

*Original article*

## Is the Act of Mandatory and Prolonged In-Hospital Quarantine a Contributing Risk Factor for Impaired Mental Health among Individuals with Confirmed COVID-19 Infection?

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### SUMMARY

**Background.** Coronavirus disease 2019 (COVID-19) affects mental health. Our study aimed to investigate whether the act of mandatory and prolonged in-hospital quarantine is a contributing risk factor for impaired mental health among individuals with confirmed COVID-19 infection.

**Materials and methods.** A mixed survey-based cross-sectional study included 300 COVID-19 patients who filled Depression, Anxiety, and Stress Scales 21 (DASS-21), a 36-item health survey of the Medical Outcomes Study Short Form (SF-36), Insomnia Severity Scale (ISS), Impact of Event Scale (IES) with two subscales - Intrusion (IES-I) and Avoidance (IES-AS), and a questionnaire designed for research purposes.

**Results.** Lower scores on IES-AS, higher scores on IES-I, and in-hospital quarantine are good predictors of high results on the Stress subscale. In-hospital quarantine, lower IES-AS scores, higher IES-I scores, and male gender are significant predictors of higher scores on the Depression subscale. Also, higher scores on IES-I as well as in-hospital quarantine are significant predictors of higher scores on the Anxiety subscale. The presence of insomnia was more pronounced in in-hospital quarantined individuals, while the levels of stress, anxiety, and depression were nearly twice as pronounced.

**Conclusion.** Mandatory in-hospital quarantine of individuals with confirmed COVID-19 infection is a contributing risk factor for impaired mental health.

**Keywords:** COVID-19, quarantine, mental health

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## INTRODUCTION

A novel coronavirus named the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), and its subsequent disease, named the coronavirus disease 2019 (COVID-19), were declared a global pandemic on March 11, 2020 (1). Based on experience and previous knowledge, to contain the spread of the COVID-19 infection and reduce its impact on the healthcare system, the Serbian Ministry of Health declared a state of emergency soon after and several mandatory restrictive measures came into force, including an in-hospital quarantine system that was temporarily established in COVID-19 hospitals (2). In the next few months, asymptomatic and symptomatic COVID-19-infected individuals with the more serious clinical picture were mandatorily in-hospital quarantined, while patients with a milder clinical picture were mandatorily quarantined at home.

Based on the outcomes of previous serious viral infections, and given that some of them were responsible for the SARS epidemic and MERS outbreak in 2003 and 2012, infected patients are at risk developing impaired mental health, with the symptoms such as depression, anxiety, and sleep disturbances (3).

The very fact of detecting COVID-19 infection brings a high level of stress, which can be a trigger for various psychiatric disorders, regardless of whether the consequent course of COVID-19 requires in-hospital or at-home quarantine. Previous studies have shown that COVID-19 patients hospitalized in intensive care units (ICUs) are a more vulnerable group for the potential development of psychiatric disorders (4). In-hospital quarantine is very old and effective containment tool, and although necessary, it emphasizes the seriousness of the disease and impairs mental health, especially if it is mandatory (3).

Patients with diagnosed infection-related psychiatric symptoms stay in the hospital longer, recover more slowly and are re-hospitalized more often compared to those who did not require hospital treatment (5). In terms of post-hospitalized patients in previous epidemics, over 20 percent develop depressive disorders in the follow-up period of 6 months to more than 2 years, and up to 25 percent develop some form of adjustment disorder accompanied by high anxiety and sleep disturbances (5).

Without trying to question the need for COVID-19 in-hospital quarantine, and to raise awareness about the importance of psychiatric screening and treatment in COVID-19 inpatients, our study aimed to investigate whether the act of obligatory and prolonged in-hospital quarantine is a contributing risk factor for impaired mental health among individuals with confirmed COVID-19 infection.

## MATERIALS AND METHODS

A cross-sectional survey-based study was conducted from April 1, 2020 to May 18, 2020, and it included 300 COVID-19 individuals - 201 adult in-hospital quarantined ( $\geq 18$  years) and 99 at-home quarantined individuals with laboratory-confirmed COVID-19 infection who were mandatorily quarantined. In-hospital quarantined patients filled out a set of questionnaires in the temporary formed COVID-19 hospitals during their stay, and a web-based version was sent to those quarantined at home by email.

All participants left their details, including e-mail addresses, when applying for testing. Informed consent was provided by all survey participants before their enrollment when delivering test results. The survey was anonymous, completely voluntary, and non-commercial. The study began by giving a paper version/uploading the electronic version of the survey to the participants with a brief explanation of the survey and its purpose. The study was conducted in accordance to the approval from the clinical research Ethics Committee of the local review board and all applicable guidelines, including the Basics of Good Clinical Practice, the Declaration of Helsinki, and the Law on Health Care of the Republic of Serbia.

Inclusion criteria were the presence of viral antigen in oral swabs confirmed by the polymerase chain reaction (PCR) as a detection standard for SARS-CoV-2. Exclusion criteria included subjects younger than 18 years, previous psychiatric disorder, and current psychiatric pharmacotherapy.

To assess the self-reported mental health of mandatorily quarantined COVID-19 confirmed individuals, we used a set of questionnaires validated in Serbia, like Depression, Anxiety, and Stress Scales 21 (DASS-21), a 36-item health survey of the Medical

Outcomes Study Short Form (SF-36), Insomnia Severity Scale (ISS), Impact of Event Scale (IES), as well as a questionnaire designed for research purposes with several questions regarding COVID-19 related data, clinical presentation, coping methods, and sociodemographic characteristics.

DASS-21 was adapted to measure the pillars of mental health, depression, anxiety, and stress in three self-report scales. It consists of 21 questions, 7 for each scale ranging from 0 - did not apply to me at all, to 3 - applied to me very much, or most of the time. The final result was obtained by summing the items' scores on each subscale and multiplying it by two (6).

SF-36 is a short questionnaire with 36 items that measure eight multi-item variables: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE) and mental health (MH). The total score was also measured. The scores for each of the eight domains and the total score were converted to a 0 - 100 scale, with a higher score representing a better health state (7, 8).

Insomnia was assessed via the ISS, a 7-item self-report index evaluating the severity of insomnia: the absence of insomnia, sub-threshold, moderate, and severe insomnia. A 5-point Likert scale is used to rate each item (e.g., 0 = no problem; 4 = very severe problem), yielding a total score ranging from 0 to 28 (9).

IES consists of fifteen items. Seven items described episodes of Intrusion (IES-I), and eight described episodes of Avoidance (IES-AS) (10). The scale used a somewhat unusual response format: Not at all = 0, Rarely = 1, Sometimes = 3, and Often = 5. The IES-I is a self-report measure of intrusive symptoms (e.g., recurrent images, feelings, nightmares) related to a negative life event. The IES-AS consists of reported episodes of conscious awareness. The IES can assess psychological stress reactions after any major life event (10).

Statistical analyses were performed by using SPSS 19.0 software. The Kolmogorov-Smirnov test was used to assess the normal distribution of quantitative data. Comparison between groups was assessed by t-test or the Chi-square test. Multiple linear regression analysis was used to estimate the size and statistical significance of the relationship between variables.

## RESULTS

Most participants were male, aged 21 to 84, and lived in a city. The sociodemographic characteristics of our participants are presented in Table 1. Regarding the COVID-19 related data, most of our patients reported the presence of more than one symptom. Temperature, fever, and dry cough were the most frequent, and only 2% of our in-hospital quarantined individuals were asymptomatic.

Statistically significant differences between the two tested groups were registered in all of our ques-

**Table 1.** Socio-demographic characteristics of in-hospital quarantined individuals and at-home quarantined individuals

Variables	In-hospital (N = 201)	At-home (N = 99)
Age, years (Mean ± SD)	47.14 ± 12.43	48.07 ± 16.51
Gender – male (%)	58.9	43.4
Area of living – urban (%)	66.5	90.9
Presence of chronic illness (%)	15.2	20.2

tionnaires, except two domains of SF-36 (RP and VT), as shown in Table 2. Arithmetic means within stress, anxiety, and depression are almost two times higher among patients than in the quarantined group. The scores on assessing psychological stress reactions after any significant life, avoidance, and intrusion were also higher among in-hospital than the at-home quarantined group. In-hospital quarantined individuals reported the presence of insomnia more often than the at-home quarantined group.

Statistically significant correlations between scores on used questionnaires are given in Table 3. Patients who had reported a larger frequency of symptoms on IES-I had higher scores on the Anxiety (0.376,  $p < 0.001$ ), Depression (0.292,  $p < 0.001$ ), and Stress subscale (0.467,  $p < 0.001$ ), and those who had reported higher score on IES-AS subscale developed the symptoms of anxiety (0.285,  $p < 0.001$ ) and stress (0.350,  $p < 0.001$ ). Patients with the reported symptoms on IES –AS more frequently had a lower health state assessment. Also, male participants reported more symptoms, detected at the DASS-21 scale, although their self-reported overall mental state is better than of female participants.

**Table 2.** DASS-21, Stress, Anxiety, Depression, IAS-AS, IAS-I, SF-36, and ISI scores of in- hospital and at-home quarantined individuals with confirmed COVID-19 infection

Variable (mean ± SD)	In-hospital quarantined (N = 201)	At-home quarantined (N = 99)
DASS-21**	22.15 ± 13.17	9.2 ± 8.49
Stress**	15.89 ± 9.66	7.03 ± 8.47
Anxiety**	14.34 ± 8.96	4.04 ± 5.68
Depression**	14.06 ± 9.41	7.33 ± 8.01
IES-AS**	15.47 ± 6.04	12.80 ± 4.73
IES-I**	13.58 ± 4.97	11.28 ± 4.29
SF-36 total**	57.71 ± 37.49	80.36 ± 12.07
SF-36 PF**	54.68 ± 31.39	92.42 ± 12.46
SF-36 RP	34.49 ± 44.04	69.74 ± 30.02
SF-36 RE**	49.92 ± 45.88	96.30 ± 18.37
SF-36 VT	55.79 ± 27.16	78.28 ± 16.32
SF-36 SF **	65.35 ± 28.35	91.29 ± 15.41
SF-36 GH**	49.59 ± 9.03	80.15 ± 8.99
SF-36 BP**	72.14 ± 26.43	90.15 ± 12.13
SF-36 MH**	64.84 ± 20.52	80.40 ± 13.59
ISI**	6.2 ± 2.92	3.74 ± 1.77

DASS-21 - Depression, Anxiety and Stress Scale; IES-AS – Impact of Event Scale – Avoidance, IES-I – Impact of Event Scale – Intrusion; SF-36 total score and domains (mean scores and SD), PF indicates physical functioning; RP -role physical RE - role emotional; VT – vitality; SF - social functioning; GH - general health; BP - indicates bodily pain; MH - mental health; ISI

– Insomnia Severity Scale

\*\*p < .001

**Table 3.** Correlation between variables and scores obtained in a group of in-hospital quarantined individuals

	DASS-21	Stress	Depression	Anxiety	ISI	SF36
IES-I	.399**	.467**	.292**	.376**	.109	.119
IES-AS	.253**	.350**	.123	.285**	.016	.163**
IES total	.324**	.412**	.202*	.332**	.059	.139
DASS-21	/				.048	.033
Stress		/			.000	.041
Depression			/		.073	.010
Anxiety				/	.052	.049
ISI					/	-.066
SF-36 total	.033	.041	.010	.049	-.066	/
SF-36 MH	.058	.050	-.064	.050	-.067	/
Gender	-.167*	.041	-.188*	-.148	-.014	-.219**
Age	.094				.012	-.148

IES-I - Impact of Event Scale-Intrusion, IES-AS – Impact of Event Scale- Avoidance, IES total – Impact of Event Scale total, DASS-21 – Depression, Anxiety and Stress Scale, ISI - Insomnia Severity Index, SF-36 total – SF-36 total score, SF-36 MH – mental health.

\*p < .05, \*\*p < .001

Multiple linear regression analysis included all factors that correlated with scores on the Stress subscale and showed that lower scores on IES-AS (beta = -0.300,  $p < 0.05$ ), higher scores on IES-I (beta = 0.545,  $p < 0.01$ ), and being mandatorily hospitalized (beta = -0.380,  $p < 0.01$ ) represent good predictors of the high scores on Stress subscale ( $R^2 = 0.28$ ,  $p < 0.01$ ). Being mandatorily hospitalized (beta = -0.344,  $p < 0.01$ ), lower scores on IES-AS (beta = -0.403,  $p < 0.01$ ), higher scores on IES-I (beta = 0.441,  $p < 0.01$ ), and male gender (beta = -0.126,  $p < 0.05$ ) are significant predictors of higher scores on Depression subscale ( $R^2 = 0.18$ ,  $p < 0.01$ ). Likewise, higher scores on IES-I (beta = 0.379,  $p < 0.01$ ) as well as being mandatorily hospitalized (beta = -0.497,  $p < 0.01$ ) are significant predictors of higher scores on the Anxiety subscale ( $R^2 = 0.34$ ,  $p < 0.01$ ).

## DISCUSSION

Previous research has focused mainly on assessing the various aspects of mental health of both the general population and individual groups during the COVID-19 pandemic, and showed that a significant proportion of participants experience anxiety, depression, and lower mental well-being (11). According to the data available to us, this is the first study in Serbia that assesses mental health among mandatorily quarantined individuals with confirmed COVID-19 infection, including assessment of whether there are differences in the mental state depending on the type of quarantine, as well as whether the hospital stay is a significant contributing risk factor for mental disorders.

Recent findings in Jordan showed that mandatory hospitalization of asymptomatic patients with mild symptoms during the COVID-19 pandemic was a good predictor of anxiety, stress, depression, and insomnia (12). In our research, statistically significant differences between the two tested groups were registered in all of our questionnaires, except for two domains of SF-36, RP, and VT, due to the disease itself. In-hospital quarantined individuals had pronounced sleep problems, lower quality of life, and the symptoms of stress, anxiety, and depression were almost two times higher among in-hospital quarantined individuals.

In states of globally confirmed emergencies and life-threatening infections, indirect effects, which include social changes that cause stress, negatively affect general mental health (13). Mandatory

quarantine is an additional stressor because of a loss of control and a sense of being trapped (12).

Both obligatory forms of quarantine imply separation from family members and drastic reduction of social contacts, with the fact that staying at home is more comfortable, it disturbs self-esteem less, and implies a way of functioning within the known and less uncertain, which reciprocally inhibits fear. Patients hospitalized during the pandemic showed that they had been experiencing recurrent images, feelings, and nightmares related to an adverse life event, avoiding thoughts and images associated with that event more often than people who stayed at home (14). Individuals with the tendency to avoid memories of stressful life events, i.e. prone to use avoidance as a maladaptive coping style have a higher risk of developing psychopathology and impaired mental health.

We should also consider the stigma, the belief that "severe cases with a worse prognosis are those in hospital", as well as the fact that they were taken to temporary hospitals with short-time notice, without an option of staying home, government involvement and a lot of misinformation in the media.

Our study has several limitations. First, it is a cross-sectional study, focused on voluntary participation and subjective assessment by using self-report tools. Second, it examines mental health during the COVID-19 outbreak, without the possibility of comparison with the mental status before the pandemic.

## CONCLUSION

In conclusion, our data suggest that in-hospital compared to at-home quarantined individuals with confirmed COVID-19 infection had insomnia and lower quality of life. The symptoms of stress, anxiety, and depression were around twice as higher, all of which can lead to the development of more serious mental disorders in this vulnerable group in post-pandemic time and being a long-term burden on the health system. Our recommendation and observation are that it is necessary to direct future research in the direction of alternative consideration of ways to combat the spread of viral infections in the future, as well as provide adequate support to all infected people, especially those who require hospital treatment.

### Conflict of interest statement

The research in this manuscript has not been funded by any sponsor, therefore, there is no conflict of interest of any kind. There is no funding source.

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# Da li je čin obaveznog i produženog bolničkog karantina faktor rizika za narušeno mentalno zdravlje kod osoba sa potvrđenom infekcijom COVID-19?

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## SAŽETAK

**Uvod.** Koronavirusna bolest (COVID-19) utiče na mentalno zdravlje. Naša studija je imala za cilj da istraži da li je čin obaveznog i produženog bolničkog karantina doprinoseći faktor rizika za narušeno mentalno zdravlje kod osoba sa potvrđenom infekcijom COVID-19.

**Materijal i metode.** Studija poprečnog preseka zasnovana na mešovitim anketama uključivala je 300 bolesnika sa potvrđenom infekcijom COVID-19, koji su ispunili Skalu depresivnosti, anksioznosti i stresa-21 (DASS-21), Skalu kratkog ispitivanja zdravstvenog ishoda od 36 stavki (SF-36), Skalu ozbiljnosti nesanicice (ISS), Skalu uticaja događaja (IES) sa dve podskale – Intruzija (IES-I) i Izbegavanje (IES-AS) – i upitnik konstruisan za potrebe istraživanja.

**Rezultati.** Niži rezultati na IES-AS, viši rezultati na IES-I i bolnički karantin dobri su prediktori visokih rezultata na podskali stresa. Bolnički karantin, niži IES-AS rezultati, viši IES-I rezultati i muški pol značajni su prediktori viših rezultata na podskali depresije. Takođe, viši rezultati na IES- I, kao i bolnički karantin, značajni su prediktori viših rezultata na podskali anksioznosti. Prisustvo nesanicice bilo je izraženije kod osoba u bolničkom karantinu, a nivoi stresa, anksioznosti i depresije bili su skoro dvostruko izraženiji.

**Zaključak.** Obavezni bolnički karantin za osobe sa potvrđenom infekcijom COVID-19 jeste faktor rizika za narušeno mentalno zdravlje.

**Ključne reči:** COVID-19, karantin, mentalno zdravlje