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Complete List of Authors:	Mira, José ; Miguel Hernandez University of Elche, Health Psychology; Alicante-Sant Joan Health District, Carrillo, Irene; Miguel Hernandez University of Elche, Health Psychology; FISABIO, Guilabert, Mercedes; Miguel Hernandez University of Elche, Health Psychology Mula, Aurora; Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO) Martin, Jimmy; Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO) Pérez-Jover, Mª Virtudes; Miguel Hernandez University of Elche, Health Psychology Vicente, Mª Asunción ; Miguel Hernandez University of Elche, Department of Systems Engineering and Automation Fernández , César; Miguel Hernandez University of Elche, Department of Systems Engineering and Automation
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Acute Stress of the Healthcare Workforce during the COVID-19 pandemic evolution. A cross-sectional study in Spain

José Joaquín Mira[1,2*], Irene Carrillo[2,3], Mercedes Guilabert[2], Aurora Mula[3], Jimmy Martin-Delgado[3], María Virtudes Pérez-Pérez[2], María Asunción Vicente[4], César Fernández[4] on behalf of SARS-CoV-2 Second Victim Study Group†

*** Corresponding author:** José Joaquín Mira; Postal address: Avenida de la Universidad, s/n, 03202 Elche, Alicante (Spain); e-mail: jose.mira@umh.es; Telephone: +34 966658984

[1] Alicante-Sant Joan Health District, Alicante, Spain.

[2] Department of Health Psychology, Miguel Hernández University, Elche, Spain.

[3] Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO), San Juan de Alicante, Spain.

[4] Department of Systems Engineering and Automation, Miguel Hernández University, Elche, Spain.

† SARS-CoV-2 Second Victim Study Group: Ángel Cobos-Vargas, Olga Beatriz Martínez-García (Hospital Universitario Clínico San Cecilio de Granada, Andalucía, Spain), Mª José Bueno-Domínguez (Grup SAGESSA, Reus, Spain), María Pilar Astier-Peña (Centro de Salud "La Jota", Zaragoza, Spain), Pastora Pérez-Pérez (Sociedad Española de Calidad Asistencial, Spain), Matilde Lahera-Martín, Carmen Silvestre-Busto (Servicio Navarro de Salud-Osasunbidea), Susana Lorenzo-Martínez (Hospital Universitario Fundación Alcorcón, Madrid, Spain), Ascensión Sánchez-Martínez (Hospital General Universitario Reina Sofía, Murcia, Spain), Bárbara Marco-Gómez, Cristina Abad-Bouzán (Zona de Salud de Calatayud, Zaragoza, Spain), Carlos Aibar-

Remón (Hospital Clínico Universitario Lozano Blesa, Zaragoza), and Jesús María Aranaz-Andrés (Hospital Universitario Ramón y Cajal).

Keywords: COVID-19, healthcare professionals, psychological impact, acute stress, mental health, hospital, primary care

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Abstract

Objectives: To determine the volume of health professionals who present a high level of acute stress due to their care of patients with COVID-19 that may prevent them from carrying out their functions and to analyse the direction in which the response capacity of the professionals to face a rebound is evolving.

Design: A cross-sectional study.

Setting: Primary care and hospitals in Spain.

Participants: A non-randomised sample of 685 health professionals (physicians, nurses, and other health staff).

Primary and secondary outcome measures: Frequency of stress responses (EASE Scale) in global terms and by factors (affective response and fears and anxiety), the intensity of stress responses (emotional adjustment, mild levels of emotional distress, medium-high emotional overload and extreme acute stress), and variation of stress responses according to the number of deaths per day per territory and the evolutionary stage of the COVID-19 pandemic.

Results: The average global score on the EASE scale was 11.1 (SD 6.7) out of 30. Among the health professionals surveyed, 44.2% presented a good emotional adjustment, 27.4% an affordable level of emotional distress, 23.9% medium-high emotional overload, and 4.5% extreme acute stress. Three hundred and forty-one (49.8%) had difficulty disconnecting from work and 49% were afraid of infecting their family. The stress responses were slightly more intense in the most affected territories (p=0.003) and during the restoration phase (p=0.000) where, despite the improvement of the situation, the response could be determined by accumulated stress and fatigue.

Conclusions: The pandemic has affected the well-being of health professionals and has reduced their resilience in the face of possible rebounds. The institutional approach to the psychological and emotional needs of health professionals is essential to ensure patient safety, quality of care, and eventually the system's ability to respond effectively to possible future crises of similar magnitude.

Strengths and limitations of this study

- This is an observational study to determine the volume of health professionals who present a high level of acute stress due to their care of patients with COVID-19 that may prevent them from carrying out their functions and to analyse the direction in which the response capacity of the professionals to face a rebound is evolving.
- This study used a scale specifically designed to assess acute stress of health professionals in direct contact with patients with COVID-19 (EASE Scale). This scale was previously validated
- The study was conducted in Spain between March 18 and May 17, 2020, coinciding with the phase of greatest acceleration and subsequent flattening of the curve of the pandemic. In this study, it has been shown how the impact of the first outbreak has left the workforce emotionally drained, which could limit their ability to adequately play their role in the face of a possible outbreak
- This study was based on a non-randomised sample of professionals. The scale may have reached different sectors of the study population unevenly due to the media used

- Socio-demographic data were not collected from health professionals to preserve the privacy of the responses; this has made it impossible to make comparisons between groups at different times

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Competing interests: None declared.

Contributors: JJM conceived and designed the work. JJM, IC, MG and MVPJ designed the scale. MAV and CF developed the web and mobile app for the online administration of the scale. JMD was responsible for the recruitment of participants. AM performed the statistical analysis. IC and MG wrote a first draft of the manuscript, which was critically reviewed for important intellectual content by JJM and JMD. All authors reviewed the draft and approved the final version of the manuscript.

Data sharing statement: Data are available upon reasonable request.

Ethical approval: The need for ethics approval for this research is not applicable according to Spanish regulations. The study protocol was approved by the Research Committee of the San Juan University Hospital in Alicante (8th of April 2020).

Introduction

As of June, the 22nd, COVID-19 pandemic has caused more than 461,274 deaths worldwide, 28,324 in Spain.[1] The number of professionals suffering from COVID-19 is substantial. In Spain, it accounts for 21% of the total number of people infected.[2]

Although the incidence of the pandemic has expanded differently in different geographical areas of each country, most hospitals and health centres around the world have had to reorganise themselves to prioritise the care of COVID-19 patients, breaking with their usual work dynamics. In addition to this cause of work-related stress, there has been uncertainty in decision-making and a lack of resources to adequately treat patients and protect against possible contagion.[3-4] These circumstances have posed an additional risk to patient safety,[5] which may have adversely affected the quality of health care.[6]

The intensity of compassionate fatigue,[7] post-traumatic stress[8-9] and moral injury[10-11] observed among professionals can be expected to depend on the intensity of the spread of the pandemic, the resources available, and individual differences in stress response.

Results of studies quantifying the magnitude of the impact of COVID-19 patient care on the mental health of healthcare professionals have been published since the beginning of the pandemic. These findings have varied widely due to the heterogeneity of the methodologies and instruments used.[12]

In the first studies, carried out at the beginning of February, 71.5% of healthcare personnel, mostly from the province of Hubai in China, presented emotional discomfort,[13] with frequent depressive symptoms (55.7%), anxiety responses

(44.7%)[14] and insomnia (78,4%).[15] In Italy, in the days before the peak of infections (end of March), 49.4% of health professionals reported symptoms of post-traumatic stress.[16] In Ecuador, in the second half of April, 90% of the medical and nursing staff already presented moderate-severe burnout levels.[17] In Spain, after the first wave of hospital care (April-May), 79.5% and 51.1% of health professionals presented symptoms of anxiety and depression, respectively.[18] The expansion of the pandemic in each territory has determined the magnitude of the emotional response. In China, sleep disorders and psychological symptoms were more frequent among medical staff in Wuhan than among staff in Ningbo.[19]

The magnitude and exceptionality of the situation justify these results. The experience of the crisis affects the entire staff and all professional levels, including support staff in healthcare (IT, suppliers, janitors, etc.). The opposite would be difficult to explain. However, the most important question is not the number of professionals who have been emotionally affected as a result of their assistance services, a circumstance that has been aggravated by this crisis but is inherent to the work they do, but rather how many have not managed to recover, how their resilience is evolving or to what extent they can deal with a possible new outbreak.

Most studies have analysed the emotional responses in a short period (approximately one week) coinciding with a specific stage of the crisis. However, studies on community coping with catastrophic situations have described that the psychological response evolves resulting in: impact phase, heroic (intensification of efforts), honeymoon (optimism), disillusionment (fatigue) and reconstruction (recovery pre-crisis levels).[20] Therefore, it is expected that the effects of the pandemic on the psychological and emotional well-being of health professionals will vary as the pandemic evolves and affect

their resilience to a new outbreak. At the moment, there are no known studies that have addressed the problem from this perspective.

The objectives of this study were, first, to determine the volume of health professionals who, because they cared patients with COVID-19, experienced an excessive level of acute stress that prevented them from performing their role. Second, to analyse the direction in which the resilience of professionals evolves to face a new outbreak considering the variation in the frequency and intensity of their stress reactions in the different phases of the pandemic.

Methods

A cross-sectional observational study in a non-randomised sample of healthcare professionals. The study was conducted in Spain between March 18 and May 17, 2020, coinciding with the phase of greatest acceleration and subsequent flattening of the curve of the pandemic. The study protocol was approved by the Research Committee of the San Juan University Hospital in Alicante (8th of April 2020).

Variables and instrument

We used a scale specifically designed to assess acute stress of health professionals in direct contact with patients with COVID-19 (EASE Scale). This scale was previously validated.[21] The instrument is composed of 10 items to which responses are given using a 4-level Likert type scale (0 = It is not happening to me, 1 = It happens to me in concrete situations, 2 = It often happens to me and 3 = I am like this all the time). The total score on the scale can range from 0 to 30 points, with greater scores being interpreted as higher levels of stress. The items are grouped into two factors that

evaluate: affective response and fears and anxiety. Factor 1, referring to the affective response, is composed of 6 items, so that the direct score on this factor ranges from 0 to 18 points. The factor 2 that evaluates fears and anxiety is composed of 4 items and its minimum and maximum possible scores are 0 and 12 respectively.

Participants

Healthcare professionals from primary care centres and hospitals. We determined a minimum sample size of 650 professionals, considering a population of 392,667 health professionals (hospitals and primary care)[22], an effect size of 0.20, a statistical power of 95% and a confidence level of 95%.

Patient and Public Involvement

Patients or the public were not involved in any phase of this study.

Procedure

The diffusion of the scale and data gathering was done in a twofold way. First, the scale was made accessible through a web-based resource repository created by the authors to reduce the impact of the SARS-CoV-2 pandemic on the psychological well-being of healthcare professionals.[23] These resources to cope with acute stress during the worst moments of the pandemic were disseminated through several Spanish scientific societies, social media, and specialized press news. Second, the scale was accessible through the mobile application BE+ against COVID[24-25] which was disseminated using the same means and by leaders of occupational health and hospital patient safety units.

The scores on the scale were grouped into 4 ranges. Scores from 0 to 9 points denoted a good emotional adjustment, 10 to 14 points affordable level of emotional distress, 15 to 24 points medium-high emotional overload, and scores equal to or higher than 25

points an acute-extreme stress level. The latter range, with scores above 25, was considered the level of stress with the potential to limit the professional's optimal performance of his/her function or work activity.

The results of the self-assessment using this scale were linked to the data on the evolution of the pandemic in Spain, considering both the differences in impact between territories and the temporal phases of its evolution.

In the first case, to determine the territories most and least affected by the pandemic on May 17th, 2020, the country was divided into two groups according to the number of deaths from COVID-19. The first group included Madrid, and Catalonia, with more than 5,000 deaths. The second group included Asturias, the Balearic Islands, the Canary Islands, Cantabria, Extremadura, La Rioja, Murcia, and Navarre with less than 500 deaths. For comparison purposes, a total of 336 participants working in the health institutions of these territories were included in the analyses.

In the second case, to analyse acute stress during the pandemic, four moments of the evolution of the outbreak were determined according to the number of deaths per day: less than 500 (03/18 - 03/25), between 600 and 900 (03/28 - 04/15), between 300 and 600 (04/16 - 04/26) and less than 300 (04/27 - 05/17). The periods described corresponded to the phases of the community's psychological response to the pandemic: impact (awareness of the problem, less than 500 deaths/day), heroic (increased efforts to cope with the crisis and mitigate the impact, between 600 and 900 deaths/day), honeymoon (hope, between 300 and 600 deaths/day) and restoration (progressive return to calm, less than 300 deaths/day).

Statistical analysis

Descriptive and frequency analyses were performed. Mean scores on each factor were transformed to a 0-10 scale to allow comparison because the number of items was different on each factor. The Kruskal Wallis test and the Mann-Whitney U test were used to determine the differences in acute stress reactions according to the time of evolution of the pandemic and the degree to which the territory was affected, respectively. The confidence interval used was 95%. Data coding and analysis was performed using IBM SPSS Statistics software, version 25.

Results

A total of 685 professionals responded. Of these, 28.6% were doctors, 39% were nurses and 32.3% were other healthcare staff. 40.4% worked in areas where the pandemic had had a greater impact. Most of them worked in Madrid (37%), Valencia (15.7%), Andalusia (14.1%) and Catalonia (3.3%).

Scores on the EASE scale

The total score on the scale was 11.1 points (SD 6.7, 95% CI 10.6 - 11.6, range 0-30), with 44.2% (303) within a good level of emotional adjustment, 27.3% (187) with an affordable level of emotional distress, 23.9% (164) with a medium-high level of emotional overload, and 4.5% (31) showing an extreme level of acute stress. Scores between the emotional response factor vs. the fear/anxiety factor no differences were observed, 3.6 (SD 2.4) vs. 3.8 (SD=2.5); p=0.2 (score transformed into a scale of 0 to 10 points).

Three hundred and forty-one (49.8%) of the health professionals highlighted that they had difficulties in being able to disconnect from work and 49% (335) expressed fear of infecting their family once they returned home at the end of the working day. 23% (157)

expressed concerns about not falling ill and 17% (116) experienced difficulties in empathizing with the suffering of the patients (Table 1).

EASE scale scores in territories with a higher incidence rate

The average score on the EASE scale was higher (up to 30% more) in those territories with a higher number of recorded deaths compared to those territories that had a lower number (12.1 vs 9.3 p=0.003) (Table 2). Even though of the different affectation between territories, there were aspects in which these differences were not observed, such as completely losing the taste for things that previously produced tranquillity or well-being (p=0.50), feeling that people who required the help of the professional were being neglected (p=0.37), feeling emotionally blocked (p=0.37) or having difficulties in empathizing with the patients' suffering (p=0.93).

EASE scale scores according to the evolution of the pandemic and the different phases of psychological response to the disaster

The average scores on the EASE scale were higher in the restoration phase (April 27-May 17, 2020) compared to the first period defined as the impact or awareness phase (March 18-March 25, 2020) (12.7 vs 8.5 p<0.0001) (Table 3).

Discussion

This research confirms the impact of the pandemic on the well-being of healthcare professionals. The level of acute stress experienced by professionals is higher as the damage from COVID-19 increases in patients. As expected, acute stress has been higher in those territories where the pandemic has had a greater impact in terms of the incidence of COVID-19 cases and deaths from this disease.

Those professionals working in territories where the pandemic has been particularly aggressive show more intense emotional responses in those elements related to thoughts, fears, and physiological reactions because of the situation they are living. This result has not been observed with the fact of being emotionally blocked to think and take decisions or with the difficulty to empathize with the suffering of patients, responses related to this matter could be developed afterward.[26]

Acute stress was manifested mainly by the inability to disconnect from work and the fear of infecting loved ones. Losing empathy for the suffering of patients and fear of becoming ill are the variables that probably best discriminate against professionals whose condition prevents them from continuing with their care work.

The evolution observed in the stress response of professionals is largely in line with the phases proposed by the psychological disaster response model.[20] The level of acute stress manifested by professionals in the restoration phase is greater than the stress experienced during the impact phase. This result indicates that the capacity to deal with a new outbreak will be diminished if there is not enough time between outbreaks to allow for recovery or if decisive action is not taken to recover.

This study used a scale specifically designed to discriminate between situations that cause acute stress in the course of caring for COVID-19 patients, unlike other studies that used scales to screen for symptoms of anxiety and depression.[13, 27-28] This scale was based on the premise that the response to the consequences of the pandemic could not leave professionals indifferent and that the sources of stress that could disable professional duties would be quite different from those included in most instruments designed for other purposes. This differential element must be taken into account when interpreting the results, given that most of the studies that have so far evaluated the

psychological impact of the COVID-19 pandemic on health professionals have used questionnaires that were validated under different conditions than the current ones. The EASE scale has been sensitive to these changes, allowing the impact of the pandemic on health professionals to be assessed[10-11] and it can be expected to be useful for measuring the effects on emotional response and coping capacity if there is a resurgence.

This scale has reflected, above all, that they were unable to disconnect from work, experienced irritability, anxiety, fear of infecting their families, and doubts about their ability to make decisions in clinical practice. However, most of the scores reported by health professionals were in the first and second range of the scale (mild level of emotional distress). These data show that most professionals have not experienced, according to the EASE scale scores, levels of extreme acute stress. This result suggests that we must differentiate between the emotional impact that can be expected from the stress of the crisis and that other emotional impact that prevents the responsibilities of the profession from being carried out with the appropriate guarantees for patients. These results confirm the existence of emotional discomfort in the staff, identifies in what this discomfort translates to, and that only 1 out of 20 professionals have been emotionally overwhelmed and with difficulties in carrying out their work.

In the case of a new outbreak or a new epidemic, the data suggest that to determine the level of impact on the mental health of health professionals, the following should be considered: the specificity of the instruments used to identify the sources of stress or to measure acute stress associated with the care of COVID-19 patients, the care pressure and the outcome of the continuous care of new COVID-19 cases and the evolution of this pressure over time.

The SARS-CoV-2 pandemic has caused an unprecedented health crisis that has shaken the foundations of health systems around the world, requiring responses that were not always prepared. One reflection is the number of professionals infected. In Spain, as of 18 June, 52,036 health professionals had contracted the COVID-19 disease, and just over 13% of those hospitalized required admission to the Intensive Care Unit.[2] This fact, added to the emotional response to the health crisis, has led to their being identified as the second victim of SARS-CoV-2.

The term "second victim"[29] applied to healthcare personnel has been used over the last two decades to refer to the emotional distress experienced by healthcare professionals when they suspect that they have been involved in a safety incident that has resulted in harm to the patient or when they observe that the patient in their care is not developing properly and their decisions and actions are being questioned. In the current scenario, where the healthcare professional has not had the appropriate means to cure and care for patients, we extend the concept of the second victim to refer to any healthcare or support professional involved in the care of people affected by COVID-19, who presents acute stress responses when continuously exposed to an extreme situation caused by the combination of a series of critical factors, including social alarm, oversaturation of services, scarcity of resources and the poor evolution of the patients under their care.

The response to the emotional and psychological needs that the staff of health institutions is experiencing as a result of this situation is justified not only on ethical grounds but also to ensure quality care and patient safety.[30] Precisely the recovery of these systems after the COVID-19 crisis that requires restoring the working morale and welfare of health professionals and strengthening their capacity for resilience.[31] Some

authors suggest adopting measures based on the social support provided by co-workers or peers.[32-33] Digital initiatives have also been developed in the form of broader programmes that integrate social support as one of their resources to mitigate the impact of COVID-19 on health professionals.[10, 34]

Despite the recent emergence of tools to measure the effects of the pandemic on mental health and behaviour in the general population,[35-37] there are still no specific measures designed and validated for evaluation in health professionals. As far as we are aware, this study is the first to explore the emotional distress caused by the COVID-19 health crisis and one of the first to use a specifically validated measure for this purpose.

Limitations

This study was based on a non-randomised sample of professionals. The scale may have reached different sectors of the study population unevenly due to the media used. The motivation of respondents and those who chose not to respond could have biased the sample and therefore the results. The study looked at a small number of sociodemographic variables with the intention that participants would feel that their privacy was guaranteed when completing the scale. This decision has limited the possibilities of comparative analysis of stress responses by groups. It also prevented intrasubject comparisons at different times of the crisis.

Conclusion

Over time, we have become more scientifically and technically prepared to deal with COVID-19 and have learned multiple lessons on how to best deal with this crisis, but the impact of the first outbreak has left the workforce emotionally drained, which could limit

their ability to properly perform their role in the face of a possible outbreak. Consequently, health institutions in the process of workforce recovery must incorporate measures to restore the well-being and work morale of healthcare professionals. This study demonstrates this, confirming that emotional difficulties begin to appear at the end of the most critical phases of the pandemic.

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Table 1. EASE Scores on the COVID-19 Acute Stress in Care Scale

	Mean (IC 95%)	SD	It often happens to me (%)	I am like this all the time (%)
I can't help but think of recent critical situations. I can't get out of work.	1.5 (1.4 – 1.6)	1.0	33.4	16.4
I have completely lost the taste for things that gave me peace of mind.	1.1 (1.0 – 1.2)	0.9	25.5	8.0
I keep my distance, I resent dealing with people, I'm irascible even at home.	1.3 (1.2 – 1.4)	1.0	24.4	12.8
I feel that I am neglecting many people who need my help.	1.0 (0.9 – 1.1)	1.0	21.5	9.2
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	1.1 (1.0 – 1.1)	1.0	23.1	8.9
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	1.2 (1.1 – 1.3)	1.0	25.5	11.2
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.0 (0.9 – 1.1)	1.0	20.7	9.9
Worrying about not getting sick causes me a strain that's hard to bear.	0.9 (0.8 – 1.0)	0.9	16.4	7.6
I'm afraid I'm going to infect my family.	1.5 (1.4 – 1.6)	1.0	28.2	20.7
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia).	0.6 (0.5 – 0.7)	0.9	11.7	5.8
Total score	11.1 (10.6 – 11.6)	6.7	23.9	4.5

Factor 1	3.6 (3.4 – 3.8)	2.4
Factor 2	3.8 (3.6 – 4.0)	2.5

N=685

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

Mean difference between factors p=0.2

Table 2. Mean difference on EASE Scale between territories most and least affected by the SARS-CoV-2 pandemic

	Most affected territories [a]	Least affected territories [b]	p
I can't help but think of recent critical situations. I can't get out of work.	1.6	1.4	0.06
I have completely lost the taste for things that gave me peace of mind.	1.1	1.1	0.50
I keep my distance, I resent dealing with people, I'm irascible even at home.	1.4	1.1	0.004
I feel that I am neglecting many people who need my help.	1.1	0.9	0.12
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	1.2	1.0	0.37
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	1.3	0.8	0.00
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.1	0.7	0.02
Worrying about not getting sick causes me a strain that's hard to bear.	1.0	0.6	0.004
I'm afraid I'm going to infect my family.	1.7	1.3	0.004
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia).	0.7	0.6	0.93
Total score	12.1	9.3	0.003
Factor 1	3.9	3.3	0.09
Factor 2	4.2	2.8	0.00

N=336

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

[a] Madrid y Cataluña (more than 5000 deaths by May the 17th 2020)

[b] Asturias, Baleares, Canarias, Cantabria, Extremadura, La Rioja, Murcia y Navarra (less than 500 deaths by May the 17th 2020)

Table 3. Mean difference at four temporal moments of expansion of the SARS-COV-2 pandemic

	Impact [a]	Heroic [b]	Honeymoon [c]	Reconstruction [d]	p
I can't help but think of recent critical situations. I can't get out of work.	1.3	1.4	1.3	1.6	<0.001
I have completely lost the taste for things that gave me peace of mind.	0.6	1.0	1.1	1.2	<0.001
I keep my distance, I resent dealing with people, I'm irascible even at home.	0.5	1.1	1.1	1.5	<0.001
I feel that I am neglecting many people who need my help.	0.7	0.9	0.9	1.2	0.01
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	0.8	0.9	0.9	1.3	<0.001
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	0.7	1.0	1.1	1.4	<0.001
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.0	0.9	0.8	1.2	<0.001
Worrying about not getting sick causes me a strain that's hard to bear.	0.9	0,9	0,8	1,0	0,22
I'm afraid I'm going to infect my family.	1.6	1,3	1,3	1,7	<0.001
I have difficulty empathizing with patients' suffering or connecting with their situation	0.4	0.7	0.5	0.6	0.42

(emotional distancing, emotional anaesthesia).					
Total score	8.5	10.2	9.8	12.7	<0.001
Factor 1	2.4	3.3	3.3	4.1	<0.001
Factor 2	3.5	3.5	3.3	4.4	<0.001

N=685

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

[a] From March 18th to March 25th, 2020 (less than 500 deaths per day)

[b] From March 28th to April 15th, 2020 (between 600 - 900 deaths per day)

[c] From April 16th to April 26th, 2020 (between 300 - 600 deaths per day)

[d] From April 27th to May 17th, 2020 (less than 300 deaths per day)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	-
Study size	10	Explain how the study size was arrived at	5, 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	6-7
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	6-7
		(*e*) Describe any sensitivity analyses	-
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data	15*	Report numbers of outcome events or summary measures	7-8 15-17

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-8 15-17
		(*b*) Report category boundaries when continuous variables were categorized	7-8 15
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion			
Key results	18	Summarise key results with reference to study objectives	9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10-11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	3

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Acute Stress of the Healthcare Workforce during the COVID-19 pandemic evolution. A cross-sectional study in Spain

José Joaquín Mira[1,2*], Irene Carrillo[2,3], Mercedes Guilabert[2], Aurora Mula[3], Jimmy Martin-Delgado[3], María Virtudes Pérez-Pérez[2], María Asunción Vicente[4], César Fernández[4] on behalf of SARS-CoV-2 Second Victim Study Group†

*** Corresponding author:** José Joaquín Mira; Postal address: Avenida de la Universidad, s/n, 03202 Elche, Alicante (Spain); e-mail: jose.mira@umh.es; Telephone: +34 966658984

[1] Alicante-Sant Joan Health District, Alicante, Spain.

[2] Department of Health Psychology, Miguel Hernández University, Elche, Spain.

[3] Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO), San Juan de Alicante, Spain.

[4] Department of Systems Engineering and Automation, Miguel Hernández University, Elche, Spain.

† SARS-CoV-2 Second Victim Study Group: Ángel Cobos-Vargas, Olga Beatriz Martínez-García (Hospital Universitario Clínico San Cecilio de Granada, Andalucía, Spain), Mª José Bueno-Domínguez (Grup SAGESSA, Reus, Spain), María Pilar Astier-Peña (Centro de Salud "La Jota", Zaragoza, Spain), Pastora Pérez-Pérez (Sociedad Española de Calidad Asistencial, Spain), Matilde Lahera-Martín, Carmen Silvestre-Busto (Servicio Navarro de Salud-Osasunbidea), Susana Lorenzo-Martínez (Hospital Universitario Fundación Alcorcón, Madrid, Spain), Ascensión Sánchez-Martínez

(Hospital General Universitario Reina Sofía, Murcia, Spain), Bárbara Marco-Gómez, Cristina Abad-Bouzán (Zona de Salud de Calatayud, Zaragoza, Spain), Carlos Aibar-Remón (Hospital Clínico Universitario Lozano Blesa, Zaragoza), and Jesús María Aranaz-Andrés (Hospital Universitario Ramón y Cajal).

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Abstract

Objectives: To determine the volume of health professionals who suffered distress due to their care COVID-19 patients and to analyse the direction in which the response capacity of the professionals to face future waves of COVID-19 is evolving.

Design: A cross-sectional study.

Setting: Primary care and hospitals in Spain.

Participants: A non-randomised sample of 685 professionals (physicians, nurses, and other health staff).

Primary and secondary outcome measures: Frequency and intensity of stress responses measured by the Acute Stress of Health Professionals Caring COVID-19 Scale (EASE). Variation of stress responses according to the number of deaths per day per territory and the evolutionary stage of the COVID-19 outbreak measured by the Kruskal Wallis and the Mann-Whitney U tests.

Results: The average score on the EASE scale was 11.1 (SD 6.7) out of 30. Among the participants, 44.2% presented a good emotional adjustment, 27.4% a tolerable level of distress, 23.9% medium-high emotional load, and 4.5% extreme acute stress. The stress responses were more intense in the most affected territories (12.1 vs 9.3, p=0.003) and during the disillusionment phase (12.7 vs 8.5 impact, 10.2 heroic, and 9.8 honeymoon, p=0.000).

Conclusions: The pandemic has affected the mental health of a significant proportion of health professionals which may reduce their resilience in the face of future waves of COVID-19. The institutional approaches to support the psychological needs of health professionals are essential to ensure optimal care considering these results.

Strengths and limitations of this study

- This is an observational study to determine the volume of health professionals who present a high level of acute stress due to their care of patients with COVID-19 that may prevent them from carrying out their functions and to analyse the direction in which the response capacity of the professionals to face future waves of COVID-19 is evolving.
- This study used a scale specifically designed to assess acute stress of health professionals in direct contact with patients with COVID-19 (EASE Scale). This scale was previously validated.
- The study was conducted in Spain between March 18 and May 17, 2020, coinciding with the phase of greatest acceleration and subsequent flattening of the curve of the pandemic. In this study, it has been shown how the impact of the first outbreak has left the workforce emotionally drained, which could limit their ability to adequately play their role in the face of a possible outbreak.
- The scale was not administered to a random sample of the population, which could limit the generalizability of the results. Also, the scale may have reached different sectors of the study population unevenly due to the means used to distribute it.
- Only basic socio-demographic data were collected from health professionals. No comparisons among subgroups were calculated.

Funding: This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests: None declared.

Contributors: JJM conceived and designed the work. JJM, IC, MG and MVPJ designed the scale. MAV and CF developed the web and mobile app for the online administration of the scale. JMD was responsible for the recruitment of participants. AM performed the statistical analysis. IC and MG wrote a first draft of the manuscript, which was critically reviewed for important intellectual content by JJM and JMD. All authors reviewed the draft and approved the final version of the manuscript.

Data sharing statement: Data are available upon reasonable request.

Ethical approval: The study protocol was approved by the Research Committee of the San Juan University Hospital in Alicante (8th of April 2020).

Introduction

As of August, the 26th, COVID-19 pandemic has caused 819.830 deaths worldwide, 28,924 in Spain.[1] The number of professionals suffering from COVID-19 is substantial. In Spain, it accounts for 21% of the total number of people infected.[2]

Although the incidence of the pandemic has expanded differently, among the geographical areas of each country, most hospitals and health centres around the world have had to reorganise themselves to prioritise the care of COVID-19 patients, breaking with their usual work dynamics. In addition to this cause of work-related stress, there has been uncertainty in decision-making and a lack of resources to adequately treat patients and protect against possible contagion.[3-4] These circumstances have posed an additional risk to patient safety,[5] which may have adversely affected quality of health care.[6]

The intensity of compassion fatigue,[7] post-traumatic stress[8-9] and moral injury[10-11] observed among professionals can be expected to depend on the intensity of the spread of the pandemic, the resources available, and individual differences in stress response. Likewise, the extent of trauma experienced by professionals may also be influenced by factors that are not directly related to the health care response, such as family income and living situation, self-perceived health status, gender, personality traits, and coping styles.[12-13]

Results of studies quantifying the magnitude of the impact of COVID-19 patient care on the mental health of healthcare professionals have been published since the beginning of the pandemic. These findings have varied widely due to the heterogeneity of the methodologies and instruments used.[14]

In the first studies, carried out at the beginning of February, 71.5% of healthcare personnel, mostly from the province of Hubai in China, presented emotional discomfort,[15] with frequent depressive symptoms (55.7%), anxiety responses (44.7%)[16] and insomnia (78,4%).[17] In Italy, in the days before the peak of infections (end of March), 49.4% of health professionals reported symptoms of post-traumatic stress.[18] In Ecuador, in the second half of April, 90% of the medical and nursing staff already presented moderate-severe burnout levels.[19] In Spain, after the first wave of hospital care (April-May), 79.5% and 51.1% of health professionals presented symptoms of anxiety and depression, respectively.[20] The expansion of the pandemic in each territory has determined the magnitude of the emotional response. In China, sleep disorders and psychological symptoms were more frequent among medical staff in Wuhan than among staff in Ningbo.[21] A recent meta-analysis showed that depression, anxiety and psychological distress were common responses in health professionals during the COVID-19 outbreak, is more likely in women and in those who had direct contact with positive cases of COVID-19.[22]

The magnitude and exceptionality of the situation justify these results. The experience of the crisis affects the entire staff and all professional levels, including support staff in healthcare (IT, suppliers, janitors, etc.). The complete absence of impact in mental health on the staff of health institutions would be difficult to explain. However, the most important question is not the number of professionals who have been emotionally affected as a result of their assistance services, a circumstance that has been aggravated by this crisis but is inherent to the work they do, but rather how many have not managed to recover, how their resilience is evolving or to what extent they can deal with a possible new outbreak.

Most studies have analysed the emotional responses in a short period (approximately one week) coinciding with a specific stage of the crisis. However, studies on community coping with catastrophic situations have described that the psychological response evolves resulting in: impact phase, heroic (intensification of efforts), honeymoon (optimism), disillusionment (fatigue) and reconstruction (recovery pre-crisis levels).[23] Therefore, it is expected that the effects of the pandemic on the psychological response of health professionals will vary as the pandemic evolves and affect their resilience to a new outbreak. At the moment, there are no known studies that have addressed the problem from this perspective.

The objectives of this study were, first, to determine the volume of health professionals who, because of the impact of the COVID-19 pandemic on the healthcare environment in which they work, experienced an excessive level of acute stress that prevented them from performing their role. Second, to analyse the direction in which the levels of the emotional response of professionals evolve to face a new outbreak, considering the variation in the frequency and intensity of their stress reactions in the different phases of the pandemic and according to the areas with the greater or lesser impact of the pandemic.

Methods

A cross-sectional observational study in a non-randomised sample of Spanish healthcare professionals was conducted. The study was designed to analyse two assumptions. Firstly, since the results yielded in studies conducted elsewhere involving healthcare workforce caring COVID-19 patients, it was expected that between 3% and

10,5% [9, 13, 24] of the healthcare professionals present psychological distress, with it being more severe as the pandemic becomes more intense. So, as seen in other studies, in those territories most affected by the pandemic, the percentage of professionals with emotional distress is expected to be higher.[21] Finally, since the impact of the pandemic should be directly related to the distress experienced by professionals, it was expected that there will be a cumulative effect whereby the percentage of professionals with high levels of stress will be greater in the more advanced phases of the model of the psychological response during a disaster.[23]

The study was conducted in Spain between March 18 and May 17, 2020, coinciding with the phase of greatest acceleration and subsequent flattening of the curve of the pandemic. The study protocol was approved by the Research Committee of the San Juan University Hospital in Alicante (8th of April 2020).

Variables and instrument

We used a scale specifically designed to assess acute stress of health professionals in direct contact with COVID-19 patients (EASE Scale) (supplementary material). This scale was previously validated, first, a pragmatic literature review of items assessing acute stress in healthcare professionals was conducted for possible inclusion, also, the most relevant sources of acute stress, pointed by the professional's experiences were represented into 17 reactive items; this number was finally reduced to 10 items, once participants considered their representativeness and comprehension. The instrument was validated following COSMIN protocol involving 228 Spanish physicians, and nurses, it is composed of 10 items to which responses are given using a 4-level Likert type scale (0 = It is not happening to me, 1 = It happens to me in concrete situations, 2 = It often happens to me and 3 = I am like this all the time). The total score on the scale can range

from 0 to 30 points, with greater scores being interpreted as higher levels of stress. Reliability was calculated using OMEGA (0.87) and Cronbach's Alpha (0.85). The items were grouped by Exploratory Factor Analysis into two factors that evaluate: affective response and fears and anxiety, explaining 55% of the variance. Factor 1, referring to the affective response, is composed of 6 items, so that the direct score on this factor ranges from 0 to 18 points. The factor 2 that evaluates fears and anxiety is composed of 4 items and its minimum and maximum possible scores are 0 and 12 respectively. The interpretability of the score ranges was established: 0-9 points (good emotional adjustment), 10-14 points (emotional distress), 15-24 points (medium-high emotional overload), >25 points (extreme acute stress) [25].

Participants

Healthcare professionals from primary care centres and hospitals. At the time the study was conducted, the entire public health system was involved in the care of COVID-19 patients. Care for patients suffering other pathologies was suspended except for emergencies and those that could not be delayed, in other situations care was provided by telephone. We determined a minimum sample size of 650 professionals, considering a population of 392,667 health professionals (hospitals and primary care) [26], an effect size of 0.20, a statistical power of 95% and a confidence level of 95%.

Patient and Public Involvement

Patients or the public were not involved in any phase of this study.

Procedure

The diffusion of the scale and data gathering was done in a twofold way. First, the scale was made accessible through a web-based resource repository created by the authors

to reduce the impact of the SARS-CoV-2 pandemic on the psychological well-being of healthcare professionals.[27] These resources to cope with acute stress during the worst moments of the pandemic were disseminated through several Spanish scientific societies, social media, and specialized press news. Second, the scale was accessible through the mobile application BE+ against COVID [28-29] which was disseminated using the same means and by leaders of occupational health and hospital patient safety units. The consenting procedure to participate in the study was inherent in the use of the website and app.

Acute stress responses

Scores on the scale equal to or higher than 15 points were considered the level of stress with the potential to limit the professional's optimal performance of his/her function or work activity.

Pandemic extension and acute stress responses

The results of the self-assessment using this scale were linked to the data on the evolution of the pandemic in Spain using the data published daily by the Spanish Health Ministry, considering both the differences in impact between territories and the temporal phases of its evolution.

To determine the territories most and least affected by the pandemic on May 17th, 2020, the country was divided into two groups according to the number of deaths from COVID-19. The first group included Madrid, and Catalonia, with more than 5,000 deaths. The second group included Asturias, the Balearic Islands, the Canary Islands, Cantabria, Extremadura, La Rioja, Murcia, and Navarre with less than 500 deaths. To compare results on the EASE scale according to the territory, a sub-sample of 336 participants

working in health institutions in the regions specified above was selected. The comparison was made between the most and least affected territories.

Acute stress during the outbreak evolution

To analyse acute stress during the pandemic, four moments of the evolution of the outbreak were determined according to the number of deaths per day: less than 500 (03/18 - 03/25), between 600 and 900 (03/28 - 04/15), between 300 and 600 (04/16 - 04/26) and less than 300 (04/27 - 05/17). The periods described corresponded to the phases of the community's psychological response to the pandemic: impact (awareness of the problem, less than 500 deaths/day), heroic (increased efforts to cope with the crisis and mitigate the impact, between 600 and 900 deaths/day), honeymoon (hope, between 300 and 600 deaths/day) and disillusionment (accumulated fatigue, less than 300 deaths/day). For the temporal definition of the phases, data on deaths per day were extracted from the dashboard of the Spanish Health Ministry.

Statistical analysis

Descriptive and frequency analyses were performed. Mean scores on each factor were transformed to a 0-10 scale to allow comparison because the number of items was different on each factor. The Kruskal Wallis test and the Mann-Whitney U test were used to determine the differences in acute stress reactions according to the time of evolution of the pandemic and the degree to which the territory was affected, respectively. Also, responses on the Be+ against COVID app and the Website were compared. The comparative analyses of scores on the EASE scale were conducted item by item, by

scale factors and overall score. The confidence interval used was 95%. Data coding and analysis was performed using IBM SPSS Statistics software, version 25.

Results

A total of 685 professionals responded. Of these, 28.6% (n=196) were doctors, 39% (n=267) were nurses and 32.3% (n=222) were other healthcare staff (including advanced technicians in nursing auxiliary care, radiodiagnosis, and clinical diagnostic laboratory). A majority of them reported working in a hospital setting 81.9% (n=561), in primary care 8% (n=55) and in both care levels 10.1% (n=69). 40.4% worked in areas where the pandemic had had a greater impact. Most of them worked in Madrid (37%), Valencia (15.7%), Andalusia (14.1%) and Catalonia (3.3%).

Scores on the EASE scale

The mean total score on the scale was 11.1 points (SD 6.7, 95% CI 10.6 - 11.6, range 0-30), with 23.9% (n=164) with a medium-high level of emotional load, and 4.5% (n=31) showing an extreme level of acute stress. Scores between the emotional response factor vs. the fear/anxiety factor no differences were observed, 3.6 (SD 2.4) vs. 3.8 (SD=2.5); p=0.2 (score transformed into a scale of 0 to 10 points).

Three hundred and forty-one (49.8%) of the health professionals highlighted that they had difficulties in being able to disconnect from work and 49% (n=335) expressed fear of infecting their family once they returned home at the end of the working day. 23% (n=157) expressed concerns about not falling ill and 17% (n=116) experienced difficulties in empathizing with the suffering of the patients (Table 1).

Scores on the EASE scale were similar among the professional categories (p=0.46). Only, differences were found between the scores for the statement related to maintaining emotional distance with people (p=0.03). Nurses scored higher than doctors or others.

Differences were found in the scores, in the use of the two platforms Website vs Be+ against COVID to respond to the EASE scale (10.5; SD 6.3 vs 11.8; SD 7.1; p=0.008). However, the use of the app was mostly employed by professionals from territories with greater expansion of the pandemic 66% (n=206) vs 21.1% (n=79). 45.5% (n=312) answered the questionnaire through the app and 54.5% (n=373) through the website.

EASE scale scores in territories with a higher incidence rate

The average score on the EASE scale was higher (up to 30% more) in those territories with a higher number of recorded deaths compared to those territories that had a lower number (12.1 vs 9.3 p=0.003) (Table 2). Despite the different affectation between territories, there were aspects in which these differences were not observed, such as completely losing the taste for things that previously produced tranquillity or well-being (p=0.50), feeling that people who required the help of the professional were being neglected (p=0.37), feeling emotionally blocked (p=0.37) or having difficulties in empathizing with the patients' suffering (p=0.93).

EASE scale scores according to the evolution of the pandemic and the different phases of psychological response to the disaster

The average scores on the EASE scale were higher in the disillusionment phase (April 27-May 17, 2020) compared to the first period defined as the impact or awareness phase (March 18-March 25, 2020) (12.7 vs 8.5 p<0.0001) (Table 3).

Discussion

Acute stress was manifested mainly by the inability to disconnect from work and the fear of infecting loved ones. Losing empathy for the suffering of patients and fear of becoming ill are the statements that probably best discriminate against professionals whose condition prevents them from continuing with their care work. This study backs up what has been suggested in previous studies that approximately 5% of the healthcare professionals suffered an extreme level of acute stress as a consequence of caring COVID-19 patients [9, 13, 24]. Considering these results, the targets for the interventions designed to cope with distress due to the COVID-19 pandemic [30] must take in account that approximately a quarter of professionals could need support not to evolve towards situations of extreme acute stress.

Intense emotional responses in territories with a higher incidence rate

This research suggests the level of acute stress experienced by Spanish professionals is higher as the damage from COVID-19 increases in patients. As expected, acute stress has been higher in those territories where the pandemic has had a greater impact in terms of the incidence of COVID-19 cases and deaths from this disease.

Those professionals working in territories where the pandemic has been particularly aggressive show more intense emotional responses in those elements related to thoughts, fears, and physiological reactions because of the situation they are living. This result has not been observed with the fact of being emotionally blocked to think and take decisions or with the difficulty to empathize with the suffering of patients, these emotional responses could be developed in later stages.[31]

Distress, therefore, appear to be associated with the pressures and demands caused by the pandemic, although it has not been possible to determine whether increased availability of resources or support programs might have alleviated their effects.

Intense emotional responses in the final phases of psychological response according to the evolution of the pandemic

The evolution observed in the stress response of professionals is largely in line with the phases proposed by the psychological disaster response model.[23] The level of acute stress manifested by professionals in the disillusionment phase is greater than the stress experienced during the impact phase. This result confirms the expected outcome and is suggesting that the capacity to deal with a new outbreak will be diminished if there is not enough time between outbreaks to allow for recovery or if decisive action is not taken to recover.

Purpose- built measure

This study used a scale specifically designed to discriminate between situations that cause acute stress in the course of caring for COVID-19 patients, unlike other studies that used scales to screen for symptoms of anxiety and depression.[15, 32-33] This scale was based on the premise that the response to the consequences of the pandemic could not leave professionals indifferent and that the sources of stress that could disable professional duties would be quite different from those included in most instruments designed for other purposes. This differential element must be considered when interpreting the results, given that most of the studies that have so far evaluated the psychological impact of the COVID-19 pandemic on health professionals have used questionnaires that were validated under different conditions than the current ones. The

EASE scale has been sensitive to these changes, allowing the impact of the pandemic on health professionals to be assessed[10-11] and it can be expected to be useful for measuring the effects on emotional response and coping capacity if there is a resurgence.

This scale has reflected, above all, that they were unable to disconnect from work, experienced irritability, anxiety, fear of infecting their families, and doubts about their ability to make decisions in clinical practice. However, most of the scores reported by health professionals were in the first and second range of the scale (mild level of emotional distress). These data show that most professionals have not experienced, according to the EASE scale scores, levels of extreme acute stress. This result suggests that we must differentiate between the emotional impact that can be expected from the stress of the crisis and that other emotional impact that prevents the responsibilities of the profession from being carried out with the appropriate guarantees for patients. These results confirm the existence of emotional discomfort in the staff, identifies in what this discomfort translates to, and that only 1 out of 20 professionals have been emotionally overwhelmed and with difficulties in carrying out their work.

In the case of a new outbreak, the data suggest that to determine the level of impact on the mental health of health professionals, the following should be considered: employing instruments used to identify the sources of stress or to measure acute stress associated with the care of COVID-19 patients rather than instruments designed for screening anxiety or depression; measurements should consider the care pressure faced by professionals and the evolution of this pressure over time because that is when it decreases when the intensity of acute stress increases.

Applications of this study

The SARS-CoV-2 pandemic has caused an unprecedented health crisis that has shaken the foundations of health systems around the world, requiring responses that were not always prepared. One reflection is the number of professionals infected. In Spain, as of 18 June, 52,036 health professionals had contracted the COVID-19 disease and just over 13% of those hospitalized required admission to the Intensive Care Unit.[2] This fact, added to the emotional response to the health crisis, has led to their being identified as the second victim of SARS-CoV-2.

The term "second victim"[34] applied to healthcare personnel has been used over the last two decades to refer to the emotional distress experienced by healthcare professionals when they suspect that they have been involved in a safety incident that has resulted in harm to the patient or when they observe that the patient in their care is not developing properly and their decisions and actions are being questioned. In the current scenario, where the healthcare professional has not had the appropriate means to cure and care for patients, we extend the concept of the second victim to refer to any healthcare or support professional involved in the care of people affected by COVID-19, who presents acute stress responses when continuously exposed to an extreme situation caused by the combination of a series of critical factors, including social alarm, oversaturation of services, scarcity of resources and the poor evolution of the patients under their care.

The response to the emotional and psychological needs that the staff of health institutions is experiencing as a result of this situation is justified not only on ethical grounds but also to ensure quality care and patient safety.[35] Precisely the recovery of these systems after the COVID-19 crisis that requires restoring the working morale and welfare of health professionals and strengthening their capacity for resilience.[36] Some

authors suggest adopting measures based on the social support provided by co-workers or peers.[37-38] Digital initiatives have also been developed in the form of broader programmes that integrate social support as one of their resources to mitigate the impact of COVID-19 on health professionals.[10, 30]

Despite the recent emergence of tools to measure the effects of the pandemic on mental health and behaviour in the general population, [39-41] there are still no specific measures designed and validated for evaluation in health professionals. As far as we are aware, this study is the first to explore the emotional distress caused by the COVID-19 health crisis and one of the first to use a specifically validated measure for this purpose.

Limitations

This study was conducted using a scale that was not administered to a random sample of the population which could limit the generalizability of the findings. During the pandemic, depending on the care needs of the territories, primary care professionals moved to work in hospitals (e.g., field hospitals). The scale may have reached different sectors of the study population unevenly due to the media used. Access to the scale by participants via their well-being repository may have overrepresented the response of professionals who were feeling more distressed. Those days the entire health system was dedicated to the care of COVID-19 patients. No specific procedure was used to confirm that respondents to the scale were working caring COVID-19 patients at the time of the outbreak, despite prior instructions requiring this. The motivation of respondents and those who chose not to respond could have biased the sample and therefore the results. The study looked at a small number of sociodemographic variables with the intention that participants would feel that their privacy was guaranteed when completing

the scale. This decision has limited the possibilities of comparative analysis of stress responses by groups. It also prevented intrasubject comparisons at different times of the crisis. The comparative analyses between the most and least affected territories only took into account the number of deaths/day without controlling for other variables that could be influencing the impact of the pandemic on the health centre and its professionals, such as access to equipment, human resources, among others. it should be considered that during the pandemic, there was an increase in personnel and resources throughout the health system in response to an emergency that could not be quantified. The training of this staff to perform their new function could not be considered which could affect their stress levels.

Conclusion

Over time, we have become more scientifically and technically prepared to deal with COVID-19 and have learned multiple lessons on how to best deal with this crisis, but the impact of the first outbreak has left the workforce emotionally drained, which could limit their ability to properly perform their role in the face of a possible outbreak. Consequently, health institutions in the process of workforce recovery must incorporate measures to restore the well-being and work morale of healthcare professionals. This study demonstrates this, confirming that emotional difficulties begin to appear at the end of the most critical phases of the pandemic.

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Table 1. EASE Scores on the COVID-19 Acute Stress in Care Scale

	Mean (IC 95%)	SD	It often happens to me (%)	I am like this all the time (%)
I can't help but think of recent critical situations. I can't get out of work.	1.5 (1.4 – 1.6)	1.0	33.4	16.4
I have completely lost the taste for things that gave me peace of mind.	1.1 (1.0 – 1.2)	0.9	25.5	8.0
I keep my distance, I resent dealing with people, I'm irascible even at home.	1.3 (1.2 – 1.4)	1.0	24.4	12.8
I feel that I am neglecting many people who need my help.	1.0 (0.9 – 1.1)	1.0	21.5	9.2
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	1.1 (1.0 – 1.1)	1.0	23.1	8.9
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	1.2 (1.1 – 1.3)	1.0	25.5	11.2
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.0 (0.9 – 1.1)	1.0	20.7	9.9
Worrying about not getting sick causes me a strain that's hard to bear.	0.9 (0.8 – 1.0)	0.9	16.4	7.6
I'm afraid I'm going to infect my family.	1.5 (1.4 – 1.6)	1.0	28.2	20.7
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia).	0.6 (0.5 – 0.7)	0.9	11.7	5.8
Total score	11.1 (10.6 – 11.6)	6.7	23.9	4.5

Factor 1. Affective response	3.6 (3.4 – 3.8)	2.4
Factor 2. Fears and anxiety	3.8 (3.6 – 4.0)	2.5

N=685

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

Mean difference between factors p=0.2

Table 2. Mean difference on EASE Scale between territories most and least affected by the SARS-CoV-2 pandemic

	Most affected territories [a]	Least affected territories [b]	p
I can't help but think of recent critical situations. I can't get out of work.	1.6	1.4	0.06
I have completely lost the taste for things that gave me peace of mind.	1.1	1.1	0.50
I keep my distance, I resent dealing with people, I'm irascible even at home.	1.4	1.1	0.004
I feel that I am neglecting many people who need my help.	1.1	0.9	0.12
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	1.2	1.0	0.37
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	1.3	0.8	0.00
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.1	0.7	0.02
Worrying about not getting sick causes me a strain that's hard to bear.	1.0	0.6	0.004
I'm afraid I'm going to infect my family.	1.7	1.3	0.004
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia).	0.7	0.6	0.93
Total score	12.1	9.3	0.003
Factor 1. Affective response	3.9	3.3	0.09
Factor 2. Fears and anxiety	4.2	2.8	0.00

N=336

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

[a] Madrid y Cataluña (more than 5000 deaths by May the 17th 2020)

[b] Asturias, Baleares, Canarias, Cantabria, Extremadura, La Rioja, Murcia y Navarra (less than 500 deaths by May the 17th 2020)

Table 3. Mean difference at four temporal moments of expansion of the SARS-COV-2 pandemic

	Impact [a]	Heroic [b]	Honeymoon [c]	Disillusionment [d]	p
I can't help but think of recent critical situations. I can't get out of work.	1.3	1.4	1.3	1.6	<0.001
I have completely lost the taste for things that gave me peace of mind.	0.6	1.0	1.1	1.2	<0.001
I keep my distance, I resent dealing with people, I'm irascible even at home.	0.5	1.1	1.1	1.5	<0.001
I feel that I am neglecting many people who need my help.	0.7	0.9	0.9	1.2	0.01
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	0.8	0.9	0.9	1.3	<0.001
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	0.7	1.0	1.1	1.4	<0.001
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.0	0.9	0.8	1.2	<0.001
Worrying about not getting sick causes me a strain that's hard to bear.	0.9	0,9	0,8	1,0	0,22
I'm afraid I'm going to infect my family.	1.6	1,3	1,3	1,7	<0.001
I have difficulty empathizing with patients' suffering or connecting with their situation	0.4	0.7	0.5	0.6	0.42

(emotional distancing, emotional anaesthesia).					
Total score	8.5	10.2	9.8	12.7	<0.001
Factor 1. Affective response	2.4	3.3	3.3	4.1	<0.001
Factor 2. Fears and anxiety	3.5	3.5	3.3	4.4	<0.001

N=685

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

[a] From March 18th to March 25th, 2020 (less than 500 deaths per day)

[b] From March 28th to April 15th, 2020 (between 600 - 900 deaths per day)

[c] From April 16th to April 26th, 2020 (between 300 - 600 deaths per day)

[d] From April 27th to May 17th, 2020 (less than 300 deaths per day)

Supplementary file. Acute Stress of Health Professionals Caring COVID-19 Scale (EASE SCALE)

Please answer the following questions according to the thoughts, emotions, sensations and actions you are experiencing during these days of crisis

	It's not happening to me	It happens to me in concrete situations	It often happens to me	I'm like this all the time
I can't help but think of recent critical situations. I can't get out of work	☐	☐	☐	☐
I have completely lost the taste for things that gave me peace of mind	☐	☐	☐	☐
I keep my distance, I resent dealing with people, I'm irascible even at home	☐	☐	☐	☐
I feel that I am neglecting many people who need my help	☐	☐	☐	☐
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage	☐	☐	☐	☐
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis situation	☐	☐	☐	☐
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues or myself at risk	☐	☐	☐	☐
Worrying about not getting sick causes me a strain that's hard to bear	☐	☐	☐	☐
I'm afraid I'm going to infect my family	☐	☐	☐	☐
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anesthesia)	☐	☐	☐	☐

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	-
Study size	10	Explain how the study size was arrived at	5, 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	6-7
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	6-7
		(*e*) Describe any sensitivity analyses	-
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data	15*	Report numbers of outcome events or summary measures	7-8 15-17

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-8 15-17
		(*b*) Report category boundaries when continuous variables were categorized	7-8 15
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion			
Key results	18	Summarise key results with reference to study objectives	9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10-11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	3

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Acute Stress of the Healthcare Workforce during the COVID-19 pandemic evolution. A cross-sectional study in Spain

José Joaquín Mira[1,2*], Irene Carrillo[2,3], Mercedes Guilabert[2], Aurora Mula[3], Jimmy Martin-Delgado[3], María Virtudes Pérez-Pérez[2], María Asunción Vicente[4], César Fernández[4] on behalf of SARS-CoV-2 Second Victim Study Group†

*** Corresponding author:** José Joaquín Mira; Postal address: Avenida de la Universidad, s/n, 03202 Elche, Alicante (Spain); e-mail: jose.mira@umh.es; Telephone: +34 966658984

[1] Alicante-Sant Joan Health District, Alicante, Spain.

[2] Department of Health Psychology, Miguel Hernández University, Elche, Spain.

[3] Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO), San Juan de Alicante, Spain.

[4] Department of Systems Engineering and Automation, Miguel Hernández University, Elche, Spain.

† SARS-CoV-2 Second Victim Study Group: Ángel Cobos-Vargas, Olga Beatriz Martínez-García (Hospital Universitario Clínico San Cecilio de Granada, Andalucía, Spain), Mª José Bueno-Domínguez (Grup SAGESSA, Reus, Spain), María Pilar Astier-Peña (Centro de Salud "La Jota", Zaragoza, Spain), Pastora Pérez-Pérez (Sociedad Española de Calidad Asistencial, Spain), Matilde Lahera-Martín, Carmen Silvestre-Busto (Servicio Navarro de Salud-Osasunbidea), Susana Lorenzo-Martínez (Hospital Universitario Fundación Alcorcón, Madrid, Spain), Ascensión Sánchez-Martínez (Hospital General Universitario Reina Sofía, Murcia, Spain), Bárbara Marco-Gómez, Cristina Abad-Bouzán (Zona de Salud de Calatayud, Zaragoza, Spain), Carlos Aibar-

Remón (Hospital Clínico Universitario Lozano Blesa, Zaragoza), and Jesús María Aranaz-Andrés (Hospital Universitario Ramón y Cajal).

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Abstract

Objectives: To determine the volume of health professionals who suffered distress due to their care COVID-19 patients and to analyse the direction in which the response capacity of the professionals to face future waves of COVID-19 is evolving.

Design: A cross-sectional study.

Setting: Primary care and hospitals in Spain.

Participants: A non-randomised sample of 685 professionals (physicians, nurses, and other health staff).

Primary and secondary outcome measures: Frequency and intensity of stress responses measured by the Acute Stress of Health Professionals Caring COVID-19 Scale (EASE). Variation of stress responses according to the number of deaths per day per territory and the evolutionary stage of the COVID-19 outbreak measured by the Kruskal Wallis and the Mann-Whitney U tests.

Results: The average score on the EASE scale was 11.1 (SD 6.7) out of 30. Among the participants, 44.2% presented a good emotional adjustment, 27.4% a tolerable level of distress, 23.9% medium-high emotional load, and 4.5% extreme acute stress. The stress responses were more intense in the most affected territories (12.1 vs 9.3, p=0.003) and during the disillusionment phase (12.7 vs 8.5 impact, 10.2 heroic, and 9.8 honeymoon, p=0.000).

Conclusions: The pandemic has affected the mental health of a significant proportion of health professionals which may reduce their resilience in the face of future waves of COVID-19. The institutional approaches to support the psychological needs of health professionals are essential to ensure optimal care considering these results.

Strengths and limitations of this study

- This is an observational study to determine the volume of health professionals who present a high level of acute stress due to their care of patients with COVID-19 that may prevent them from carrying out their functions and to analyse the direction in which the response capacity of the professionals to face future waves of COVID-19 is evolving.
- This study used a scale specifically designed to assess acute stress of health professionals in direct contact with patients with COVID-19 (EASE Scale). This scale was previously validated.
- The study was conducted in Spain between March 18 and May 17, 2020, coinciding with the phase of greatest acceleration and subsequent flattening of the curve of the pandemic. In this study, it has been shown how the impact of the first outbreak has left the workforce emotionally drained, which could limit their ability to adequately play their role in the face of a possible outbreak.
- The scale was not administered to a random sample of the population, which could limit the generalizability of the results. Also, the scale may have reached different sectors of the study population unevenly due to the means used to distribute it.
- Only basic socio-demographic data were collected from health professionals. No comparisons among subgroups were calculated.

Funding: This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests: None declared.

Contributors: JJM conceived and designed the work. JJM, IC, MG and MVPJ designed the scale. MAV and CF developed the web and mobile app for the online administration of the scale. JMD was responsible for the recruitment of participants. AM performed the statistical analysis. IC and MG wrote a first draft of the manuscript, which was critically reviewed for important intellectual content by JJM and JMD. All authors reviewed the draft and approved the final version of the manuscript.

Data sharing statement: Data are available upon reasonable request.

Ethical approval: The study protocol was approved by the Research Committee of the San Juan University Hospital in Alicante (8th of April 2020).

Introduction

As of August, the 26th, COVID-19 pandemic has caused 819.830 deaths worldwide, 28,924 in Spain.[1] The number of professionals suffering from COVID-19 is substantial. In Spain, it accounts for 21% of the total number of people infected.[2]

Although the incidence of the pandemic has expanded differently, among the geographical areas of each country, most hospitals and health centres around the world have had to reorganise themselves to prioritise the care of COVID-19 patients, breaking with their usual work dynamics. In addition to this cause of work-related stress, there has been uncertainty in decision-making and a lack of resources to adequately treat patients and protect against possible contagion.[3-4] These circumstances have posed an additional risk to patient safety,[5] which may have adversely affected quality of health care.[6]

The intensity of compassion fatigue,[7] post-traumatic stress[8-9] and moral injury[10-11] observed among professionals can be expected to depend on the intensity of the spread of the pandemic, the resources available, and individual differences in stress response. Likewise, the extent of trauma experienced by professionals may also be influenced by factors that are not directly related to the health care response, such as family income and living situation, self-perceived health status, gender, personality traits, and coping styles.[12-13]

Results of studies quantifying the magnitude of the impact of COVID-19 patient care on the mental health of healthcare professionals have been published since the beginning of the pandemic. These findings have varied widely due to the heterogeneity of the methodologies and instruments used.[14]

In the first studies, carried out at the beginning of February, 71.5% of healthcare personnel, mostly from the province of Hubai in China, presented emotional discomfort,[15] with frequent depressive symptoms (55.7%), anxiety responses (44.7%)[16] and insomnia (78,4%).[17] In Italy, in the days before the peak of infections (end of March), 49.4% of health professionals reported symptoms of post-traumatic stress.[18] In Ecuador, in the second half of April, 90% of the medical and nursing staff already presented moderate-severe burnout levels.[19] In Spain, after the first wave of hospital care (April-May), 79.5% and 51.1% of health professionals presented symptoms of anxiety and depression, respectively.[20] The expansion of the pandemic in each territory has determined the magnitude of the emotional response. In China, sleep disorders and psychological symptoms were more frequent among medical staff in Wuhan than among staff in Ningbo.[21] A recent meta-analysis showed that depression, anxiety and psychological distress were common responses in health professionals during the COVID-19 outbreak, is more likely in women and in those who had direct contact with positive cases of COVID-19.[22]

The magnitude and exceptionality of the situation justify these results. The experience of the crisis affects the entire staff and all professional levels, including support staff in healthcare (IT, suppliers, janitors, etc.). The complete absence of impact in mental health on the staff of health institutions would be difficult to explain. However, the most important question is not the number of professionals who have been emotionally affected as a result of their assistance services, a circumstance that has been aggravated by this crisis but is inherent to the work they do, but rather how many have not managed to recover, how their resilience is evolving or to what extent they can deal with a possible new outbreak.

Most studies have analysed the emotional responses in a short period (approximately one week) coinciding with a specific stage of the crisis. However, studies on community coping with catastrophic situations have described that the psychological response evolves resulting in: impact phase, heroic (intensification of efforts), honeymoon (optimism), disillusionment (fatigue) and reconstruction (recovery pre-crisis levels).[23] Therefore, it is expected that the effects of the pandemic on the psychological response of health professionals will vary as the pandemic evolves and affect their resilience to a new outbreak. At the moment, there are no known studies that have addressed the problem from this perspective.

The objectives of this study were, first, to determine the volume of health professionals who, because of the impact of the COVID-19 pandemic on the healthcare environment in which they work, experienced an excessive level of acute stress that prevented them from performing their role. Second, to analyse the direction in which the levels of the emotional response of professionals evolve to face a new outbreak, considering the variation in the frequency and intensity of their stress reactions in the different phases of the pandemic and according to the areas with the greater or lesser impact of the pandemic.

Methods

A cross-sectional observational study in a non-randomised sample of Spanish healthcare professionals was conducted. The study was designed to analyse two assumptions. Firstly, since the results yielded in studies conducted elsewhere involving healthcare workforce caring COVID-19 patients, it was expected that between 3% and

10,5% [9, 13, 24] of the healthcare professionals present psychological distress, with it being more severe as the pandemic becomes more intense. So, as seen in other studies, in those territories most affected by the pandemic, the percentage of professionals with emotional distress is expected to be higher.[21] Finally, since the impact of the pandemic should be directly related to the distress experienced by professionals, it was expected that there will be a cumulative effect whereby the percentage of professionals with high levels of stress will be greater in the more advanced phases of the model of the psychological response during a disaster.[23]

The study was conducted in Spain between March 18 and May 17, 2020, coinciding with the phase of greatest acceleration and subsequent flattening of the curve of the pandemic. The study protocol was approved by the Research Committee of the San Juan University Hospital in Alicante (8th of April 2020).

Variables and instrument

We used a scale specifically designed to assess acute stress of health professionals in direct contact with COVID-19 patients (EASE Scale) (supplementary material). This scale was previously validated, first, a pragmatic literature review of items assessing acute stress in healthcare professionals was conducted for possible inclusion, also, the most relevant sources of acute stress, pointed by the professional's experiences were represented into 17 reactive items; this number was finally reduced to 10 items, once participants considered their representativeness and comprehension. The instrument was validated following COSMIN protocol involving 228 Spanish physicians, and nurses, it is composed of 10 items to which responses are given using a 4-level Likert type scale (0 = It is not happening to me, 1 = It happens to me in concrete situations, 2 = It often happens to me and 3 = I am like this all the time). The total score on the scale can range

from 0 to 30 points, with greater scores being interpreted as higher levels of stress. Reliability was calculated using OMEGA (0.87) and Cronbach's Alpha (0.85). The items were grouped by Exploratory Factor Analysis into two factors that evaluate: affective response and fears and anxiety, explaining 55% of the variance. Factor 1, referring to the affective response, is composed of 6 items, so that the direct score on this factor ranges from 0 to 18 points. The factor 2 that evaluates fears and anxiety is composed of 4 items and its minimum and maximum possible scores are 0 and 12 respectively. The interpretability of the score ranges was established: 0-9 points (good emotional adjustment), 10-14 points (emotional distress), 15-24 points (medium-high emotional overload), >25 points (extreme acute stress) [25].

Participants

Healthcare professionals from primary care centres and hospitals. At the time the study was conducted, the entire public health system was involved in the care of COVID-19 patients. Care for patients suffering other pathologies was suspended except for emergencies and those that could not be delayed, in other situations care was provided by telephone. We determined a minimum sample size of 650 professionals, considering a population of 392,667 health professionals (hospitals and primary care) [26], an effect size of 0.20, a statistical power of 95% and a confidence level of 95%.

Patient and Public Involvement

Patients or the public were not involved in any phase of this study.

Procedure

The diffusion of the scale and data gathering was done in a twofold way. First, the scale was made accessible through a web-based resource repository created by the authors

to reduce the impact of the SARS-CoV-2 pandemic on the psychological well-being of healthcare professionals.[27] These resources to cope with acute stress during the worst moments of the pandemic were disseminated through several Spanish scientific societies, social media, and specialized press news. Second, the scale was accessible through the mobile application BE+ against COVID[28-29] which was disseminated using the same means and by leaders of occupational health and hospital patient safety units. The consenting procedure to participate in the study was inherent in the use of the website and app.

Acute stress responses

Scores on the scale equal to or higher than 15 points were considered the level of stress with the potential to limit the professional's optimal performance of his/her function or work activity.

Pandemic extension and acute stress responses

The results of the self-assessment using this scale were linked to the data on the evolution of the pandemic in Spain using the data published daily by the Spanish Health Ministry, considering both the differences in impact between territories and the temporal phases of its evolution.

To determine the territories most and least affected by the pandemic on May 17th, 2020, the country was divided into two groups according to the number of deaths from COVID-19. The first group included Madrid, and Catalonia, with more than 5,000 deaths. The second group included Asturias, the Balearic Islands, the Canary Islands, Cantabria, Extremadura, La Rioja, Murcia, and Navarre with less than 500 deaths. To compare results on the EASE scale according to the territory, a sub-sample of 336 participants

working in health institutions in the regions specified above was selected. The comparison was made between the most and least affected territories.

Acute stress during the outbreak evolution

To analyse acute stress during the pandemic, four moments of the evolution of the outbreak were determined according to the number of deaths per day: less than 500 (03/18 - 03/25), between 600 and 900 (03/28 - 04/15), between 300 and 600 (04/16 - 04/26) and less than 300 (04/27 - 05/17). The periods described corresponded to the phases of the community's psychological response to the pandemic: impact (awareness of the problem, less than 500 deaths/day), heroic (increased efforts to cope with the crisis and mitigate the impact, between 600 and 900 deaths/day), honeymoon (hope, between 300 and 600 deaths/day) and disillusionment (accumulated fatigue, less than 300 deaths/day). For the temporal definition of the phases, data on deaths per day were extracted from the dashboard of the Spanish Health Ministry.

Statistical analysis

Descriptive and frequency analyses were performed. Mean scores on each factor were transformed to a 0-10 scale to allow comparison because the number of items was different on each factor. The Kruskal Wallis test and the Mann-Whitney U test were used to determine the differences in acute stress reactions according to the time of evolution of the pandemic and the degree to which the territory was affected, respectively. Also, responses on the Be+ against COVID app and the Website were compared. The comparative analyses of scores on the EASE scale were conducted item by item, by

scale factors and overall score. The confidence interval used was 95%. Data coding and analysis was performed using IBM SPSS Statistics software, version 25.

Results

A total of 685 professionals responded. Of these, 28.6% (n=196) were doctors, 39% (n=267) were nurses and 32.3% (n=222) were other healthcare staff (including advanced technicians in nursing auxiliary care, radiodiagnosis, and clinical diagnostic laboratory). A majority of them reported working in a hospital setting 81.9% (n=561), in primary care 8% (n=55) and in both care levels 10.1% (n=69). 40.4% worked in areas where the pandemic had had a greater impact. Most of them worked in Madrid (37%), Valencia (15.7%), Andalusia (14.1%) and Catalonia (3.3%).

Scores on the EASE scale

The mean total score on the scale was 11.1 points (SD 6.7, 95% CI 10.6 - 11.6, range 0-30), with 23.9% (n=164) with a medium-high level of emotional load, and 4.5% (n=31) showing an extreme level of acute stress. Scores between the emotional response factor vs. the fear/anxiety factor no differences were observed, 3.6 (SD 2.4) vs. 3.8 (SD=2.5); p=0.2 (score transformed into a scale of 0 to 10 points).

Three hundred and forty-one (49.8%) of the health professionals highlighted that they had difficulties in being able to disconnect from work and 49% (n=335) expressed fear of infecting their family once they returned home at the end of the working day. 23% (n=157) expressed concerns about not falling ill and 17% (n=116) experienced difficulties in empathizing with the suffering of the patients (Table 1).

Scores on the EASE scale were similar among the professional categories (p=0.46). Only, differences were found between the scores for the statement related to maintaining emotional distance with people (p=0.03). Nurses scored higher than doctors or others.

Differences were found in the scores, in the use of the two platforms Website vs Be+ against COVID to respond to the EASE scale (10.5; SD 6.3 vs 11.8; SD 7.1; p=0.008). However, the use of the app was mostly employed by professionals from territories with greater expansion of the pandemic 66% (n=206) vs 21.1% (n=79). 45.5% (n=312) answered the questionnaire through the app and 54.5% (n=373) through the website.

EASE scale scores in territories with a higher incidence rate

The average score on the EASE scale was higher (up to 30% more) in those territories with a higher number of recorded deaths compared to those territories that had a lower number (12.1 vs 9.3 p=0.003) (Table 2). Despite the different affectation between territories, there were aspects in which these differences were not observed, such as completely losing the taste for things that previously produced tranquillity or well-being (p=0.50), feeling that people who required the help of the professional were being neglected (p=0.37), feeling emotionally blocked (p=0.37) or having difficulties in empathizing with the patients' suffering (p=0.93).

EASE scale scores according to the evolution of the pandemic and the different phases of psychological response to the disaster

The average scores on the EASE scale were higher in the disillusionment phase (April 27-May 17, 2020) compared to the first period defined as the impact or awareness phase (March 18-March 25, 2020) (12.7 vs 8.5 p<0.0001) (Table 3).

Discussion

Acute stress was manifested mainly by the inability to disconnect from work and the fear of infecting loved ones. Losing empathy for the suffering of patients and fear of becoming ill are the statements that probably best discriminate against professionals whose condition prevents them from continuing with their care work. This study backs up what has been suggested in previous studies that approximately 5% of the healthcare professionals suffered an extreme level of acute stress as a consequence of caring COVID-19 patients [9, 13, 24]. Considering these results, the targets for the interventions designed to cope with distress due to the COVID-19 pandemic [30] must take in account that approximately a quarter of professionals could need support not to evolve towards situations of extreme acute stress.

Intense emotional responses in territories with a higher incidence rate

This research suggests the level of acute stress experienced by Spanish professionals is higher as the damage from COVID-19 increases in patients. As expected, acute stress has been higher in those territories where the pandemic has had a greater impact in terms of the incidence of COVID-19 cases and deaths from this disease.

Those professionals working in territories where the pandemic has been particularly aggressive show more intense emotional responses in those elements related to thoughts, fears, and physiological reactions because of the situation they are living. This result has not been observed with the fact of being emotionally blocked to think and take decisions or with the difficulty to empathize with the suffering of patients, these emotional responses could be developed in later stages.[31]

Distress, therefore, appear to be associated with the pressures and demands caused by the pandemic, although it has not been possible to determine whether increased availability of resources or support programs might have alleviated their effects.

Intense emotional responses in the final phases of psychological response according to the evolution of the pandemic

The evolution observed in the stress response of professionals is largely in line with the phases proposed by the psychological disaster response model.[23] The level of acute stress manifested by professionals in the disillusionment phase is greater than the stress experienced during the impact phase. This result confirms the expected outcome and is suggesting that the capacity to deal with a new outbreak will be diminished if there is not enough time between outbreaks to allow for recovery or if decisive action is not taken to recover.

Purpose- built measure

This study used a scale specifically designed to discriminate between situations that cause acute stress in the course of caring for COVID-19 patients, unlike other studies that used scales to screen for symptoms of anxiety and depression.[15, 32-33] This scale was based on the premise that the response to the consequences of the pandemic could not leave professionals indifferent and that the sources of stress that could disable professional duties would be quite different from those included in most instruments designed for other purposes. This differential element must be considered when interpreting the results, given that most of the studies that have so far evaluated the psychological impact of the COVID-19 pandemic on health professionals have used questionnaires that were validated under different conditions than the current ones. The

EASE scale has been sensitive to these changes, allowing the impact of the pandemic on health professionals to be assessed[10-11] and it can be expected to be useful for measuring the effects on emotional response and coping capacity if there is a resurgence.

This scale has reflected, above all, that they were unable to disconnect from work, experienced irritability, anxiety, fear of infecting their families, and doubts about their ability to make decisions in clinical practice. However, most of the scores reported by health professionals were in the first and second range of the scale (mild level of emotional distress). These data show that most professionals have not experienced, according to the EASE scale scores, levels of extreme acute stress. This result suggests that we must differentiate between the emotional impact that can be expected from the stress of the crisis and that other emotional impact that prevents the responsibilities of the profession from being carried out with the appropriate guarantees for patients. These results confirm the existence of emotional discomfort in the staff, identifies in what this discomfort translates to, and that only 1 out of 20 professionals have been emotionally overwhelmed and with difficulties in carrying out their work.

In the case of a new outbreak, the data suggest that to determine the level of impact on the mental health of health professionals, the following should be considered: employing instruments used to identify the sources of stress or to measure acute stress associated with the care of COVID-19 patients rather than instruments designed for screening anxiety or depression; measurements should consider the care pressure faced by professionals and the evolution of this pressure over time because that is when it decreases when the intensity of acute stress increases.

Applications of this study

The SARS-CoV-2 pandemic has caused an unprecedented health crisis that has shaken the foundations of health systems around the world, requiring responses that were not always prepared. One reflection is the number of professionals infected. In Spain, as of 18 June, 52,036 health professionals had contracted the COVID-19 disease and just over 13% of those hospitalized required admission to the Intensive Care Unit.[2] This fact, added to the emotional response to the health crisis, has led to their being identified as the second victim of SARS-CoV-2.

The term "second victim"[34] applied to healthcare personnel has been used over the last two decades to refer to the emotional distress experienced by healthcare professionals when they suspect that they have been involved in a safety incident that has resulted in harm to the patient or when they observe that the patient in their care is not developing properly and their decisions and actions are being questioned. In the current scenario, where the healthcare professional has not had the appropriate means to cure and care for patients, we extend the concept of the second victim to refer to any healthcare or support professional involved in the care of people affected by COVID-19, who presents acute stress responses when continuously exposed to an extreme situation caused by the combination of a series of critical factors, including social alarm, oversaturation of services, scarcity of resources and the poor evolution of the patients under their care.

The response to the emotional and psychological needs that the staff of health institutions is experiencing as a result of this situation is justified not only on ethical grounds but also to ensure quality care and patient safety.[35] Precisely the recovery of these systems after the COVID-19 crisis that requires restoring the working morale and welfare of health professionals and strengthening their capacity for resilience.[36] Some

authors suggest adopting measures based on the social support provided by co-workers or peers.[37-38] Digital initiatives have also been developed in the form of broader programmes that integrate social support as one of their resources to mitigate the impact of COVID-19 on health professionals.[10, 30]

Despite the recent emergence of tools to measure the effects of the pandemic on mental health and behaviour in the general population,[39-41] there are still no specific measures designed and validated for evaluation in health professionals. As far as we are aware, this study is the first to explore the emotional distress caused by the COVID-19 health crisis and one of the first to use a specifically validated measure for this purpose.

Limitations

This study was conducted using a scale that was not administered to a random sample of the population which could limit the generalizability of the findings. During the pandemic, depending on the care needs of the territories, primary care professionals moved to work in hospitals (e.g., field hospitals). The scale may have reached different sectors of the study population unevenly due to the media used. Access to the scale by participants via their well-being repository may have overrepresented the response of professionals who were feeling more distressed. Those days the entire health system was dedicated to the care of COVID-19 patients. No specific procedure was used to confirm that respondents to the scale were working caring COVID-19 patients at the time of the outbreak, despite prior instructions requiring this. The motivation of respondents and those who chose not to respond could have biased the sample and therefore the results. The study looked at a limited number of sociodemographic variables with the intention that participants would feel that their privacy was guaranteed when completing

the scale. This decision was made because, during the first wave of COVID-19 in Spain, most healthcare professionals were reluctant to receive help in managing their acute stress. Consequently, the collection of some sociodemographic data (such as gender or age) could have been a barrier for them to self-assess their stress levels due to the fear of being identified. At that time, to give emotional support to our healthcare workforce was prioritized. These precautions in data collection significantly limited the possibilities of national and international comparative analyses of stress responses by groups (such as sex, age, experience, etc.). It also prevented intrasubject comparisons at different times of the crisis. Despite these limitations, the results obtained are in line with those found in other studies.[9, 13, 24] The comparative analyses between the most and least affected territories only took into account the number of deaths/day without controlling for other variables that could be influencing the impact of the pandemic on the health centre and its professionals, such as access to equipment, human resources, among others. it should be considered that during the pandemic, there was an increase in personnel and resources throughout the health system in response to an emergency that could not be quantified. The training of this staff to perform their new function could not be considered which could affect their stress levels.

Conclusion

Over time, we have become more scientifically and technically prepared to deal with COVID-19 and have learned multiple lessons on how to best deal with this crisis, but the impact of the first outbreak has left the workforce emotionally drained, which could limit their ability to properly perform their role in the face of a possible outbreak. Consequently, health institutions in the process of workforce recovery must incorporate measures to restore the well-being and work morale of healthcare professionals. This study

demonstrates this, confirming that emotional difficulties begin to appear at the end of the most critical phases of the pandemic.

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Table 1. EASE Scores on the COVID-19 Acute Stress in Care Scale

	Mean (IC 95%)	SD	It often happens to me (%)	I am like this all the time (%)
I can't help but think of recent critical situations. I can't get out of work.	1.5 (1.4 – 1.6)	1.0	33.4	16.4
I have completely lost the taste for things that gave me peace of mind.	1.1 (1.0 – 1.2)	0.9	25.5	8.0
I keep my distance, I resent dealing with people, I'm irascible even at home.	1.3 (1.2 – 1.4)	1.0	24.4	12.8
I feel that I am neglecting many people who need my help.	1.0 (0.9 – 1.1)	1.0	21.5	9.2
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	1.1 (1.0 – 1.1)	1.0	23.1	8.9
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	1.2 (1.1 – 1.3)	1.0	25.5	11.2
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.0 (0.9 – 1.1)	1.0	20.7	9.9
Worrying about not getting sick causes me a strain that's hard to bear.	0.9 (0.8 – 1.0)	0.9	16.4	7.6
I'm afraid I'm going to infect my family.	1.5 (1.4 – 1.6)	1.0	28.2	20.7
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia).	0.6 (0.5 – 0.7)	0.9	11.7	5.8
Total score	11.1 (10.6 – 11.6)	6.7	23.9	4.5

Factor 1. Affective response	3.6 (3.4 – 3.8)	2.4
Factor 2. Fears and anxiety	3.8 (3.6 – 4.0)	2.5

N=685

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

Mean difference between factors p=0.2

Table 2. Mean difference on EASE Scale between territories most and least affected by the SARS-CoV-2 pandemic

	Most affected territories [a]	Least affected territories [b]	p
I can't help but think of recent critical situations. I can't get out of work.	1.6	1.4	0.06
I have completely lost the taste for things that gave me peace of mind.	1.1	1.1	0.50
I keep my distance, I resent dealing with people, I'm irascible even at home.	1.4	1.1	0.004
I feel that I am neglecting many people who need my help.	1.1	0.9	0.12
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	1.2	1.0	0.37
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	1.3	0.8	0.00
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.1	0.7	0.02
Worrying about not getting sick causes me a strain that's hard to bear.	1.0	0.6	0.004
I'm afraid I'm going to infect my family.	1.7	1.3	0.004
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anaesthesia).	0.7	0.6	0.93
Total score	12.1	9.3	0.003
Factor 1. Affective response	3.9	3.3	0.09
Factor 2. Fears and anxiety	4.2	2.8	0.00

N=336

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

[a] Madrid y Cataluña (more than 5000 deaths by May the 17th 2020)

[b] Asturias, Baleares, Canarias, Cantabria, Extremadura, La Rioja, Murcia y Navarra (less than 500 deaths by May the 17th 2020)

Table 3. Mean difference at four temporal moments of expansion of the SARS-COV-2 pandemic

	Impact [a]	Heroic [b]	Honeymoon [c]	Disillusionment [d]	p
I can't help but think of recent critical situations. I can't get out of work.	1.3	1.4	1.3	1.6	<0.001
I have completely lost the taste for things that gave me peace of mind.	0.6	1.0	1.1	1.2	<0.001
I keep my distance, I resent dealing with people, I'm irascible even at home.	0.5	1.1	1.1	1.5	<0.001
I feel that I am neglecting many people who need my help.	0.7	0.9	0.9	1.2	0.01
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage.	0.8	0.9	0.9	1.3	<0.001
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis.	0.7	1.0	1.1	1.4	<0.001
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues, or myself at risk.	1.0	0.9	0.8	1.2	<0.001
Worrying about not getting sick causes me a strain that's hard to bear.	0.9	0,9	0,8	1,0	0,22
I'm afraid I'm going to infect my family.	1.6	1,3	1,3	1,7	<0.001
I have difficulty empathizing with patients' suffering or connecting with their situation	0.4	0.7	0.5	0.6	0.42

(emotional distancing, emotional anaesthesia).					
Total score	8.5	10.2	9.8	12.7	<0.001
Factor 1. Affective response	2.4	3.3	3.3	4.1	<0.001
Factor 2. Fears and anxiety	3.5	3.5	3.3	4.4	<0.001

N=685

Scores from 0 to 3 points on each of the items on the scale

Scores from 0 to 30 in total on the scale

Score transformed from 0 to 10 points by a factor of 1

Score transformed from 0 to 10 points in factor 2

[a] From March 18th to March 25th, 2020 (less than 500 deaths per day)

[b] From March 28th to April 15th, 2020 (between 600 - 900 deaths per day)

[c] From April 16th to April 26th, 2020 (between 300 - 600 deaths per day)

[d] From April 27th to May 17th, 2020 (less than 300 deaths per day)

Supplementary file. Acute Stress of Health Professionals Caring COVID-19 Scale (EASE SCALE)

Please answer the following questions according to the thoughts, emotions, sensations and actions you are experiencing during these days of crisis

	It's not happening to me	It happens to me in concrete situations	It often happens to me	I'm like this all the time
I can't help but think of recent critical situations. I can't get out of work	☐	☐	☐	☐
I have completely lost the taste for things that gave me peace of mind	☐	☐	☐	☐
I keep my distance, I resent dealing with people, I'm irascible even at home	☐	☐	☐	☐
I feel that I am neglecting many people who need my help	☐	☐	☐	☐
I have difficulty thinking and making decisions, I have many doubts, I have entered a kind of emotional blockage	☐	☐	☐	☐
I feel intense physiological reactions (shocks, sweating, dizziness, shortness of breath, insomnia, etc.) related to the current crisis situation	☐	☐	☐	☐
I feel on permanent alert. I believe that my reactions now put other patients, my colleagues or myself at risk	☐	☐	☐	☐
Worrying about not getting sick causes me a strain that's hard to bear	☐	☐	☐	☐
I'm afraid I'm going to infect my family	☐	☐	☐	☐
I have difficulty empathizing with patients' suffering or connecting with their situation (emotional distancing, emotional anesthesia)	☐	☐	☐	☐

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	-
Study size	10	Explain how the study size was arrived at	5, 7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	6-7
		(*c*) Explain how missing data were addressed	-
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	6-7
		(*e*) Describe any sensitivity analyses	-
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	-
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	-
Outcome data	15*	Report numbers of outcome events or summary measures	7-8 15-17

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-8 15-17
		(*b*) Report category boundaries when continuous variables were categorized	7-8 15
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	-
Discussion			
Key results	18	Summarise key results with reference to study objectives	9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10-11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-10
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	3

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.