

## Article

# Prevalence of Stress in Healthcare Professional During COVID-19 Pandemic in Northeast México: A Remote Fast Survey Evaluation, the Use of an Adapted COVID-19 Stress Scale

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**Abstract:** The world is currently, subjected to the worst health crisis documented in modern history; an epidemic led by the novel coronavirus disease 2019 (COVID-19). At the epicenter of this crisis, healthcare professionals continue working to safeguard our well-being. To the regular high levels of stress, COVID new heights even more to healthcare professionals so depending on the area, specialty, and type of work. Here we investigated what are the tendencies, or areas most affected. Through an adaptation of the original COVID-stress scale, we developed a remote, fast test designed for healthcare professionals of the Northeastern part of Mexico, an important part of the country with economic and cultural ties to the US. Our results showed 4 key correlations as highly dependent: Work area – Xenophobia ( $p < 0.045$ ), Work with COVID patients - Traumatic stress ( $p < 0.001$ ) and Total number of COVID patients per day – Traumatic stress ( $p < 0.027$ ), and Total number of COVID patients - Compulsive checking and reassurance. Overall concluding that normal levels of stress have increased (mild – moderate). Additionally, we further determine that the fear of being an asymptomatic patient (potential to spread without knowing) continues being a concern.

**Keywords:** COVID-19 Mexico; stress in healthcare professionals; COVID-19 stress scale

## 1. Introduction

The emerging novel coronavirus SARS-CoV-2 which leads to the coronavirus disease 2019 (COVID-19), has affected the world profoundly. It has set a fresh perspective on the strong and weak points hailing from every public health care system in the world [1–6]. COVID-19 stretches the resources of these health care systems to their utmost capacity, a grave situation particularly since it is now a full-fledged pandemic [7]. Adding extra layers of complexity to the already steaming situation, in third world countries there are also to consider economic, political, and logistical situations including availability of certain pharmaceuticals, medical equipment, and adequately trained professionals [8,9]. Increasing the overall stress of the situation, in particular of those who attend the patients, whom they are not only combating the enemy at home and from the front lines, but they have to deal with the shortcomings of an overloaded system [10–12].

For all its continuous development, economic growth and closeness to the United States, Mexico continues to be a developing democracy with high economic disparity characterized by most of its population having to strive on low-wages [13]. Interestingly, at the forefront of many past

governments, health care has been a priority in Mexico, hence developing excellent community-outreach programs, which have performed well even during underfunding times [13]. This was especially true during the 2009 AH1N1 pandemic, where Mexico established the national influenza preparedness plan. This involved the development of preparedness plans for hospitals and primary care centers, strategic stockpiling, strengthening of epidemiological and laboratory surveillance, and supporting research in this area [13]. Yet the 2 greatest downfalls to the system has been the deficit of healthcare professionals and the amount of hospital capacity, which given today's circumstances gives the highest weight in trying to deal at a clinical level with the pandemic [14]. Since the outbreak of COVID-19, Mexico's health ministry began adopting a proactive position to reinforce the health system, including the national implementation of the "healthy distance" or a 2m distancing amongst people who had to perform activities which come in contact with others, a temporary suspension of non-essential activities and the recount of infected patients daily and making enormous efforts in communicating preventive measures, albeit with less than favorable results [15,16]. Unfortunately, Mexico continues to be the #1 country in Latin-America in infection-to-death rate [1,17,18]. According to the official account of COVID-19 patients in Mexico, as of July 31, 2020, there were just over 424,467 total positive cases, 46,688 deceased (>10%) [19]. The overall map of the situation as seen here poses important challenges to both population and healthcare providers, with an added stress to their overall mental health [5,6,20]. We here will illustrate the psychological burden of working under a stressed-out health care system while under the pandemic conditions of COVID-19, which by many describe it as the worst public health crisis in generations [3,7,8].

### 1.1. *Psychological impact on Healthcare Workers*

Amid the COVID-19 pandemic, stress and tension have arisen amongst physicians, residents, healthcare workers, nursing staff, and related-students. There is a sense of unpreparedness, coupled with a lack of vital resources and the excess of workload. All these factors contribute to a physical and mental breakdown, which acts as catalysis of mental health distresses [21]. Directly affecting attention, understanding, and the decision-making process, leaving long-lasting effects on their overall wellbeing [22].

The most underestimated problem during this pandemic is the overload of work the frontline healthcare professionals undergo daily. The continuous use of the personal protection equipment (PPE), in shifts of 12 to 24 hours, makes it difficult for the healthcare professional to stay focused on their work and capable of taking optional decisions. The physical exhaustion, emotional fatigue and fear of self-infection or someone in their family causes even more anxiety and stress. This overload of physical, mental, and emotional stress can be so important that it can be a trigger for developing mild to severe psychiatric disorders such as depression, anxiety, even xenophobia and dire need for compulsive checking for reassurance seeking and traumatic stress [23–25].

In a recent study by Wang et al. (2020), researchers showed the psychological impact in the initial phases of the COVID-19 pandemic; showing that over half of the population studied rated the psychological impact as moderate-to-severe, with over a third of the group reporting moderate-to-severe anxiety [26]. Elsewhere, studies have shown that stress can induce potential benefits to the need to preserve homeostasis and levels of self-motivation and survival, counter to this stress can induce negative emotions and effects such as alterations in memory, cognition, learning, immune response, sleep, cardiovascular health, gastrointestinal complications, and the endocrine system. [27]. Therefore, understanding the balance is key to maintaining a healthy environment and the adequate mental state of the person. This is especially true for frontline healthcare workers, as studies have shown that workers directly engaged with diagnosis, treatment, and care of patients with COVID-19 associate with a higher risk of symptoms of depression [28]. This study proposes to help fill the void of understanding how trained health professional by different specialties and working in different areas cope with the stress and/or have adapted to the current work environment. We have adapted a COVID stress scale [25] as the means to help identify the circumstances that most likely affect health care professionals.

## 2. Materials and Methods

This study proposes the application, of a COVID-19 stress scale (CSS) test adapted for the Spanish-speaking healthcare professional community in Mexico. Based on the 36-item questionnaire CSS developed by Taylor et al., (2020) used to assess stress and anxiety symptoms in daily life [25]. Our questionnaire analyzes 6 main areas: danger and contamination fears (evaluated together, area 1), fears about economic consequences (area 2), xenophobia (area 3), compulsive checking and reassurance seeking (area 4), and traumatic stress symptoms (area 5) all related to COVID-19. The adapted questionnaire is shown on Table 1.

The questionnaire was written using MS FORMS (©Microsoft) and was applied remotely thought a web-link. The test was distributed to healthcare professionals hailing from the Northeast part of Mexico, mainly from Monterrey, San Luis Potosi, and the Mexico-US border towns of Nuevo Laredo and Matamoros, through electronic means such as email invitations and local medical social media groups, during a 6-week period spanning from July to August 2020, period with the highest peak of daily cases reported according to México health ministry [29,30]. All subject gave their consent for inclusion before participating in the study. A Likert-scale format was used with increasing point values [31]. All statistical analysis correlations were calculated using IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, N.Y., USA) with Pearson's chi-squared and R ratio of 0.05 to value the prevalence in the alteration of the mental health in the health professional attending COVID-19 patients in Mexico.

**Table 1.** Structure and adaptation of the COVID Stress Scale [25], for Spanish speaking health care providers.

Inicial Questions	
1	Desea usted participar en el cuestionario?
2	Cual es su profesión?
3	En que área trabaja?
4	Trabaja usted con pacientes con coronavirus?
5	Con cuantos pacientes trabaja diariamente?
Section 1 (Danger)**	
6	Estoy preocupado por contraer el virus
7	Estoy preocupado de ya tener el virus y ser asintomático*
8	Me preocupa que la higiene básica (por ejemplo, el lavado de manos) no sea suficiente para mantenerme a salvo del virus
9	Me preocupa que nuestro sistema de salud no pueda mantenerme a salvo del virus
10	Me preocupa no poder mantener a mi familia a salvo del virus
11	Me preocupa que nuestro sistema de salud no pueda proteger a mis seres queridos
12	Me preocupa que el distanciamiento social no sea suficiente para mantenerme a salvo del virus
Section 2 (Socialeconomical)	
13	Me preocupa que las tiendas de comestibles se queden sin comida
14	Me preocupa que las tiendas de comestibles se queden sin remedios para el resfriado o la gripe
15	Me preocupa que las farmacias se queden sin medicamentos recetados
16	Me preocupa que las tiendas de comestibles se queden sin agua
17	Me preocupa que las tiendas de comestibles se queden sin productos de limpieza o desinfectantes.

1  
8

Me preocupa que las tiendas de comestibles cierren

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Section 3 (Xenophobia)

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1  
9

Me preocupa que personas fuera del estado estén propagando el virus.

2  
0

Me preocupa que las personas que conozco, que viven fuera de mi estado, puedan tener el virus.

2  
1

Me preocupa entrar en contacto con personas fuera del estado porque pueden tener el virus.

2  
2

Me preocupa que personas extranjeras estén propagando el virus porque no están tan limpios

como nosotros

2  
3

Si fuera a un restaurante especializado en alimentos extranjeros, me preocuparía contraer el virus

2  
4

Si estuviera en un elevador con un grupo de extranjeros, me preocuparía que estén infectados

con el virus.

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Section 4 (Fear of Contamination) \*\*

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2  
5

Me preocupa que las personas a mi alrededor me infecten con el virus

2  
6

Me preocupa que si tocara algo en un espacio público (por ejemplo, pasamanos, manija de la puerta), pueda contraer el virus

2  
7

Me preocupa que si alguien tosiera o estornudara cerca de mí, podría contraer el virus.

2  
8

Me preocupa que pueda contraer el virus al manejar dinero o usar una máquina de tarjeta de débito/crédito

2  
9

Estoy preocupado por hacer transacciones en efectivo

3  
0

Me preocupa que mi paquetería / correo haya sido contaminado por los manejadores de correo

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Section 5 (Traumatic stress)

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3  
1

Tuve problemas para dormir porque me preocupaba el virus

3  
2

Tuve malos sueños sobre el virus

3  
3

Pensé en el virus cuando no quise

3  
4

Aparecieron en mi mente, contra mi voluntad, imágenes mentales inquietantes sobre el virus

3  
5

Tuve problemas para concentrarme porque seguía pensando en el virus

3  
6

Los recordatorios del virus me provocaron reacciones físicas, como sudoración o latidos fuertes del corazón.

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Section 6 (Compulsive Checking)

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3  
7

Reviso ubicaciones en redes sociales sobre COVID-19

3  
8

Reviso videos de YouTube sobre COVID-19

3  
9

Solicitó tranquilidad a amigos o familiares sobre COVID-19

4  
0

Reviso mi propio cuerpo en busca de signos de infección (p. Ej., Tomando mi temperatura)

4 Pido consejo a los profesionales de la salud (por ejemplo, médicos o farmacéuticos)  
1 sobre COVID-19  
4  
2 Busco en Internet tratamientos para COVID-19

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Final questions for future follow-up

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4 Ha sido diagnosticado con COVID 19  
3  
4 ¿Le interesaría en un futuro participar en un cuestionario para seguimiento de su salud  
4 mental?\*\*\*  
4 Le agradecemos su interés y le pedimos, por favor nos deje una dirección de correo  
5 electrónico\*\*\*

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\* Fear of being an asymptomatic patient (FOBAP)

\*\* Danger and Fear of Contamination were evaluated together as area 1

\*\*\* Followup interest

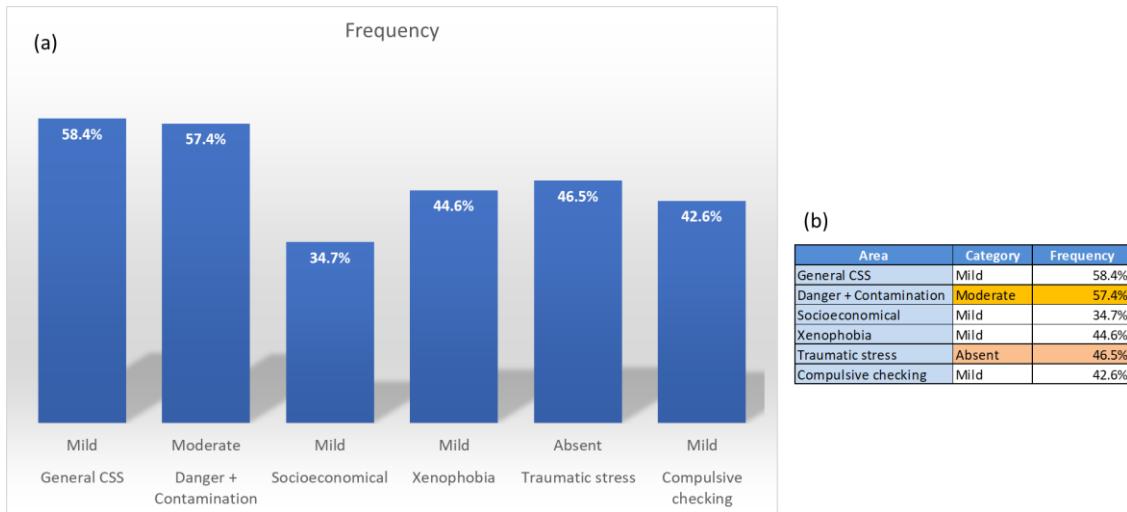
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Briefly, we calculated the frequency to answers in relation to categories, areas and other variables. We then correlated answers to the number of points in each section. The resulting ranges were classified in the following categories 0-5 absent, 6-11 mild, 12-17 moderate, and 18-24 severe. Next, we made a general scale to assess COVID-19 stress, using cumulative scores for each section 0-35 absent, 36-71 mild, 72-107 moderate, and 108-144 severe. An extra question was added to the first section of the questionnaire measuring “the fear of being an asymptomatic patient” (FOBAP), which was scored independently, not to alter the structure of the original CSS. The scores for FOBAP on a scale of 0-4 and a classification was correlated to the number of points scored in the question 0 absent, 1 normal, 2 mild, 3 moderate, and 4 severe. Other items regarding health case profession corresponding to the level or type of training, specialties, areas of work, number of COVID-19 patients attended per day, and if they had themselves a previous diagnose of COVID-19 were added, as well as their willingness to continue participating in follow-up questionnaires, totaling 45 items.

### 3. Results

From 110 participants remotely recruited, 6 presented exclusion factors, i.e., declining to take part in the test. Also, participants were not required to answer all sections to advance through the questionnaire. Out of the total participants that answered the CSS we obtained the following results.

First, from the evaluated stress level frequency for all health care professionals in accordance to the general areas, the percentage of frequency was as followed: on area 1 + 4 3% scored absent, 22.8% mild, 57.4% moderate, and 16.8% severe, on area 2 29.7% scored (absent), 34.7% mild, 23.8% moderate, and 11.9% severe, on area 3 14.9% scored absent, 44.6% mild, 28.7% moderate, and 11.9% severe, on area 5 46.5% scored absent, 24.8% mild, 20.8% moderate, and 7.9% severe, on compulsive checking and reassurance seeking area 6 25.7% scored absent, 42.6% mild, 21.8% moderate, and 9.9% severe (Table 2). The most representative values are presented in Figure 1.



**Figure 1.** Most representative COVID stress level frequency for health care providers by area. (a) Graph of frequencies in relation to areas. (b) Table showing the most representative frequencies in each area. Areas of Socioeconomical, Xenophobia, Compulsive Checking show levels of mild stress, Danger and Contamination show levels of moderate stress, and Traumatic stress show absent of stress.

**Table 2.** COVID-related stress frequency for health care providers correlated to General CSS and studied individual areas.

Asymptotic sig.	0.000	0.000	0.009	0.000	0.000	0.000
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a. 0 cells (0.0%) have an expected frequency lower than 5. The expected minimum frequency is 25.3.

Next, we analyzed the data for correlations separating it into different categories. First, we analyzed by professions: physician resident, physician, medical student, physician in community service<sup>1</sup>, nursing, and other. Next by work area: pediatrics, first line healthcare provider<sup>2</sup>, COVID-19 designated area, internal medicine, intensive care unit (ICU), radiology, obstetrics, and gynecology (OBGYN), surgical area, emergency room (ER), and others. Then, we analyzed for previous COVID-19 diagnostic, work with COVID-19 patients, total number of COVID-19 patients per day (separate analysis based on the number of patients. Finally, the FOBAP question.

We began by looking at the category for professions, correlating to total CSS ( $p<0.977$ ) showed the following correlations in area 1 ( $p<0.840$ ), area 2 ( $p<0.367$ ), area 3 ( $p<0.931$ ), area 4 ( $p<0.108$ ), area 5 ( $p<0.524$ ) (supplemental table 1). Next, we separated data into medical and nursing professional and correlated to CSS ( $p<0.849$ ), and for individual areas results showed the following correlations area 1 ( $p<0.629$ ), area 2 ( $p<0.321$ ), area 3 ( $p<0.700$ ), area 4 ( $p<0.677$ ), area 5 ( $p<0.357$ ) (supplemental table 2). We then analyzed by work area correlated to CSS ( $p<0.275$ ) and for individual areas results showed the following correlations for area 1 ( $p<0.998$ ), area 2 ( $p<0.489$ ), area 3 ( $p<0.045$ ), area 4 ( $p<0.144$ ), area 5 ( $p<0.2507$ ) (supplemental table 3). We further analyzed the data by positive diagnosis to COVID-19, resulting for total CSS ( $p<0.664$ ), and for individual areas as followed area 1 ( $p<0.542$ ), area 2 ( $p<0.664$ ), area 3 ( $p<0.653$ ), area 4 ( $p<0.781$ ), area 5 ( $p<0.666$ ) (supplemental table 4). We then analyzed the data as related to professionals if they work with COVID-19 positive patients, resulting for total CSS ( $p<0.303$ ), and for individual areas as followed area 1 ( $p<0.266$ ), area 2 ( $p<0.786$ ) area 3 ( $p<0.553$ ), area 4 ( $p<0.001$ ), area 5 ( $p<0.121$ ) (supplemental table 5). We then reanalyzed by the number of patients they work with, resulting for the total CSS ( $p<0.076$ ). For individual areas as followed area 1 ( $p<0.122$ ), area 2 ( $p<0.521$ ), area 3 ( $p<0.077$ ), area 4 ( $p<0.027$ ), area 5 ( $p<0.047$ ) (supplemental table 6). Finally, we analyzed the data in relation to the FOBAP question, results for the total CSS were ( $p<0.000$ ), area 1 ( $p<0.003$ ), area 2 ( $p<0.638$ ), area 3 ( $p<0.047$ ), area 4 ( $p<0.002$ ), area 5 ( $p<0.024$ ) (supplemental table 7). Table 3, shows Pearson's chi-squared test for all tested correlations.

**Table 3.** Overview of all resulting Pearson's chi-square for all tested correlations.

	TOTAL CSS	DANGER + CONTAMINATI ON	SOCIOECONO MIC CONSEQUENC ES
		XENOPHOB IA	TRAUMATIC STRESS
medical professions	$p<0.977$	$p<0.840$	$p<0.367$
medical vs nursing professionals	$p<0.849$	$p<0.629$	$p<0.321$
work area	$p<0.275$	$p<0.998$	$p<0.498$
previous COVID positive diagnostic	$p<0.664$	$p<0.542$	$p<0.664$
work with COVID patients	$p<0.303$	$p<0.266$	$p<0.786$
total number of COVID patients per day	$p<0.076$	$p<0.122$	$p<0.521$
Fear of being an asymptomatic patient (FOBAP)	$p<0.000$	$p<0.003$	$p<0.638$

<sup>1</sup> Physician in community service, is a medical student whom has finished the required medical school training in Mexico and is doing a compulsive 1-year internship at a local community hospital or health facility, after which time, the student is awarded their medical license.

<sup>2</sup> First line healthcare provider, is a common term in Spanish for certain healthcare providers in a designated area that fall into primary health provider and front-line healthcare provider both common -terms in English speaking countries. Emergency care providers fall in a separate category.

medical professions	p<0.931	p<0.108	p<0.524
medical vs nursing professionals	p<0.700	p<0.677	p<0.357
work area	<b>p&lt;0.045</b>	p<0.144	p<0.250
previous COVID positive diagnostic	p<0.653	p<0.781	p<0.666
work with COVID patients	p<0.553	<b>p&lt;0.001</b>	p<0.121
total number of COVID patients per day	p<0.077	<b>p&lt;0.027</b>	<b>p&lt;0.047</b>
Fear of being an asymptomatic patient (FOBAP)	<b>p&lt;0.047</b>	<b>p&lt;0.002</b>	<b>p&lt;0.024</b>

#### 4. Discussion

From the data recollected, looking at frequency of response by area, our results as seen on Table 2 and Figure 1 showed that the areas of socioeconomical consequences, xenophobia, and compulsive checking scored responses potentially representing mild stress, meanwhile danger and contamination scored tendencies of moderate stress and strikingly traumatic stress scored absent. We should note that this is a first approximation that encompasses all data with no breakdown. According to this analysis, the most predominant result is mild levels of stress because of the COVID-19 pandemic. Theoretically, an absent result of COVID-19 induced stress is what one would expect under normal conditions. We must emphasize that daily lives and activities, particularly in “naturally high-stressful jobs” such as health care [32–34] do amount to a particular level of individual stress, which should never be discarded when evaluating a person. Yet, our observations are on the effects of the pandemic over these normal levels of stress. Remarking that the COVID-19 pandemic has been one of the worst pandemics in recorded history [35–37], it is understandable that the levels of evaluated stress would rise. In a systematic review by Luken et al., (2016), researchers pointed-out that even under “normal” conditions, job burnout related to stress was high particularly for health care professionals. Considering the pandemic, it is not surprising that the apparent stress for most areas have risen from apparent absent to mild. We should also note that these researchers mentioned that healthcare and other professionals presented with distressing activities, such as mindfulness seminars or other relaxing techniques, would present considerably less burnout [32,38]. As stress rises across the board, it was predictable to see the areas of danger and contaminations would have shown even higher levels of stress, which for us translated into potential moderate levels. What we find interesting is traumatic stress, as it scored in a general view as potentially absent. One likely scenario taking place is the beginning of “normalization” of conditions at work. As guidelines have improved work conditions professionals could experience a relief surpassing that initial traumatic stress phase [5,39]. Next, we will begin to breakdown and make correlations, we will see how more individualized populations analyzed for different variables statistically correlated with different areas affected by COVID stress. As we embark further into the outcome of the pandemic, it would be interesting to ask if this “normalization” can spill into the other categories, and how this varies along with the reduce number of cases as the global situation improves. Yet, for our initial work this is the picture we have during the months of July - August, almost 6 months after the first reported case in Northeast Mexico [40].

Different healthcare professionals perceive stress in different ways, this in part because of their training (type, experience, level), their current work area, the type and number of patients they work with every day, and other related variables. When analyzing the data, we took these variables into consideration to better understand the tendencies of our results. In Table 3 we can observe 4 interesting statistical correlations in 3 areas when crossed with categories in the following manner Work area – Xenophobia ( $p < 0.045$ , Table 4 and supplemental Table 3), Work with COVID patients - Traumatic stress ( $p < 0.001$ , Table 5a and supplemental Table 5) and Total number of COVID patients per day – Traumatic stress ( $p < 0.027$ , Table 5b and supplemental Table 6), and Total number of COVID patients - Compulsive checking ( $p < 0.024$ , Table 6 supplemental Table 6).

Our first observation relates to the correlation of Work area – Xenophobia, where 41.7% of the total response showed a tendency towards a mild level of stress. Professionals working “others”<sup>3</sup> area, and in a COVID designated area, had the highest proportional totaling a combined of 53%. Within COVID designated area, mild levels of stress represented 72.7% of their total. Mild levels of “Others” represented their 70%. Results of moderate levels of stress was the second highest category representing 28.2% with first line health care providers and internal medicine representing 42%. The results for these categories continue to affirm the mild tendency of fear towards people from outside the state. Although the overall tendency is mild levels of stress, these results seem to associate with potential migration. For the case of the border towns, border crossings is a normal activity, yet in past several years there have been noticeable waves of migrants from outside the country seeking asylum to the US coming from central and south America [41]. Even though these waves began before the current pandemic, these asylum seekers represent vulnerable groups with low or no income. Therefore, it is reasonable to think COVID-19 sprouts within these vulnerable groups would spread fast [42–44]. For the cases of Monterey and San Luis Potosi, these are both major metropolitan cities geographically at close distance with the US. Both cities hold major airports, and major highways which makes it easy to have high affluency of regional and out-of-state visitors.

**Table 4.** Work area correlated to Xenophobia.

Work area - Xenophobia											
Work area - Xenophobia		ABSENT	(%) ↓	MILD	(%) ↓	MODERATE	(%) ↓	SEVERE	(%) ↓	Total	(%) ↓
Pediatrics	Frequency	0	0	0	0	3	10	0	0	3	3
	Percentage (%)	0.0%		0.0%		100.0%		0.0%		100.0%	
First line healthcare provider	Frequency	10	0	9	21	8	28	2	20	29	28
	Percentage (%)	34.5%		31.0%		27.6%		6.9%		100.0%	
COVID designated area	Frequency	2	10	8	19	0	0	1	10	11	11
	Percentage (%)	18.2%		72.7%		0.0%		9.1%		100.0%	
Internal medicine	Frequency	2	10	2	5	4	14	1	10	9	9
	Percentage (%)	22.2%		22.2%		44.4%		11.1%		100.0%	
Surgical	Frequency	0	0	1	2	2	7	0	0	3	3
	Percentage (%)	0.0%		33.3%		66.7%		0.0%		100.0%	
ICU	Frequency	0	0	2	5	2	7	0	0	6	6
	Percentage (%)	0.0%		33.3%		66.7%		0.0%		100.0%	
Radiology	Frequency	1	5	1	2	0	0	0	0	2	2
	Percentage (%)	50.0%		50.0%		0.0%		0.0%		100.0%	
OBGYN	Frequency	2	10	3	7	3	10	3	30	11	11
	Percentage (%)	18.2%		27.3%		27.3%		27.3%		100.0%	
ER	Frequency	3	14	3	7	2	7	1	10	9	9
	Percentage (%)	33.3%		33.3%		22.2%		11.1%		100.0%	

<sup>3</sup> All areas not accounted for in our work area breakdown

Others	Frequency	1	5	14	33	3	10	2	20	20	19
	Percentage (%)	5.0%		70.0%		15.0%		10.0%		100.0%	
Total	Frequency	21	100	43	100	29	100	10	100	103	100
	Percentage (%)	20.4%		41.7%		28.2%		9.7%		100.0%	
	Value	df	Sig. Asymptotic (bilateral)								
Pearson Chi-square	40.607 <sup>a</sup>	27	0.045								
Verisimilitude	44.182	27	0.020								
linear association	1.111	1	0.292								
N cases	103										

Results for traumatic stress proved to be highly dependent upon 2 categories: work with COVID patients (Table 5a) and the number of patients they work with (Table 5b). Previously, we mention that traumatic stress score overwhelmingly as absent (Table 2, Figure 1), and when broken-down by categories this continues to hold true. From the total of participants who took the test, 58% answered yes to working directly with COVID-19 patients, further the participants from the participants who work with COVID-19 35% scored potential absent levels of stress, and when compared to their counterpart (not working with COVID-19 patients) the result more than doubled with 72.1% scoring absent. Remarkably, healthcare professionals who do work with COVID-19 positive patients scored higher in the mild category with 45%, which was almost 4 times higher than their counterparts who scored 11.6%. When combined the absent result represented 50.5% (40% work with COVID-19 patients and 60% not working with COVID-19 patients), meanwhile the mild result was 31.1% (84% work with COVID-19 patients and 16% not working with COVID-19 patients). These results show that there is a high sense of relief in stress tendency by not working directly with COVID-19 patients. Nonetheless when it comes to those working with COVID-19 patients, the tendency is to score low in the overall stress level, but the perceivable difference is almost 10% higher in the mild result, a significant difference. When we analyzed by number of patients, slightly more than half 50.8% scored absent (albeit 71% represented no patients), while the mild category only scored 31.1%. We also found that 50% of professionals working with more than 20 COVID-19 patients scored absent and 41.7% scored mild, totaling 91.7% of that particular group. Although this was almost an outlier situation, other professionals working with COVID-19 had similar tendencies, but in all other cases the mild result had the highest frequency typically followed by absent. Only the group of 10 to 20 patients (lowest number of professionals) per day showed higher tendency in the moderate results. Although more analysis is needed, the 10 to 20 patient per day ratio brings up some interesting questions, such as is this the range where professionals work with more critical patients? Is the time spent with these patients sufficient to induce moderate stress? What other conditions play into the tendency? Along with stress, the compulsive need for checking and reassurance (Table 6) also depended on the number of patients seen per day, and as expected there were similar tendencies. One interesting observation found when looking at the group with a low number of patients (1 to 5) is that they scored 30.3% in the moderate level and 39.8% in the mild, rivaled only by the 10 to 20 patients per day which was 50% in the moderate and 33.3% in the mild, therefore the need to check and reassure oneself potentially depends on the number of patients. As we stated before, this is rational as the number of patients also seems to induce a sense of traumatic stress. Taylor et al. confers that in time of pandemic people exhibit anxiety related responses, both traumatic stress, and the need for checking and reassurance fall into these behaviors as the second is a self-defense mechanism in order to, mitigate the feelings developing during stressful situations [25].

**Table 5.** Traumatic stress correlated to a) Work with patients, b) Number of patients.

**a) Work with COVID patients - Traumatic stress**

		ABSENT	(%) ↓	MILD	(%) ↓	MODERATE	(%) ↓	SEVERE	(%) ↓	Total	(%) ↓
Yes	Frequency	21	40	27	84	7	64	5	63	60	58

Work with COVID patients	No	Percentage (%)	35.0%	45.0%		11.7%		8.3%		100.0%	
		Frequency Percentage (%)	31	60	5	16	4	36	3	38	43
		Frequency Percentage (%)	72.1%	11.6%		9.3%		7.0%		100.0%	
Total		Frequency Percentage (%)	52	100	32	100	11	100	8	100	103
		Value	df	Sig. Asymptotic (bilateral)							
Pearson Chi-square	15.996 <sup>a</sup>	3	0.001								
Verisimilitude	17.074	3	0.001								
linear association	8.298	1	0.004								
N cases	103										

a. 3 cells (37.5%) have an expected frequency lower than 5. The minimum expected frequency is 3.34.

### b) # Patients - Traumatic stress

# of Patients	0	ABSENT	(%) ↓	MILD	(%) ↓	MODERATE	(%) ↓	SEVERE	(%) ↓	Total	(%) ↓				
	0	Frequency Percentage (%)	31	60	5	16	4	36	3	38	43				
		Frequency Percentage (%)	72.1%	11.6%		9.3%		7.0%		100.0%					
	1 to 5	Frequency Percentage (%)	10	19	16	50	3	27	4	50	33				
		Frequency Percentage (%)	30.3%	48.5%		9.1%		12.1%		100.0%					
	5 to 10	Frequency Percentage (%)	4	8	3	9	1	9	1	13	9				
		Frequency Percentage (%)	44.4%	33.3%		11.1%		11.1%		100.0%					
	10 to 20	Frequency Percentage (%)	1	2	3	9	2	18	0	0	6				
		Frequency Percentage (%)	16.7%	50.0%		33.3%		0.0%		100.0%					
	> 20	Frequency Percentage (%)	6	12	5	16	1	9	0	0	12				
		Frequency Percentage (%)	50.0%	41.7%		8.3%		0.0%		100.0%					
Total		Frequency Percentage (%)	52	100	32	100	11	100	8	100	103				
		Frequency Percentage (%)	50.5%	31.1%		10.7%		7.8%		100.0%					
		Value	df	Sig. Asymptotic (bilateral)											
Pearson Chi-square	23.126 <sup>a</sup>	12	0.027												
Verisimilitude	24.853	12	0.016												
N cases	103														

a. 15 cells (75.0%) have an expected frequency lower than 5. The expected minimum frequency is .47.

## 5. Conclusions

We have shown here the application of a COVID stress scale for healthcare professionals in the Northeast of Mexico. Healthcare professionals attending COVID-19 showed mostly mild and, in particular cases, moderate stress in different areas being traumatic stress, xenophobia and compulsive checking the most predominant in their daily lives. Alongside this there is a fear of being an asymptomatic patient, as this condition might mean they themselves are a source of infection to the community and to their patients. Unfortunately, our study is limited to a small number of participants, from different work areas and specialties. A larger number size of participant per area and specialties is needed to be thoroughly conclusive. Yet, our results show important tendencies, which should be addressed of how different areas in the medical field are being affected. In addition,

levels of stress and potential burnout should be an essential focus at an administrative level to maintain a healthy team of healthcare professionals.

**Supplementary Materials:** The following are available online at [www.mdpi.com/xxx/s1](http://www.mdpi.com/xxx/s1),

- Supplemental Table 1. COVID Stress Scale test correlations by training.
- Supplemental Table 2. COVID Stress Scale test correlations medical / nursing.
- Supplemental Table 3. COVID Stress Scale test correlations by work area.
- Supplemental Table 4. COVID Stress Scale test correlations by COVID diagnosis.
- Supplemental Table 5. COVID Stress Scale test correlations by work with (or not) COVID+ patients.
- Supplemental Table 6. COVID Stress Scale test correlations by work with number of COVID+ patients.
- Supplemental Table 7. FOBAP correlations by CSS areas.
- Supplemental Table 8. Development of the scale construction scores for FOBAP analysis.

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