

**Original article****Provision of Medical-psychological and Psychiatric Care to Patients with Post-covid Syndrome in Telemedicine Conditions**Nina V. Koliadenko<sup>1</sup>, Khrystyna S. Zhyvago<sup>2</sup>, Andrii I. Bursa<sup>3</sup>**Abstract**

**Objective.** The need for scientific understanding of the revolutionary changes that have occurred associated with the situation of the COVID-19 pandemic, both in the organization of psychological and psychiatric care, and in the direction of developing effective treatment and prevention measures, determines the relevance of this study, the purpose of which is to study the clinical manifestations of psychopathological symptoms in patients, survivors of the COVID-19 disease, and develop a conceptual model for providing them with medical care in telemedicine. **Materials and methods.** We studied the psychopathological manifestations of post-covid syndrome in 129 patients who had recovered from COVID-19 and who applied to us for remote medical counseling psychological and psychiatric help for 10 months, from March to December 2020, using clinical psychopathological and psychodiagnostic test research methods. **Results and Discussion.** The high level of stress, anxiety and depression identified in the studied patients is primarily associated with the negative situation of the pandemic and the COVID-19 disease. A follow-up study proved the effectiveness of a treatment carried out in a telemedicine setting and combining cognitive-behavioral therapy with antidepressants and non-benzodiazepine tranquilizers. In patients who underwent a severe form of COVID-19, in the presence of premorbid chronic bronchopulmonary pathology, in addition to long-lasting psychopathological symptoms, somatic post-covid complications were also observed, and the stressfulness of the situation was perceived at a deeper personal level. For such patients, the course of treatment in telemedicine conditions should be extended and medical and psychological support provided during the entire period of convalescence. **Conclusion.** Chronic premorbid diseases of the bronchopulmonary and immune systems are predictors of long-term psychopathological symptomatology and the occurrence of post-covid somatic complications. The treatment tactics of patients with post-covid mental health disorders in telemedicine should be based on the protocols of cognitive-behavioral therapy for hypochondriacal and generalized anxiety disorder, in combination with antidepressants and tranquilizers of the non-benzodiazepine series, which ensures the stability of the positive results of therapeutic interventions, confirmed by our studies. The conceptual patient-centered model developed by us for the provision of psychological and psychiatric care for post-covid syndrome in telemedicine can be recommended as a universal algorithm for psycho-psychiatric interventions when providing remote assistance to patients with post-covid mental disorders.

**Keywords:** anxiety; catamnesis; depression; cognitive impairment; cognitive-behavioral therapy; medical psychology; mental disorders; post-covid syndrome; psychiatry; psycho-psychiatric care; psychodiagnostics; telemedicine; WHO recommendations.

Bangladesh Journal of Medical Science Vol. 21 No. 04 October '22 Page : 719-730

DOI: <https://doi.org/10.3329/bjms.v21i4.60256>**Introduction**

The COVID-19 pandemic has become a global challenge to humanity, affecting all health parameters

- physical, mental, social and spiritual. In addition to the symptoms of the bronchopulmonary system in the form of a severe respiratory syndrome,<sup>1,2</sup>

1. Nina V. Koliadenko - PhD, MD, Doctor of Medical Sciences, Associate Professor, Head of the Department of Medical Psychology, PJSC "PHEI "Interregional Academy of Personnel Management", Frometivska str., 2, Kyiv, Ukraine; [nina-k@ukr.net](mailto:nina-k@ukr.net)
2. Khrystyna S. Zhyvago - PhD, MD, Assistant Professor of the Psychiatric Department, Bohomolets National Medical University, bul. Shevchenko, 13, Kyiv, Ukraine; [k.zhyvago@gmail.com](mailto:k.zhyvago@gmail.com)
3. Andrii I. Bursa - PhD, MD, Associate Professor of the Psychiatric Department, Bohomolets National Medical University, bul. Shevchenko, 13, Kyiv, Ukraine; E-mail: [andrii.bursagmail.com](mailto:andrii.bursagmail.com)

**Correspondence:** Nina V. Koliadenko - PhD, MD, Doctor of Medical Sciences, Associate Professor, Head of the Department of Medical Psychology, PJSC "PHEI "Interregional Academy of Personnel Management", Frometivska str., 2, Kyiv, Ukraine; [nina-k@ukr.net](mailto:nina-k@ukr.net)

neuropsychological and mental disorders are observed in patients with COVID-19, but they are not well understood. The existence of links between depressive symptoms and viral diseases predicts a significant and persistent negative impact of the previous coronavirus infection on mental health.<sup>3</sup> The need to ensure the safety of doctors and patients in a situation of shortage of medicines and personal protective equipment,<sup>4,5</sup> has led to the predominant provision of psychological and psychiatric assistance remotely, through telemedicine technologies. The need for scientific understanding of the revolutionary changes that have occurred associated with the situation of the COVID-19 pandemic, both in the organization of psychological and psychiatric care, and in the direction of developing effective treatment and prevention measures, determines the relevance of this study.

### *The aim*

**The object of our study** is the impact of the COVID-19 pandemic on the psychological state and mental health of the population, **the subject of the study** is the process of providing psycho-psychiatric care to patients with post-covid syndrome in telemedicine conditions. **The aim of the study** is to study the clinical manifestations of psychopathological symptoms in patients with COVID-19 disease and develop a conceptual model for providing them with medical care in telemedicine.

### *Research objectives:*

- analyze scientific literature data on the impact of COVID-19 on mental health and the possibilities of using telemedicine technologies to provide psychological and psychiatric care to patients;
- to identify the main clinical manifestations of post-covid syndrome and evaluate the effectiveness of appropriate treatment measures, with remote management of these patients using telemedicine technologies;
- based on the results of the study, develop a conceptual model for the diagnosis and treatment of patients with psycho-psychiatric disorders due to the previous COVID-19 disease in the context of telemedicine.

**The hypothesis of the study** is the assumption that telemedicine is an effective way to provide remote psychological and psychiatric assistance to patients with mental disorders associated with the previous COVID-19 disease.

### *Literature review*

The coronavirus disease COVID-19 directly and indirectly affects all aspects of society on a global scale, including both physical and mental health,<sup>6-11</sup> causing stress, causing depression and anxiety. This is objectively confirmed by studies using valid methods, in particular, IES-R and DASS-21,<sup>12,13</sup> which is considered a reliable tool for the diagnosis of depression, anxiety and stress and is used for this purpose in many countries of the world.<sup>14</sup> There is sufficient evidence for the possible existence of a post-COVID syndrome or for the justification to correspondingly designate these possible sequelae with persisting symptoms in this way there is sufficient evidence for the possible existence of a post-COVID syndrome or for the justification to correspondingly designate these possible sequelae with persisting symptoms in this way.<sup>15</sup> Mental health disorders associated with COVID-19 are prone to young patients of working age, and risk factors are female gender, unemployment, and the presence of concomitant chronic pathology,<sup>16-18</sup> however, the psychological stress aspect of the global emergency of the COVID-19 pandemic has long been neglected.<sup>17</sup> Nurses, doctors and other healthcare professionals are at risk,<sup>19</sup> showing symptoms of insomnia, anxiety, depression, somatization and obsessive-compulsive disorder,<sup>19-21</sup> while psychological and social support increased their psychological stability.<sup>22-25</sup> During the pandemic, there was also a decrease in public confidence in healthcare systems.<sup>2</sup> Positive thinking, active coping with stress, and social support were positive predictors of psychological quality of life, well-being, and negative predictors of perceived stress, depression, anxiety and insomnia.<sup>26,27</sup> It has been established that the psychological status of the population during a pandemic is influenced by: young age; female gender (however, in men, mental health also deteriorated, up to the presence of suicidal thoughts,<sup>28</sup> especially in the presence of chronic obstructive bronchopulmonary disease)<sup>29</sup>; higher self-esteem of the likelihood of infection; anxiety about psychological barriers and mistrust.<sup>30,31</sup>

A direct damaging effect of coronavirus on the central nervous system has been found,<sup>18</sup> and an intense stress response associated with an epidemic situation has both short-term and long-term negative consequences for mental health.<sup>19,32</sup> When developing differential diagnostic and therapeutic measures, one should take into account the polymorphism of psychopathological symptoms associated with COVID-19,<sup>33,34</sup> and

the mechanisms of neuropsychological deficit.<sup>35</sup> The neuropsychiatric complications of COVID-19 can be short-term and long-term,<sup>35-37</sup> require increased attention to this problem and its further study.<sup>38</sup> Psychological prevention of the negative consequences of the COVID-19 pandemic should take into account psychological, social and neurobiological aspects.<sup>6,19,32</sup>

Public health faced the task of developing and implementing a public health policy aimed at controlling the situation and stopping the COVID-19 pandemic.<sup>39</sup> The mental health problem associated with the COVID-19 pandemic prioritizes the development of global psycho-preventive interventions,<sup>35,40</sup> as well as the need for psychological support and psychological assistance through telemedicine.<sup>20,41-45</sup> This is especially important due to the fact that fear of infection leads to a decrease in the number of psychiatric care seekers in medical institutions.<sup>46</sup> The COVID-19 pandemic has led to the development of remote mental health care,<sup>20</sup> but it depends on the availability and quality of the Internet and telecommunications.<sup>47-49</sup> One of the alternative options for remote psychological and psychiatric assistance is the organization of a psychological support service by telephone.<sup>50</sup> However, video platforms make it possible to assess psychiatric symptoms that cannot be observed over the telephone.<sup>36</sup> The positive assessment by patients

with mental disorders with COVID-19 makes it a promising direction.<sup>51</sup> At the same time, it is necessary that the doctor pays attention to ensuring the quality of the therapeutic relationship, and the patient feels safe and comfortable when interacting with the therapist in a virtual environment.<sup>51</sup> The challenge of meeting the health needs of the population has led to the elimination of regulatory barriers that have limited the spread of telemedicine,<sup>52</sup> which has proven to be a reliable and quality method of health care delivery.<sup>53</sup> The COVID-19 pandemic provides an opportunity for wider use of telemedicine,<sup>54,55</sup> overcoming skepticism and confirming its effectiveness in the treatment of mental disorders.<sup>47</sup> The massive cultural changes in the provision of psychotherapy services to patients, due to the COVID-19 pandemic, quickly translated into a virtual format, raises the question of creating protocols aimed at ensuring the ethical provision of services to patients at high risk.<sup>56</sup>

### Materials and methods

We studied the psychopathological manifestations of post-covid syndrome in 129 patients who had recovered from COVID-19 and who applied to us for remote medical consultative psychological and psychiatric help for 10 months, from March to December 2020. All patients were with higher education, their gender and age characteristics are presented in Table 1.

**Table 1.** Gender and age characteristics of our patients with psychopathological post-covid disorders

Gender	Age (years)														Total	
	20-29		30-39		40-49		50-59		60-69		70-79		80-89			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
m	12	9.3	8	6.2	18	14.0	12	9.3	7	5.4	4	3.1	0	-	61	47.3
f	4	3.1	9	7.0	15	11.6	24	18.6	8	6.2	5	3.9	3	2.3	68	52.7
Total	16	12.4	17	13.2	33	25.6	36	27.9	15	11.6	9	7.0	3	2.3	129	100

We used the following methods to study patients in telemedicine conditions: anamnestic method (retrospective assessment of premorbid mental status); clinical and psychopathological method; method of pathopsychological diagnostics. The following psychodiagnostic test methods were used: “10 words” and “counting according to Bleicher” - the study of memory, volitional efforts, exercise and fatigue of patients;<sup>57</sup> DASS-21 (Depression, Anxiety and Stress Scale - 21 points),<sup>56</sup> is a valid method used to measure the emotional states of depression, anxiety and stress; Spielberger-Khanin scale of reactive and personal anxiety;<sup>58</sup> The WAM questionnaire,<sup>58</sup> which

allows you to quickly assess the patient’s well-being, activity and mood in the dynamics of the therapeutic process.

The psychodiagnostic study was carried out three times: at the initial visit of the patient for psychological and psychiatric help in telemedicine, at the end of the main course of treatment (one month after the initial visit), and in the follow-up 3-6 months after the end of treatment.

Methods for the treatment of identified anxiety-depressive and other emotional disorders of varying severity were carried out online in accordance

with the cognitive-behavioral therapy protocol for generalized anxiety disorder and hypochondriacal disorder, using antidepressants and tranquilizers of the non-benzodiazepine series.

**Research design**

The research design assumed the sequential implementation of the following stages: Stage 1 - problem statement, formulation of research goals and objectives; Stage 2 - an analytical review of scientific literature sources on the problem of mental health disorders associated with COVID-19, and the provision of psychological and psychiatric care to patients in a telemedicine setting; Stage 3 - selection of valid research methods and formation of a relevant sample; Stage 4 - conducting a study, statistical processing of the results using the online calculator medstatistic.ru,<sup>59</sup> and their analysis; Stage 5 - based on the results obtained, the creation of a conceptual model for the provision of psychological and psychiatric care to patients with post-covid syndrome in telemedicine conditions; Stage 6 - formulation of conclusions and practical recommendations.

**Limitations of the study**

The limitations of the study were associated with a relatively small sample of patients, since we conducted studies only of those patients who independently turned to us for psychological and psychiatric help in a telemedicine setting. It is planned to continue research to identify possible subclinical cases of post-covid syndrome.

**Results**

Patients who recovered from COVID-19 independently sought psychological and psychiatric help in connection with complaints of memory, sleep and appetite disorders, decreased mood and ability to work, loss of prospects and interest in life, anxiety and fear of death, hypochondriacal disorders and

worries about loved ones people, as well as obsessive-compulsive symptoms, which was confirmed by clinical and psychopathological research. The acute period of COVID-19 in the studied patients was expressed to varying degrees, and the severity of the condition was determined not so much by gender and age as by the presence of premorbid chronic bronchopulmonary and immunodeficiency pathology, which was observed in 5 (3.9%) patients. These patients had the most serious illness, were treated intensively with the use of mechanical ventilation, and during the period of convalescence they had various somatic complications. The rest of the patients were treated at home, and if 82 people (63.6%) had a high temperature, from 38 ° to 41 ° C, which lasted 3-7 days, then in 39 patients (30.3%) it did not exceed 37.5 ° C, and in 3 (2.3%) patients, COVID-19 disease was almost asymptomatic, in the form of mild weakness, headache and minor symptoms of SARS, and was accidentally detected by laboratory tests. In addition, no loss of smell was observed in about a third of the patients studied. It should also be pointed out that as a result of a retrospective study of the patients' premorbid state, none of them had any clinically significant mental health problems or personality and behavioral disorders prior to COVID-19, that is, they were previously practically healthy and have never sought help from psychiatrists or medical psychologists before. When examining memory, 98 (76.0%) patients showed impairment of memorization. For complete or almost complete reproduction of 10 words, 56 (43.4%) patients took from 9 to 16 readings, for the rest of the subjects the number of readings did not have a significant effect on the volume of memorized material, and they could not reproduce more than half of the words read. In addition, the patients experienced difficulty in reproducing the words they read one hour after the presentation of the test

**Table 2.** Results of a study of patients who have recovered from COVID-19, using the method of detecting stress, anxiety and depression DASS-21

Scale	Indicator level										Total	
	Normal		Mild		Moderate		Severe		Extremely Severe			
	n	%	n	%	n	%	n	%	n	%	n	%
Depression	0	-	3	2.3	26	20.2	79	61.2	21	16.3	129	100
Anxiety	0	-	1	0.8	25	19.4	76	58.9	27	20.9		
Stress	0	-	0	-	22	17.1	79	61.2	28	21.7		
Correlation coefficient	0.978											

material, and the next day only 24 (18.6%) patients were able to recall most of the words they read. Such results indicate the presence of a combination of pathopsychological signs of neuroinfectious and neurotic processes, which indicates the complex damaging effect of COVID-19 on the central nervous system. Only 18 (13.9%) patients coped with the task of counting according to Bleicher without significant errors, which in the remaining 111 (86.0%) cases indicates instability of attention. The summary (without differentiation by gender and age) results of the study of patients using the DASS-21 method are presented in Table 2.

None of the patients who applied to us had a normal level of stress, anxiety and depression according to the DASS-21 scales, and only 1 person had an

insignificant level of depression, and 1 studied - a slight level of anxiety. Indicators of stress correlated with indicators of anxiety and depression, which indicates the presence of a direct strong connection between the indicators of these scales. We did not find statistically significant differences in the level of anxiety, depression and stress between men and women.

In the next Table 3 presents the results of studies of patients who have had COVID-19, according to the Spielberger-Khanin method. Despite the fact that there is a direct correlation between personal and situational anxiety, the level of indicators of situational anxiety is statistically significantly higher than personal.

**Table 3.** Results of a study of personal and situational anxiety in patients who have recovered from COVID-19, using the Spielberger-Khanin method

Level	Personal Anxiety		Situative anxiety		Student's t-test	P	Correlation coefficient
	n	%	n	%			
High	20	1.6	86	66.7	460.33	<0.05	0.836
Average	75	58.1	43	33.3	175.36	<0.05	
Low	34	26.4	0	-	186.68	<0.05	
Total	129	100	129	100			

The results of this test suggest that the high levels of stress, anxiety and depression identified in the studied patients are primarily associated with the negative situation of the pandemic and the COVID-19 disease. Indeed, this is confirmed by the presence of a direct, close, strong correlation between the high situational anxiety of the studied patients, revealed by the Spielberger-Khanin method and a high level on the

depression scale (correlation coefficient  $\rho = 0.813$ ), anxiety scale (correlation coefficient  $\rho = 0.820$ ) and the scale stress (correlation coefficient  $\rho = 0.739$ ) of the DASS-21 method.

The subjective state of patients in dynamics was assessed using the WAM method (Well-being, Activity, Mood). The results of the primary research using this technique are presented in Table 4.

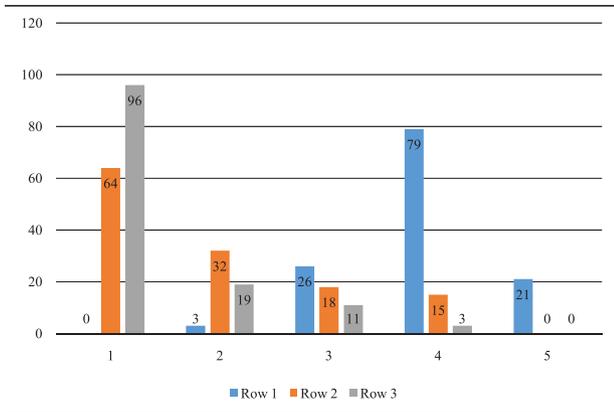
**Table 4.** Results of a study of patients who have recovered from COVID-19, according to the WAM method (Well-being, Activity, Mood)

Scale	W		A		M	
	n	%	n	%	n	%
High	0	-	0	-	0	-
Average	51	39.5	34	26.4	17	1.4
Low	78	60.5	95	73.6	102	79.1
Total	129	100	129	100	129	100

In patients who had recovered from COVID-19, a decrease was found on all three scales of the WAM technique. They showed low indicators of both well-being and activity and mood, which also positively correlated with the results of previous tests. The decrease in activity and mood was expressed to

a greater extent than the state of health, which indicated the presence of both anxiety-depressive and hypochondriacal symptoms, which were also detected during clinical and psychopathological research.

After the treatment of psychopathological symptoms, carried out in accordance with the protocols of cognitive-behavioral therapy for hypochondriacal and generalized anxiety disorders, in combination with drug therapy with antidepressants and non-benzodiazepine tranquilizers, a reduction in psychopathological symptoms was observed, which was objectively confirmed by the results of a second study. The dynamics of stress, anxiety and depression indicators according to the DASS-21 method is graphically presented in Figure 1.



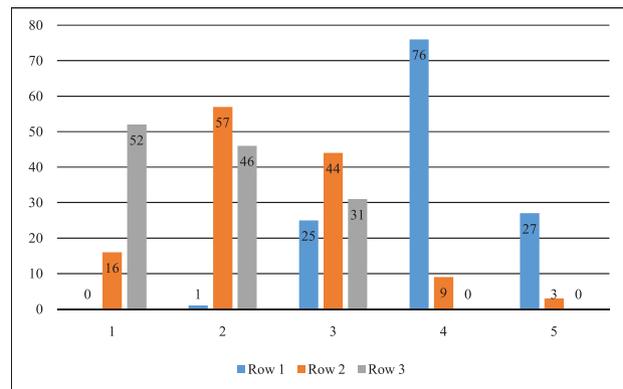
**Figure 1.** Dynamics of indicators on the scale of depression of the DASS-21 method in patients with post-covid syndrome (level: 1-normal, 2-mildr, 3-moderate, 4 - severe, 5 - extremely severe; row 1 - before treatment, row 2 - after treatment, row 3 - follow-up)

As can be concluded from this diagram, in the course of treatment it was possible to achieve the normalization of indicators on the scale of depression in the studied patients.

In patients who underwent a severe form of COVID-19 and suffered from concomitant premorbid chronic bronchopulmonary pathology, in addition to long-term psychopathological symptoms, somatic post-covid complications such as myocarditis, renal dysfunction, etc. were also observed.

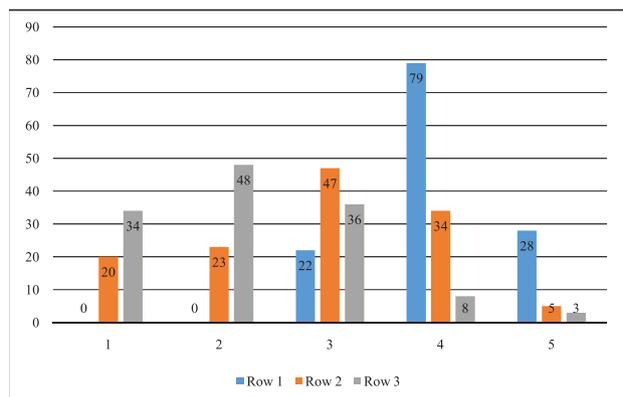
The following Figure 2 shows the dynamics of the DASS-21 test indicators on the alarm scale.

The follow-up study showed a tendency of normalization of indicators on the DASS-21 anxiety scale in all patients. Manifestations of moderate anxiety in the follow-up period in 31 patients is associated, in our opinion, with the ongoing stressful situation of the pandemic and premorbid personality traits of the patients, which led to a prolonged negative experience. In Figure 3 shows the dynamics of indicators on the DASS-21 stress scale at the



**Figure 2.** Dynamics of indicators on the anxiety scale of the DASS-21 method in patients with post-covid syndrome (level: 1-normal, 2-mildr, 3-moderate, 4 - severe, 5 - extremely severe; row 1 - before treatment, row 2 - after treatment, row 3 - follow-up)

beginning and at the end of treatment and after the follow-up period (3-6 months). In a number of patients, normalization on the stress scale was much slower than on the other two scales of the DASS-21 method. We can assume that for patients with a severe form of COVID-19 and emerging from the acute period of the disease with the presence of complications from the cardiovascular, excretory and other body systems in combination with psychopathological symptoms, the stressfulness of the situation was perceived at a deeper personal level. For such patients, the course of treatment should be extended and medical and psychological support provided during the entire period of convalescence.



**Figure 3.** Dynamics of indicators on the scale of stress of the DASS-21 method in patients with post-covid syndrome (level: 1-normal, 2-mildr, 3-moderate, 4 - severe, 5 - extremely severe; row 1 - before treatment, row 2 - after treatment, row 3 - follow-up)

The next graph (Figure 4) presents the dynamics of

the indicators of the WAM technique in the course of treatment and in the follow-up. Despite the fact that communication with patients took place in the context of telemedicine, the psychotherapeutic assistance provided to them using the methods of cognitive-behavioral therapy was quite effective and made it possible to ensure a positive dynamics of indicators on all three scales. In our opinion, psychological support played a leading role in this, which is especially important for overcoming the feeling of loneliness while limiting social contacts due to quarantine measures.

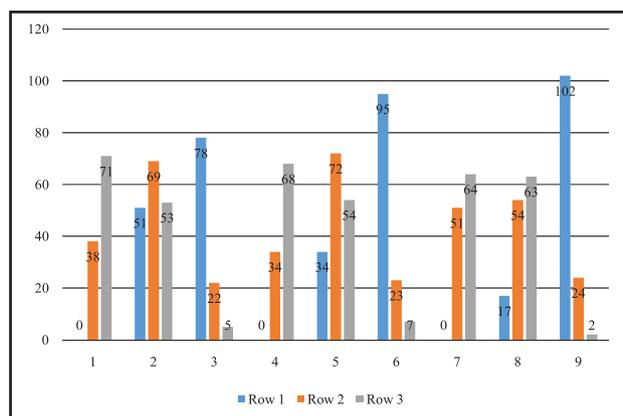


Figure 4. Dynamics of indicators of the WAM technique in patients with post-covid syndrome (1-3 - Well-being, 4-6 - Activity, 7-9 - Mood; row 1 - before treatment, row 2 - after treatment, row 3 - follow-up; characteristics: 1 - high, 2 - medium, 3 - low)

A repeated study of memory and attention showed that cognitive impairments in patients with post-covid syndrome are reduced more slowly than anxiety-depressive symptoms, which can be associated with both a long-term asthenic state and the direct neurotoxic effect of the virus. This aspect must be taken into account in the development of treatment and rehabilitation tactics for managing such patients.

## Discussion

The results of our study confirm the scientific literature data on the damaging effects of COVID-19 on the central nervous system.<sup>19,32</sup> The COVID-19 disease is characterized by psychopathological symptoms in the form of manifestations of anxiety-depressive syndrome of varying severity,<sup>19-21</sup> cognitive dysfunction,<sup>19,33,34</sup> and other phenomena that persist for a long time after the end of the acute period of the disease,<sup>36,37</sup> which can be defined as a specific post-covid syndrome. Summarizing the results of our research and comparing them with the

data of scientific literature,<sup>19-21,33-38</sup> we have identified two main groups of psychopathological disorders in COVID-19: cognitive impairment (memory and attention impairment) and emotional disorders (anxiety-depressive syndrome, stress and panic reactions, hypochondriacal symptoms, PTSD). These groups are united by a specific asthenic postcoid syndrome (Figure 5).

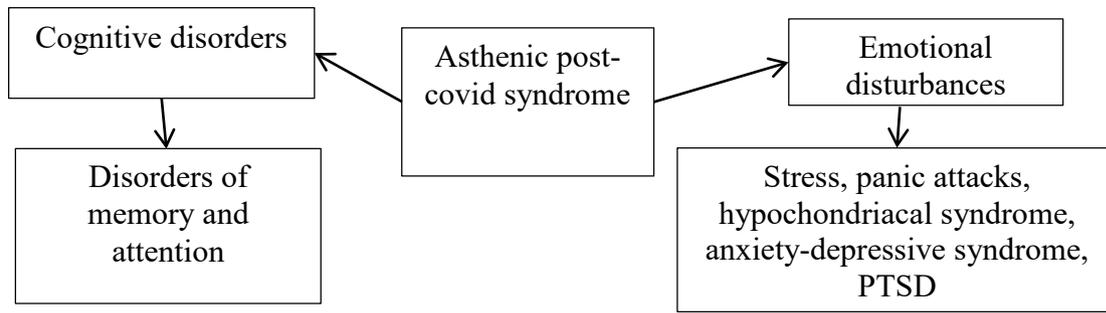
The effectiveness of therapeutic intervention based on the protocols of cognitive-behavioral therapy for hypochondriacal and generalized anxiety disorder, in combination with antidepressants and non-benzodiazepine tranquilizers, is confirmed by the results of our study, including follow-up, which is especially important for the treatment of mental disorders in patients with COVID-19 disease. According to our observations, chronic premorbid diseases of the bronchopulmonary and immune systems act as predictors of both long-lasting psychopathological symptoms and the occurrence of post-covid somatic complications.

Having analyzed and summarized the obtained research results in comparison with scientific literature data,<sup>20,32,41-45</sup> we have developed a conceptual model for the provision of psychological and psychiatric care to patients with postcoid syndrome in telemedicine, shown in Figure 6.

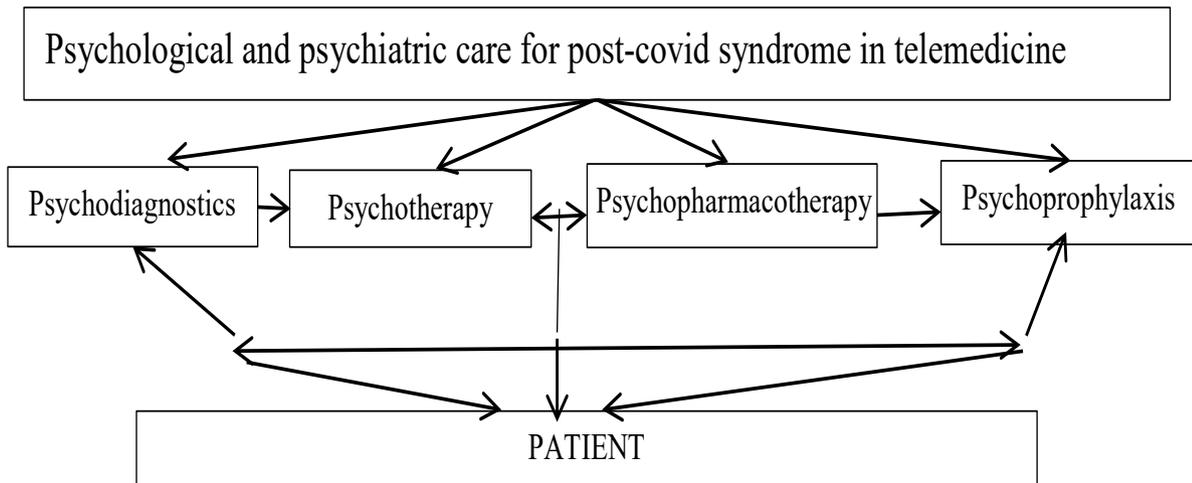
This model consists of four semantic blocks: psychodiagnostic, psychotherapeutic, psychopharmacotherapeutic and psychoprophylactic. All blocks of this model are interconnected, and their sequence is determined by the clinical picture of post-covid syndrome and the characteristics of its course in a particular patient. At the same time, the psychodiagnostic unit involves monitoring the patient's condition using not only the clinical and psychopathological method, but also pathopsychological diagnostics, in dynamics, at all stages of the provision of medical and preventive care. The block of psychoprophylaxis implies all its levels, including the stages of medical-psychological and medical-social rehabilitation. This model is patient-centered and is built taking into account the requirements of bioethics and the moral responsibility of the doctor.

## Conclusion

Based on the results we obtained, the main psychopathological and pathopsychological phenomena of specific asthenic post-covid syndrome were identified, which can be presented in the form



**Figure 5.** Scheme of mental disorders in post-covid syndrome



**Figure 6.** Conceptual model of providing psychological and psychiatric care to patients with post-covid syndrome in telemedicine conditions

of two blocks: cognitive impairment (impairment of memory and attention) and emotional disorders (anxiety-depressive syndrome, stress and panic reactions, hypochondriacal symptoms posttraumatic stress disorder). To objectify the clinical and psychopathological manifestations of post-covid syndrome in telemedicine, when observation of the patient is difficult, we recommend using a battery of valid psychodiagnostic tests, consisting of the following methods: “10 words” and “Bleicher count” - for the diagnosis of cognitive impairments; DASS-21 - for measuring the level of anxiety, depression and stress; Spielberger-Khanin, which allows differentiating personal and situational anxiety; WAM (Well-being, Activity, Mood) - for a quick assessment of the effectiveness of medical psychological and psychiatric care in dynamics. According to our observations, chronic premorbid diseases of the bronchopulmonary and immune systems are predictors of both long-lasting psychopathological symptoms and the occurrence of post-covid somatic complications. The treatment tactics of patients with

post-covid mental health disorders should be based on the protocols of cognitive-behavioral therapy for hypochondriacal and generalized anxiety disorder, in combination with antidepressants and tranquilizers of the non-benzodiazepine series. A persistent reduction in anxiety-depressive symptoms, combined with an improvement in patients’ well-being, an increase in their activity and mood, indicates the high therapeutic effectiveness of such a therapeutic intervention. Follow-up studies confirm the achievement of a long-term positive result in the treatment of mental disorders in post-covid syndrome, which is evidence of the success of the use of telemedicine for the provision of psychological and psychiatric care to patients with the consequences of COVID-19 disease. The conceptual patient-centered model developed by us for the provision of psycho-psychiatric care to patients with post-covid syndrome in telemedicine is built taking into account the principles of bioethics and the moral responsibility of a doctor, consists of four semantic blocks: psychodiagnostic, psychotherapeutic, psychopharmacotherapeutic and

psychoprophylactic, and can be recommended as a universal algorithm for psychological; and psychiatric interventions in the provision of remote assistance to patients with post-covid mental disorders.

#### **Funding**

This article was carried out within the framework of the research work of the Department of Medical Psychology, PJSC “PHEI “Interregional Academy of Personnel Management” and the Department of Psychiatry of Bogomolets National Medical University, Kyiv, Ukraine.

#### **Conflict of interests**

Authors declare that they have no conflict of interests.

#### **Data availability**

Data will be available on request.

#### **Ethical clearance**

Ethical issues were ensured by the anonymity of the

research being conducted and the compliance of its procedure with national and international ethical standards, the Declaration of Helsinki, 1975, revised in 2008, and other regulatory documents regulating the observance of bioethical principles of scientific research. The study was approved by the Ethics Committee of the Bogomolets National Medical University, Kyiv, Ukraine, Protocol No. 1pd of 18.01.2021.

#### **Authors's contribution**

Data gathering and idea owner of this study: *Nina V. Koliadenko, Khrystyna S. Zhyvago*

Study design: *Andrii I. Bursa*

Data gathering: *Khrystyna S. Zhyvago, Andrii I. Bursa*

Writing and submitting manuscript: *Nina V. Koliadenko, Khrystyna S. Zhyvago*

Editing and approval of final draft: *Nina V. Koliadenko*

## References

1. Haque M. Combating COVID-19: A coordinated efforts of healthcare providers and policy makers with global participation are needed to achieve the desired goals. *Bangladesh J Med Sci* 2020; **19**: 1-5. <https://doi.org/10.3329/bjms.v19i0.47610>
2. Rahman SZ, Khan S. Patients' case scenario as well as approaches and strategies adopted to manage COVID-19 pandemic at Aligarh Muslim University, Aligarh, India. *Bangladesh J Med Sci* 2020; **19**: 28-35. <https://doi.org/10.3329/bjms.v19i0.47832>
3. Lyons D, Frampton M., Naqvi S, Donohoe D, Adams G, Glynn K. Fallout from the COVID-19 pandemic - should we prepare for a tsunami of post viral depression? *Ir J Psychol Med* 2020; **37** (4): 295-300. <https://doi.org/10.1017/ipm.2020.40>
4. Ankaralı H, Erarslan N, Pasin Ö, Mahmood AK. Modeling and short-term forecasts of indicators for COVID-19 outbreak in 25 countries at the end of March. *Bangladesh J Med Sci* 2020; **19**: 6-20. <https://doi.org/10.3329/bjms.v19i0.47611>
5. Haque M, Islam S, Iqbal S, Urmi UL, Kamal ZM, Rahman A, Kamal M, Haque M, Jahan I, Islam Z, Hossain MM, Murshid ME, Sefah I, Kurdi A, Godman B. Availability and price changes of potential medicines and equipment for the prevention and treatment of COVID-19 among pharmacy and drug stores in Bangladesh; findings and implications. *Bangladesh J Med Sci* 2020; **19**: 36-50. <https://doi.org/10.3329/bjms.v19i0.48106>
6. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, Ballard C, Christensen H, Silver RC, Everall I, Ford T, John A, Kabir T, King K, Madan I, Michie S, Przybylski AK, Shafran R, Sweeney A, Worthman CM, Yardley L, Cowan K, Cope C, Hotopf M, Bullmore E. Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *Lancet Psychiatry* 2020; **7** (6): 547-560. [https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/10.1016/S2215-0366(20)30168-1)
7. Arshid MA, Mumtaz M, Nazir R. Unforeseen challenges to global health system, in particular context to COVID-19 pandemic and health care personnel. *Arab J Basic Appl Sci* 2021; **28** (1): 145-153. <https://doi.org/10.1080/25765299.2020.1824395>
8. Javakhishvili JD, Ardino V, Bragesjö M, Kazlauskas E, Olf M, Schäfer I. Trauma-informed responses in addressing public mental health consequences of the COVID-19 pandemic: Position paper of the European Society for Traumatic Stress Studies (ESTSS). *Eur J Psychotraumatology* 2020; **11** (1): 1780782. <https://doi.org/10.1080/20008198.2020.1780782>
9. Thome J, Deloyer J, Coogan AN, Bailey-Rodriguez D, da Cruz E Silva OA, Faltraco F, Grima C, Gudjonsson SO, Hanon C, Hollý M, Joosten J, Karlsson I, Kelemen G, Korman M, Krysta K, Lichterman B, Loganovsky K, Marazziti D, Maraitou M, deWilmars SM, Reunamen M, Rexhaj S, Sancaktar M, Sempere J, Tournier I, Weynart E, Vis C, Lebas M-C, Fond-Harmant L. The impact of the early phase of the COVID-19 pandemic on mental-health services in Europe. *World J Biol Psychiatry* 2021; **22** (7): 516-525. <https://doi.org/10.1080/15622975.2020.1844290>
10. Lotzin A, Acquarini E, Ajdukovic D, Ardino V, Böttche M, Bondjers K, Bragesjö M, Dragan M, Grajewski P, Figueiredo-Braga M, Gelezelyte O, Javakhishvili JD, Kazlauskas E, Knefel M, Lueger-Schuster B, Makhshvili N, Mooren T, Sales L, Stevanovic A, Schäfer I. Stressors, coping and symptoms of adjustment disorder in the course of the COVID-19 pandemic—study protocol of the European Society for Traumatic Stress Studies (ESTSS) pan-European study. *Eur J Psychotraumatology* 2020; **11** (1): 1780832. <https://doi.org/10.1080/20008198.2020.1780832>
11. Meyer-Kalos PS, Roe D, Gingerich S, Hardy K, Bello I, Hrouda D, Shapiro D, Hayden-Lewis K, Cao L, Hao X, Liang Y, Zhong S, Mueser KT. The impact of COVID-19 on coordinated specialty care (CSC) for people with first episode psychosis (FEP): Preliminary observations, and recommendations, from the United States, Israel and China. *Counse Psychol Q* 2021; **34** (3-4): 387-410. <https://doi.org/10.1080/09515070.2020.1771282>
12. Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, Choo FN, Tran B, Ho R, Sharma VK, Ho C. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behav Immun* 2020; **87**: 40-48. <https://doi.org/10.1016/j.bbi.2020.04.028>
13. Paulino M, Dumas-Diniz R, Brissos S, Brites R, Alho L, Simões MR, Silva CF. COVID-19 in Portugal: exploring the immediate psychological impact on the general population. *Psychol Health Med* 2021; **26** (1): 44-55. <https://doi.org/10.1080/13548506.2020.1808236>
14. Zolotareva AA. Systematic review of the psychometric properties of the Depression Anxiety and Stress Scale-21 (DASS-21). *V.M. Bekhterev Review of Psychiatry and Medical Psychology* 2020; **2**: 26-37. <https://doi.org/10.31363/2313-7053-2020-2-26-37>
15. Lamprecht, B. Gibt es ein Post-COVID-Syndrom? *Pneumologie* 2020; **17**: 398-405. <https://doi.org/10.1007/s10405-020-00347-0>
16. Nie XD, Wang Q, Wang MN, Zhao S, Liu L, Zhu YL, Chen H. Anxiety and depression and its correlates in patients with coronavirus disease 2019 in Wuhan. *Int J Psychiatry Clin Pract* 2021; **25** (2): 109-114. <https://doi.org/10.1080/13651501.2020.1791345>
17. Abbas AM, AbouBakr A, Magdy S, Refai A, Ismail Y, Mahmoud N, AbuElmagd ME. Psychological effect of COVID-19 on medical health-care workers. *Int J Psychiatry Clin Pract* 2021; **25** (2): 140-141. <https://doi.org/10.1080/13651501.2020.1791903>
18. Arslan G, Allen KA. Exploring the association between coronavirus stress, meaning in life, psychological flexibility, and subjective well-being. *Psychol Health*

- Med* 2022; **27** (4): 803-814. <https://doi.org/10.1080/13548506.2021.1876892>
19. Jegede O, Anand Raman A, Tionson B, Garlapati PR, Hershberger J, Gayam V. Clinical characteristics, hospital course, and outcomes among COVID-19 positive patients with mental illness in a community hospital in New York City. *Int J Ment Health* 2021; **50** (1): 4-15. <https://doi.org/10.1080/00207411.2020.1845567>
  20. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun* 2020; **88**: 901-907. <https://doi.org/10.1016/j.bbi.2020.05.026>
  21. Amin S. The psychology of coronavirus fear: Are healthcare professionals suffering from corona-phobia? *Int J Healthc Manag* 2020; **13** (3): 249-256. <https://doi.org/10.1080/20479700.2020.1765119>
  22. Arslan HN, Karabekiroglu A, Terzi O, Dundar C. The effects of the COVID-19 outbreak on physicians' psychological resilience levels. *Postgrad Med* 2021; **133** (2): 223-230. <https://doi.org/10.1080/00325481.2021.1874166>
  23. Zhang Y, Wei L, Li H, Pan Y, Wang J, Li Q, Wu Q, Wei H. The psychological change process of frontline nurses caring for patients with COVID-19 during its outbreak. *Issues Ment Health Nurs* 2020; **41** (6): 525-530. <https://doi.org/10.1080/01612840.2020.1752865>
  24. Kang L, Ma S, Chen M, Yang J, Wang Y, Li R, Yao L, Bai H, Cai Z, Yang BX, Hu S, Zhang K, Wang G, Ma C, Liu Z. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. *Brain Behav Immun* 2020; **87**: 11-17. <https://doi.org/10.1016/j.bbi.2020.03.028>
  25. Ceri V, Cicek I. Psychological well-being, depression and stress during COVID-19 pandemic in Turkey: A comparative study of healthcare professionals and non-healthcare professionals. *Psychol Health Med* 2021; **26** (1): 85-97. <https://doi.org/10.1080/13548506.2020.1859566>
  26. Yıldırım M, Güler A. Positivity explains how COVID-19 perceived risk increases death distress and reduces happiness. *Pers Individ Differ* 2020; **168**: 110347. <https://doi.org/10.1016/j.paid.2020.110347>
  27. Budimir S, Probst T, Pieh C. Coping strategies and mental health during COVID-19 lockdown. *J Ment Health* 2021; **30** (2): 156-163. <https://doi.org/10.1080/09638237.2021.1875412>
  28. Ogrodniczuk JS, Rice SM, Kealy D, Seidler ZE, Delara M, Oliffe JL. Psychosocial impact of the COVID-19 pandemic: A cross-sectional study of online help-seeking Canadian men. *Postgrad Med* 2021; **133** (7): 750-759. <https://doi.org/10.1080/00325481.2021.1873027>
  29. Yohannes AM. COPD patients in a COVID-19 society: depression and anxiety. *Expert Rev Respir Med* 2021; **15** (1): 5-7. <https://doi.org/10.1080/17476348.2020.1787835>
  30. Wu Y, Xiong X, Fang X, Sun W, Yi Y, Liu J, Wang J. Psychological status of TMD patients, orthodontic patients and the general population during the COVID-19 pandemic. *Psychol Health Med* 2021; **26** (1): 62-74. <https://doi.org/10.1080/13548506.2020.1858489>
  31. Dragan M, Grajewski P, Shevlin M. Adjustment disorder, traumatic stress, depression and anxiety in Poland during an early phase of the COVID-19 pandemic. *Eur J Psychotraumatology* 2021; **12** (1): 1860356. <https://doi.org/10.1080/20008198.2020.1860356>
  32. Minihan E, Gavin B, Kelly BD, McNicholas F. COVID-19, mental health and psychological first aid. *Ir J Psychol Med* 2020; **37** (4): 259-263. <https://doi.org/10.1017/ipm.2020.41>
  33. Ripon RK, El-Sabban F, Sikder T, Hossain S, Mim SS, Ahmed HU, Mehta N. Psychological and nutritional effects on a COVID-19-quarantined population in Bangladesh. *J Hum Behav Soc Environ* 2021; **31** (1-4): 271-282. <https://doi.org/10.1080/10911359.2020.1822252>
  34. Kaseda ET, Levine AJ. Post-traumatic stress disorder: A differential diagnostic consideration for COVID-19 survivors. *Clin Neuropsychol* 2020; **34** (7-8): 498-1514. <https://doi.org/10.1080/13854046.2020.1811894>
  35. World Health Organization. *Policy brief: COVID-19 and the need for action on mental health*. World Health Organization, 2020. <https://unsdg.un.org/sites/default/files/2020-05/UN-Policy-Brief-COVID-19-and-mental-health.pdf>
  36. Whiteside DM, Oleynick V, Holker E, Waldron EJ, Porter J, Kasprzak M. Neurocognitive deficits in severe COVID-19 infection: case series and proposed model. *Clin Neuropsychol* 2021; **35** (4): 799-818. <https://doi.org/10.1080/13854046.2021.1874056>
  37. Riordan P, Stika M, Goldberg J, Drzewiecki M. COVID-19 and clinical neuropsychology: A review of neuropsychological literature on acute and chronic pulmonary disease. *Clin Neuropsychol* 2020; **34** (7-8): 1480-1497. <https://doi.org/10.1080/13854046.2020.1810325>
  38. Rabinovitz B, Jaywant A, Fridman CB. Neuropsychological functioning in severe acute respiratory disorders caused by the coronavirus: implications for the current COVID-19 pandemic. *Clin Neuropsychol* 2020; **34** (7-8): 1453-1479. <https://doi.org/10.1080/13854046.2020.1803408>
  39. Ashiq K, Ashiq S, Bajwa MA, Tanveer S, Qayyum M. Knowledge, attitude and practices among the inhabitants of Lahore, Pakistan towards the COVID-19 pandemic: an immediate online based cross-sectional survey while people are under the lockdown. *Bangladesh J Med Sci* 2020; **19**: 69-76. <https://doi.org/10.3329/bjms>

v19i0.48169

40. Tanhan A, Yavuz KF, Young JS, Nalbant A, Arslan G, Yildirim M, Ulusoy S, Genc E, Ugur E, Çiçek İ. A proposed framework based on literature review of online contextual mental health services to enhance wellbeing and address psychopathology during COVID-19. *Electron J Gen Med* 2020; **17** (6): em254. <https://dx.doi.org/10.29333/ejgm/8316>
41. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General Psychiatry* 2020; **33** (2): e100213. <https://doi.org/10.1136/gpsych-2020-100213>
42. Boland X, Dratcu L. COVID-19 and acute inpatient psychiatry: The shape of things to come. *Int J Psychiatry Clin Pract* 2021; **25** (2): 132-134. <https://doi.org/10.1080/13651501.2020.1801755>
43. Jurcik T, Jarvis GE, Zeleskov Doric J, Krasavtseva Y, Yaltonskaya A, Ogiwara K, Sasaki J, Dubois S, Grigoryan K. Adapting mental health services to the COVID-19 pandemic: reflections from professionals in four countries. *Counse Psychol Q* 2021; **34** (3-4): 649-675. <https://doi.org/10.1080/09515070.2020.1785846>
44. Lemieux AJ, Dumais Michaud AA, Damasse J, Morin-Major JK, Nguyen TN, Lesage A, Crocker AG. Management of COVID-19 for persons with mental illness in secure units: A rapid international review to inform practice in Québec. *Vict Offenders* 2020; **15** (7-8): 1337-1360. <https://doi.org/10.1080/15564886.2020.1827111>
45. Singh L, Espinosa L, Ji JL, Moulds ML, Holmes EA. Developing thinking around mental health science: the example of intrusive, emotional mental imagery after psychological trauma. *Cogn Neuropsychiatry* 2020; **25** (5): 348-363. <https://doi.org/10.1080/13546805.2020.1804845>
46. Beghi M, Brandolini R, Casolaro I, Beghi E, Cornaggia CM, Fraticelli C, De Paoli G, Ravani C, Castelpietra G, Ferrari S. Effects of lockdown on emergency room admissions for psychiatric evaluation: an observational study from the AUSL Romagna, Italy. *Int J Psychiatry Clin Pract* 2021; **25** (2): 135-139. <https://doi.org/10.1080/13651501.2020.1859120>
47. Poletti B, Tagini S, Brugnera A, Parolin L, Pievani L, Ferrucci R, Compare A, Silani V. Telepsychotherapy: a leaflet for psychotherapists in the age of COVID-19. A review of the evidence. *Counse Psychol Q* 2021; **34** (3-4): 352-367. <https://doi.org/10.1080/09515070.2020.1769557>
48. Rochette AD, Rahman-Filipiak A, Spencer RJ, Marshall D, Stelmokas JE. Teleneuropsychology practice survey during COVID-19 within the United States. *Appl Neuropsychol Adult* 2021; in press. <https://doi.org/10.1080/23279095.2021.1872576>
49. Peterson RK, Ludwig NN, Jashar DT. A case series illustrating the implementation of a novel tele-neuropsychology service model during COVID-19 for children with complex medical and neurodevelopmental conditions: A companion to Pritchard et al., 2020. *Clin Neuropsychol* 2021; **35** (1): 99-114. <https://doi.org/10.1080/13854046.2020.1799075>
50. Ribeiro E, Sampaio A, Gonçalves MM, Taveira MDC, Cunha J, Maia Â, Matos M, Gonçalves S, Figueiredo B, Freire T, Soares T. Telephone-based psychological crisis intervention: the Portuguese experience with COVID-19. *Counse Psychol Q* 2021; **34** (3-4): 432-446. <https://doi.org/10.1080/09515070.2020.1772200>
51. Tarquinio C, Brennstuhl MJ, Rydberg JA, Bassan F, Peter L, Tarquinio CL, Auxéméry Y, Rotonda C, Tarquinio P. EMDR in telemental health counseling for healthcare workers caring for COVID-19 patients: a pilot study. *Issues Ment Health Nurs* 2020; **42** (1): 3-14. <https://doi.org/10.1080/01612840.2020.1818014>
52. Meyer C, Becot F, Burke R, Weichelt B. Rural telehealth use during the COVID-19 pandemic: how long-term infrastructure commitment may support rural health care systems resilience. *J Agromedicine* 2020; **25** (4): 362-366. <https://doi.org/10.1080/1059924X.2020.1814921>
53. Bilder RM, Postal KS, Barisa M, Aase DM, Cullum CM, Gillaspay SR, Harder L, Kanter G, Lanca M, Lechuga DM, Morgan JM, Most R, Puente AE, Salinas CM, Woodhouse J. InterOrganizational practice committee recommendations/guidance for teleneuropsychology (TeleNP) in response to the COVID-19 pandemic. *Clin Neuropsychol* 2020; **34** (7-8): 1314-1334. <https://doi.org/10.1080/13854046.2020.1767214>
54. Hammers DB, Stolwyk R, Harder L, Cullum CM. A survey of international clinical teleneuropsychology service provision prior to and in the context of COVID-19. *Clin Neuropsychol* 2020; **34** (7-8): 1267-1283. <https://doi.org/10.1080/13854046.2020.1810323>
55. Kleykamp BA, Guille C, Barth KS, McClure EA. Substance use disorders and COVID-19: the role of telehealth in treatment and research. *J Soc Work Pract Addict* 2020; **20** (3): 248-253. <https://doi.org/10.1080/1533256X.2020.1793064>
56. Johnson CC, Aldea MA. Ethical Considerations for telepsychotherapy and the management of high-risk patients during Coronavirus 2019 (COVID-19): Challenges and practice considerations. *Ethics Behav* 2021; **31** (3): 193-204. <https://doi.org/10.1080/1050842.2020.1870979>
57. MAIC. DASS-21 test. 2022. <https://maic.qld.gov.au/wp-content/uploads/2016/07/DASS-21.pdf>
58. AZPS. Psychological tests. 2022. <https://azps.ru/tests>
59. MedStatistic. Medical statistic. 2022. <https://medstatistic.ru/>