

Features of Anesthesiologists-Reanimatologists' Emotional States in Different COVID-19 Pandemic Periods in Russia

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Introduction: The COVID-19 pandemic is one of the most stressful events in recent times. Medical professionals, including anesthesiologists-reanimatologists, suffered the main blow in this difficult and stressful environment.

Aims: This study aimed at identifying the features of anesthesiologists-reanimatologists' emotional states in different COVID-19 pandemic periods.

Methods: The study was conducted through an anonymous questionnaire among anesthesiologists-reanimatologists in two periods. In the First stage – which was carried out in May 2020 (during the first COVID-19 pandemic wave) – 58 anesthesiologists-reanimatologists in the Arkhangelsk region took part. During the Second segment – which took place in October 2020 (in the second COVID-19 pandemic wave) – 43 anesthesiologists-reanimatologists were examined. Repeated questioning was carried out among the same participants.

Results: In October 2020, compared to May, the number of doctors who noted a high intensity of professional activity increased. Regardless of the study period, one-third of the subjects experienced constant pronounced anxiety. Anesthesiologists-reanimatologists, whose professional activity was directly related to the patients in COVID-19 care, noted a poorer emotional state more frequently in October, accompanied by anxiety, depressed mood, irritability and a high burnout level, which may indicate a depletion of internal resources in this group.

Conclusions: The study results showed that for anesthesiologists-reanimatologists, a further depletion of emotional resources accompanied the second pandemic wave. The anesthesiologists-reanimatologists' emotional state was mediated by a number of social and gender factors, as well as specific labor organization features.

Keywords: COVID-19 pandemic, anesthesiologists-reanimatologists, mental health, emotional state, anxiety

Introduction

The issue of coronavirus infection consequences is currently one of the most discussed in the media and scientific circles (Bolobokina et al., 2020; Correia et al., 2020; Pervichko & Konyukhovskaya, 2020; Raudenská et al., 2020; Wu et al., 2020), and the COVID-19 pandemic remains one of the most stressful events in recent times (Di Tella et al., 2020; Kühlmeyer et al., 2020). Medical professionals bore the main blow in this difficult and stressful environment. Many medical workers, including anesthesiologists-reanimatologists, labored in conditions that actually qualified as extreme conditions. They had an increased risk for infecting themselves and their relatives, and also worked in increased physical and emotional stress conditions, bearing responsibility for severely ill patients' lives (Almeida & DeCavalcante, 2021; Galbraith et al., 2020; Korehova et al., 2020; Ornell et al., 2020; Petrikov et al., 2020). Intensive care unit doctors experienced additional stress when dealing with elderly and/or severely ill patients (Neto et al., 2020). Working in such difficult conditions places increased demands on the personal character and stress resistance of anesthesiologists-reanimatologists, whose professional activity is considered as one of the most stressful, saturated with harmful health factors (Lebedinsky et al., 2004). They needed to quickly make responsible decisions affecting the patients' lives, often had to work in information and emotional overload and uncertain conditions, as well as in situations accompanied by painful ethical difficulties (Koshkin et al., 2015; Mamas & Kosarevskaya, 2010; Nyssen et al., 2003).

During the COVID-19 pandemic, the anxiety and stress disorders frequency among medical personnel stood quite high, and in women it registered higher than in men (Zhou & Panagioti, 2020). Medical professionals who treated patients with COVID-19 were most likely to develop psychological distress and post-traumatic stress disorder (PTSD) symptoms. According to the results conducted in 34 hospitals in China in January-February 2020, it was found that a significant proportion of nurses and doctors reported depression (50.4%), anxiety (44.6%), insomnia (34.0%) and distress (71.5%) symptoms (Lai et al., 2020). In China, intensive care physicians showed burnout signs in 82.1% and severe burnout in 38.8% (Wang et al., 2021). Studies conducted in Russia during the pandemic confirmed that a significant percentage of medical workers experienced high professional burnout rates, depression symptoms, increased anxiety and suicidal orientation levels (Kravchenko et al., 2020; Matyushkina et al., 2020).

Selye's stress theory (Selye, 1974) had already described stress development dynamics decades ago. In the first stage (the anxiety stage), all the body resources were mobilized and adapted to helping the stressor action. However, with an increase in the exposure to the stressor duration, the body's strength became depleted and a risk existed for pathological consequences. For medical professionals, the need to stay in stressful conditions for an extended time during the COVID-19 pandemic, in the personal and external resources case shortage, was highly likely to lead to chronic exhaustion and long-term psychological consequences. There were studies analyzing PTSD symptom prevalence and mental disorders in health care workers during other disease outbreaks, such as SARS in Asia, in four temporary, *a priori*, phases: the acute phase – i.e., (1) during the pandemic and up to 1.5 months after it; (2) 1.6–5.9 months after it; (3) 6–11.9 months after it; (4) 12 months after it and later. Clinical PTSD manifestations became less frequent over time: in the acute phase, the prevalence estimate was 23.4%, and in the “12 months plus” window it was 11.9%. Interesting data were obtained on the general psychiatric morbidity among medical workers: in the acute phase 34.1%; after 6–12 months 17.9%; and after 12 months plus 29.3% of medical workers reported psychiatric symptoms (Allan et al., 2020). In a study conducted in the United States among medical workers during the COVID-19 pandemic, compared with the pre-pandemic period, there was a significant decrease in overall well-being, life satisfaction, and a significant increase in difficulties of falling asleep, and a sense of fear concerning their work (Fitzpatrick et al., 2020). Practically no studies exist on emotional states in different COVID-19 pandemic periods in the same professional group.

In that regard, this study's aim focused on identifying the features of anesthesiologists-reanimatologists' emotional states in different COVID-19 pandemic periods: in May 2020 (during the first pandemic COVID-19 wave) and in October 2020 (the second COVID-19 pandemic wave).

Methods

Study Design and Selection of Participants

The study was conducted via an anonymous survey among doctors, specifically anesthesiologists-reanimatologists in the Arkhangelsk region. Only about 200 anesthesiologists-reanimatologists serve in this region. The questionnaire was sent to all the region's anesthesiologists-resuscitators, and 58 people responded.

The prospective longitudinal study was conducted in two periods: in May 2020 (during the first pandemic COVID-19 wave) and in October 2020 (in the second COVID-19 pandemic wave). The repeated questioning was carried out among the same doctors.

Table 1. Socio-Demographic Characteristics of the Sample

Socio-demographic characteristics of the sample	First period (n = 58)	Second period (n = 58)
Age	32.7 ± 1.7	28.0 ± 1.2
Sex		
Male	29 (50.0%)	26 (60.5%)
Female	29 (50.0%)	17 (39.5%)
Professional experience		
Up to 5 years	37 (63.8%)	31 (72.1%)
From 5 to 10 years	6 (10.3%)	5 (11.6%)
Over 10 years	15 (25.9%)	7 (16.3%)
Marital status	Second	Second
Married	26 (44.8%)	16 (37.2%)
Single	27 (46.6%)	27 (62.8%)
Divorced	4 (6.9%)	-
Widowed	1 (1.7%)	-
Number of children		
No children	32 (55.2%)	30 (69.8%)
1 child	18 (31.0%)	5 (11.6%)
2 children	4 (6.9%)	7 (16.3%)
3 or more children	4 (6.9%)	1 (2.3%)
City of residence in the Arkhangelsk region		
Arkhangelsk	49 (84.5%)	41 (95.3%)
Novodvinsk	1 (1.7%)	2 (4.7%)
Severodvinsk	4 (6.9%)	-
Kotlas	4 (6.9%)	-
City in the Arkhangelsk region where you work		
Arkhangelsk	50 (86.2%)	41 (95.3%)
Severodvinsk	4 (6.9%)	2 (4.7%)
Kotlas	4 (6.9%)	-

Sample

In the First period (May 2020), 58 anesthesiologists-reanimatologists in the Arkhangelsk region were examined. In the Second period (October 2020), 43 of the 58 participants took part in the survey again. Socio-demographic characteristics of the sample are shown in Table 1.

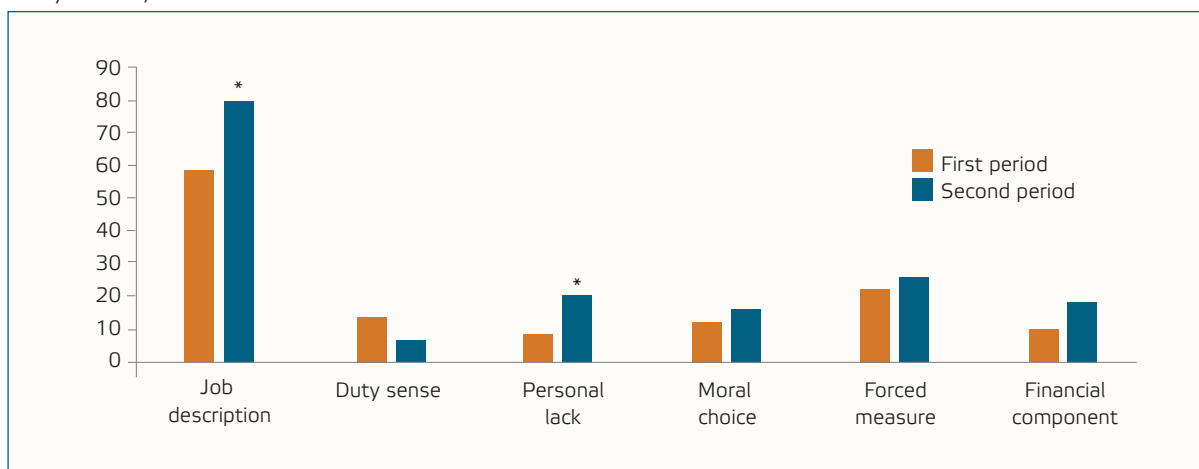
In addition, the survey data were analyzed depending on whether the professionals provided direct assistance to patients with COVID-19 or not. A group of doctors (DIP) was associated with providing daily care to patients with coronavirus infection (DIP – 27.6 % and 39.5% at Stages 1 and 2, respectively). The other group of doctors (NIP) did not participate in providing care to patients with coronavirus infection on a daily and direct basis (NIP – 72.4% while 60.5% were involved at Stages 1 and 2, respectively).

Measurements

In the study, we used an anonymous survey form, distributed among doctors, specifically anesthesiologists-reanimatologists, including several question blocks. In Block 1, questions were related to socio-demographic characteristics. In Block 2, questions were asked about the facts, causes, and characteristics of working conditions with COVID-19 patients. In Block 3, questions were used to measure some features of the doctors' emotional state and mental health.

When answering a number of questions in the questionnaire, an 11-point rating scale was proposed to assess the severity of a particular characteristic (0 meant the absence of the characteristic, 10 meant a very strong

Figure 1. Prevalence of the Reasons why Anesthesiologists-Reanimatologists Worked with COVID-19 Patients in Both Study Periods, %



Note: The differences are significant at * $p \leq .05$ (conjugacy tables).

presence of the characteristic). For some other questions, multiple choice answers were offered from which the respondents were required to choose only one. The second survey conducted later on the same sample of anesthesiologists-reanimatologists contained the same questions.

Research Ethics

All participants were clearly explained the study's goals and methods, and they signed a consent form for participation in the study. They were told about the right to stop participating in the study without providing an explanation. All information received was encrypted and kept secret. The study was anonymous, each subject identified himself with a certain nickname that remained the same during both study periods.

Research Hypotheses

- The emotional state of anesthesiologists-reanimatologists worsens with prolonged exposure to a stressor, such as in the form of a prolonged unfavorable epidemiological situation due to the COVID-19 pandemic.
- The emotional state of anesthesiologists-resuscitators during the COVID-19 pandemic is associated with a number of social and gender factors, as well as peculiarities of labor organization.

Statistical Analysis

The analyses were processed using the SPSS Statistics application software package (version 23.00, license Z125-5301-14). We used the descriptive statistics parameters, the Wilcoxon T-test for dependent samples, because some distributions of the variables were different from normal. Frequency tables and chi-square statistics were used to assess differences in occurrence frequency. The differences were considered significant at $p < .05$.

Results

In the First period, one-third of anesthesiologists-reanimatologists' professional activities were related to providing care to patients with COVID-19; at the second stage of the study, the number of doctors working with such patients increased.

One of the reasons why anesthesiologists-resuscitators provided care to patients with COVID-19 was an official duty, regardless of the study period (Figure 1). In the First study term, a greater number of doctors believed that they were working with such patients out of duty.

The comparative results of the survey for the study's different periods are presented in Table 2. The proportion of male doctors' care activity directly related to COVID-19 patients was approximately the same in both periods, while among women, this number increased three times. As we introduced above, official duty and forced

Table 2. Categorical Indicators According to the Survey Data Among Anesthesiologists-Reanimatologists at Different Stages of the Study (in %)

Indicators	Period 1	Period 2	Chi ² statistics	Women			Men			
	(n = 58)	(n = 43)		Period 1	Period 2	Chi ² statistics	Period 1	Period 2	Chi ² statistics	
				(n = 29)	(n = 17)		(n = 29)	(n = 26)		
Professional activity is related to providing care to patients with COVID-19	27.6	39.5	1.209 $p = .272$	13.8	35.3	2.912 $p = .088$	41.3	42.3	0.109 $p = .741$	
High risk degree of COVID-19 infection during professional activity	48.3	74.4	6.156 $p = .013$	31.0	88.0	14.053 $p = .000$	68.9	65.4	0.080 $p = .778$	
Very high degree in severity and intensity of professional activity	48.3	69.8	4.665 $p = .031$	24.1	64.7	7.405 $p = .007$	68.9	73.1	0.112 $p = .737$	
Feeling unwell	8.6	23.5	4.182 $p = .041$	6.9	11.8	0.320 $p = .572$	10.3	30.8	3.574 $p = .054$	
You experience anxiety every day, almost every day	31.0	32.5	0.026 $p = .871$	30.9	35.2	0.088 $p = .766$	30.9	30.7	0.000 $p = .983$	
Sleep up to 6 hours a day	51.7	60.5	0.374 $p = .541$	34.5	64.5	3.946 $p = .047$	62.1	50.0	0.812 $p = .368$	
Sleep up to 6 hours a day	Insufficient provision of personal protective equipment	74.1	41.9	10.755 $p = .001$	72.4	47.1	2.957 $p = .085$	75.9	38.5	7.882 $p = .005$
	Organizational difficulties	44.8	20.9	6.227 $p = .013$	41.4	0	9.517 $p = .002$	48.2	34.6	1.051 $p = .305$
	Concern about the possibility of transferring the infection home	87.9	25.6	40.498 $p = .000$	82.7	76.5	0.269 $p = .604$	93.1	69.2	5.252 $p = .022$
There is hope that everything will end soon	67.2	62.7	0.577 $p = .447$	62.1	88.2	10.619 $p = .001$	72.4	46.2	3.293 $p = .070$	
There are concerns about the insecurity of professional activity with COVID-19 patients from a legal point of view	91.4	62.7	12.254 $p = .000$	96.6	58.8	10.619 $p = .001$	86.2	65.4	3.293 $p = .070$	
The COVID-19 situation has greatly changed the values of life	13.8	20.9	0.708 $p = .400$	24.1	11.8	1.043 $p = .307$	20.7	26.9	6.078 $p = .014$	
They believe that after resolving the COVID-19 situation, life will be completely different	18.9	41.9	6.324 $p = .012$	17.2	35.3	1.920 $p = .166$	20.7	46.2	4.038 $p = .044$	

measures counted as the most common reasons for both male and female doctors working with COVID-19 patients. Among women, for the Second study period, the prevalence of such reasons for working with these patients significantly decreased (official duty: 88.2% and 51.7%, respectively, $\chi^2 = 6.298$, $p = .012$; personnel shortage: 23.5% and 3.4%, respectively, $\chi^2 = 4.461$, $p = .035$). Female doctors estimated the infection risk degree during their professional duties in the First period to be lower than in the Second period (5.6 ± 2.4 and 7.5 ± 1.9 , respectively, $Z = -2.047$, $p = .041$). At the same time, it was with women, in the First study period, that a higher emotional burnout level with physical and mental exhaustion signs was noted (4.3 ± 2.4 and 2.6 ± 2.4 , respectively, $Z = -2.236$, $p = .025$).

Interestingly, in the Second period, the proportion of women who believed that the situation with COVID-19 would soon be resolved and they would live the same life as before increased, unlike with the men, where the reverse change was observed ($p \leq .05$).

A comparative analysis of the results, depending on whether the respondents directly assisted patients with COVID-19, is presented in Table 3.

Anesthesiologists-reanimatologists who were directly involved in providing care to patients with COVID-19 (DIP), compared to doctors who were not directly involved in this (NOP), and regardless of the study period, more often noted a higher work severity and intensity degree ($\chi^2 = 4.376$, $p = .036$ and $\chi^2 = 4.546$, $p = .033$, at Periods 1 and 2, respectively) and a higher infection risk degree during their professional duty performance ($\chi^2 = 9.621$, $p = .002$ and $\chi^2 = 2.919$, $p = .093$, at Period 1 and 2, respectively).

In the DIP group, more than half of the doctors reported poor health during the Second study period, and during the First, this indicator was found only in every tenth patient ($p < .05$).

Among anesthesiologists-reanimatologists in the NIP group at the Second study period, we observed an improvement of well-being and mood, reduction of anxiety ($p < .05$).

Interestingly, in the First period, the DIP group was less likely to have a bad emotional state, anxiety, low mood, irritability, compared with the NIP group. In the Second period, the situation was already changing: the doctors in the DIP group were more likely to experience anxiety, have a high emotional burnout level, and poor health.

Discussion

In the study based on a sample of anesthesiologists-reanimatologists in October 2020, the number of doctors involved in providing care to patients having COVID-19 increased compared to May 2020; the number of doctors quarantined due to contact with COVID-19 patients grew almost three times. In the Second study period, the number of doctors who considered their professional activities very difficult, stressful, with a high risk for COVID-19 infection, increased. One-third of the doctors during both periods very often experienced anxiety, almost daily. Our data on anxiety was similar to the study results conducted in the United States during the COVID-19 pandemic, in which 33% of health care workers showed anxiety symptoms (Shechter et al., 2020). However, our study showed that, in general, among anesthesiologists-reanimatologists, the level of concerns regarding professional contact with COVID-19 patients had significantly decreased. Concern about possibly transferring the infection to the family and loved ones in October 2020, compared with May, decreased by more than three times. Concern about their health, and their loved ones' health, due to the high risk of SARS-CoV-2 infection, remained among the main concerns among various medical specialties professionals during the COVID-19 pandemic (Krasavtseva et al., 2020; Ovsyanik, 2020). According to foreign authors (Almaghrabi et al., 2020), almost 94% of health care workers believed that sufficient personal protective equipment provision for employees increased their readiness for work, reduced psychological stress and concern for family members' safety.

The results obtained correspond to the other authors' results (Alnafaiey et al., 2020), proving the COVID-19 pandemic's negative impact on medical workers' sleep quality and duration, in which the prevalence was 43.9% during the pandemic.

Anesthesiologists-reanimatologists involved in COVID-19 patient care in October 2020 more often noted a poor emotional state, anxiety, reduced mood, irritability and a high burnout level compared to May, which may indicate the depletion of these doctors' group resources. The data obtained at the Second period confirmed the study results of Di Tella as well as Chen (Chen et al., 2020; Di Tella et al., 2020), which revealed that respondents working in departments with an increased infection risk have higher anxiety and depression rates.

Table 3. DIP and NIP Groups, Anesthesiologists-Reanimatologists' Survey Results at Different Study Periods (%)

Indicators		DIP			NIP		
		period 1 (n = 16)	period 2 (n = 17)	Chi ² statistics	period 1 (n = 42)	period 2 (n = 26)	Chi ² statistics
Feeling unwell		6.3	50.0	6.920, <i>p</i> = .009	9.5	7.7	0.067, <i>p</i> = .796
Being quarantined, due to contact with a COVID-19 infected person		12.5	41.2	4.258, <i>p</i> = .039	7.1	15.4	1.181, <i>p</i> = .277
High intensity of activity in relation to the care of patients with Covid		68.8	88.2	1.873, <i>p</i> = .171	38.1	57.7	2.486, <i>p</i> = .115
High COVID-19 infection risk during professional activities		81.3	88.2	0.313, <i>p</i> = .576	35.7	65.4	5.674, <i>p</i> = .017
Reasons for working with COVID-19 patients	Professional duty	87.5	88.2	0.004, <i>p</i> = .948	47.6	73.1	5.693, <i>p</i> = .017
	Sense of duty	25.0	0	4.284, <i>p</i> = .038	9.5	11.5	0.071, <i>p</i> = .790
	Personnel shortage	25.0	11.8	0.971, <i>p</i> = .325	2.4	26.9	9.318, <i>p</i> = .002
	Moral choice	25.0	11.8	0.971, <i>p</i> = .325	7.1	19.2	2.260, <i>p</i> = .133
	Forced measure	25.0	41.2	0.971, <i>p</i> = .325	21.4	15.4	0.379, <i>p</i> = .538
	Financial component	25.0	23.5	0.010, <i>p</i> = .922	4.7	15.4	2.252, <i>p</i> = .133
Very bad emotional state		12.5	23.5	0,674, <i>p</i> = .412	19.0	7.7	1.651, <i>p</i> = .199
A bad mood prevails		6.3	11.8	0.303, <i>p</i> = .582	21.4	7.7	2.235, <i>p</i> = .135
Every day, almost every day, you experience anxiety		25.0	64.3	3.860, <i>p</i> = .049	33.3	11.5	4.068, <i>p</i> = .044
They believe that after resolving the COVID-19 situation, life will be completely different		18.9	41.9	6.324, <i>p</i> = .012	17.2	35.3	1.920, <i>p</i> = .166
Concerns about professional contact with COVID-19 patients	Insufficient personal protective equipment provision	81.3	41.2	5.544, <i>p</i> = .019	71.4	42.3	5.688, <i>p</i> = .017
	Organizational difficulties	43.8	17.6	2.659, <i>p</i> = .103	45.2	23.1	3.392, <i>p</i> = .065
	Poor relationship with hospital management	0	11.8	2.004, <i>p</i> = .157	4.8	0	1.276, <i>p</i> = .256
	Worry about your health	25.0	35.3	0.414, <i>p</i> = .520	42.9	19.2	4.005, <i>p</i> = .045
	Worry about your financial situation	18.8	41.2	1.963, <i>p</i> = .161	21.4	15.4	0.379, <i>p</i> = .538
	Worry about possibly carrying the infection home	93.8	64.7	4.160, <i>p</i> = .041	85.7	76.9	0.854, <i>p</i> = .355
	I'm not worried	0	11.8	2.004, <i>p</i> = .157	2.3	11.5	2.432, <i>p</i> = .119
There is hope that everything will end soon		66.7	76.5	0.248, <i>p</i> = .619	61.5	53.8	1.118, <i>p</i> = .290
Concerns exist about professional activity-related insecurity regarding COVID-19 patients from a legal view point		75.0	58.8	0.971, <i>p</i> = .325	97.6	65.4	13.303, <i>p</i> = .000
They believe that after the COVID-19 situation's resolution, life will be completely different		18.8	35.3	1.137, <i>p</i> = .286	19.0	46.2	5.683, <i>p</i> = .017

Conclusion, Implications and Future Directions

Due to the prolonged COVID-19 pandemic, it can be noted that anesthesiologists-reanimatologists were already working at their capabilities' limit, mobilizing their internal resources to carry out long-term work in such stressful conditions. Long-term work in stressful conditions could lead to functional capability depletion leading to impairment not only in the emotional state, but also in physical health. The study results should be taken into account when organizing the prevention and negative emotional state correction for anesthesiologists-reanimatologists in the course of their professional activities.

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Author contributions

Maria KOREHOVA: conceptualization, design, methodology, funding acquisition, investigation, project administration, data management, formal analysis, interpretation, writing original draft, writing review and editing.

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Elena GOLUBEVA: project administration, formal analysis, interpretation, supervision, writing original draft, writing review and editing.

All authors gave their final approval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Declaration of interest statement

The authors have no conflicts of interest to disclose.

Ethical statement

This manuscript is the authors' original work.

The Ethics Committee of the Northern State Medical University, Arkhangelsk, Russia, license number: 07/11-20, 25.11.2020 reviewed and approved the study.

All participants took part in the research voluntarily and anonymously, and provided their written informed consent to participate in this study.

Data are stored in coded materials and databases without personal data, and the authors have policies in place to manage and keep data secure.

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