, natural disasters, COVID19, and mental health: learning from history as we deal with the present and prepare for the future. Psychiatric quarterly. 2020 Aug 16:1-3.
27. Orrù G, Ciacchini R, Deal with the present and prepare for the future. Psychological Trauma: Theory, Research, Practice, and Policy. 2020 Jul;12(5):531.
28. Minihan E, Gavin B, Kelly BD. COVID-19, mental health and psychological first aid. Ir J Psychol Med. 2020 Dec;37(4):259-263.
29. World Health Organization. (2011). Psychological First Aid; Guide for Field Workers. Accessed 11 April 2020.
30. Marazziti D, Pozza A, Di Giuseppe M. The psychosocial impact of COVID-19 pandemic in Italy: A lesson for mental health prevention in the first severely hit European country. Psychological Trauma: Theory, Research, Practice, and Policy. 2020 Jul;12(5):531.
31. Cusano M, Iacolino C. Il triage psicologico nelle grandi emergenze in Calogero Iacolino (a cura di) Dall’emergenza alla normalità. Milano: Franco Angeli. 2016; 53-82; cap.3
32. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5). American Psychiatric Pub; 2013 May 22.
33. Nussbaum AM. The pocket guide to the DSM-5 diagnostic exam. American Psychiatric Pub; 2013 May 8.
34. Lazarus RS, Folkman S. Coping and adaptation. The handbook of behavioral medicine. 1984:282 - 325. 37. Holmes EA, O’Connor RC, Perry VH, Tracey I, Wessely S, Arsenault L, Ballard C, Christensen H, Silver RC, Everall I, Ford T. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. The Lancet Psychiatry. 2020 Apr 15; 7(6): 547-560
35. Rogers JP, Chesney E, Oliver D, Pollak TA, McGuire P, Fusar-Poli P, Zandi MS, Lewis G, David AS. Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. The Lancet Psychiatry. 2020 Jul 1;7(7):611-27.
36. Panchal N, Kamal R, Orgera K, Cox C, Garfield R, Hamel L, Chidambaram P. The implications of COVID-19 for mental health and substance use. Kaiser family foundation. 2020 Apr 21.
37. Chatterjee SS, Malathesh Barikar C, Mukherjee A. Impact of COVID-19 pandemic on pre-existing mental health problems. Asian Journal of Psychiatry 2020; 51: 102071.
38. Druss BG. Addressing the COVID-19 pandemic in populations with serious mental illness. JAMA Psychiatry, 2020; 77 (9): 891-892.
39. Yao H, Chen JH, Xu YF. Patients with mental health disorders in the COVID-19 epidemic. The Lancet Psychiatry. 2020 Apr 21;7(4):e21.
40. 43.Passavanti M, Argentieri A, Barbieri DM, Lou B, Wijayaratna K, Mirhosseini SA, Wang F, Naseri S, Qamhia I, Tangerås M, Pelliciari M. The psychological impact of COVID-19 and restrictive measures in the world. Journal of Affective Disorders, 2021 Jan 15; 283: 36-51.

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Received: 1 September 2020
Accepted: 9 March 2021
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