


The psychosocial impact of quarantine due to exposure to COVID-19 among healthcare workers in Israel

Neta HaGani ^{1,*}, Yael Eilon², Sagit Zeevi¹, Liat Vaknin³, and Hagar Baruch⁴

¹Social Work Department, Rambam Health Care Campus, Haifa, Israel, ²Internal Auditor Office, Rambam Health Care Campus, Haifa, Israel, ³Occupational and Environmental Clinic (Personnel Clinic), Rambam Health Care Campus, Haifa, Israel and ⁴Nursing Administration, Rambam Health Care Campus, Haifa, Israel

*Corresponding author. E-mail: n_hagani@rmc.gov.il

Summary

Quarantine is an essential practice during pandemics but it could have negative effects. There are currently no studies on the experiences of health care workers (HCWs) in quarantine during the coronavirus disease pandemic. The aim of this study was to assess the psychosocial effects of quarantine on tertiary hospital HCWs who were exposed to coronavirus. A cross-sectional study on the psychological wellbeing, needs and resources of HCWs during quarantine was conducted using an online survey in a large tertiary hospital. In total, 148 quarantined HCWs participated in this study. Overall self-reported psychological wellbeing scores were high (5.22 ± 1.11). Physicians had higher psychological wellbeing compared to nurses (5.58 ± 1.05 and 4.83 ± 1.21 , respectively). Being a nurse, separation from family during quarantine, experiencing public shaming and longer quarantine period were associated with lower psychological wellbeing and higher needs. Working from home and confidence in safety at work was associated with fewer needs during quarantine. Nurses might be a risk group for the negative influences of quarantine. The ability to remain connected to work by working from home could have a protective effect on HCWs' psychological wellbeing. More efforts should be implemented in order to support HCWs in quarantine and after their return to work.

Lay Summary

During the COVID-19 crisis, health care workers (HCWs) were at the frontline of this pandemic and therefore were exposed to its risks and negative impact. One of the challenges during this time was the frequent quarantines of HCWs as a result of their exposure to patients. Although quarantine is important to stop the infection, it may affect mental and physical health. This study examined HCWs' experience during quarantine, their well-being and ways of coping. We sent HCWs who are working in a tertiary hospital an online questionnaire and 148 replied. We found that the average well-being of HCWs in quarantine was high, with physicians having the highest reported well-being and nurses having the lowest. HCWs who reported low sense of well-being also reported on having more difficulties coping with the quarantine and reported more public shaming due to being in quarantine. We also

found that HCWs who were working from home during quarantine and those who reported they felt safe in their place of work reported less difficulties coping with the quarantine. Our study suggests that nurses are more vulnerable to the negative impact of quarantine. It also suggests that being connected to work during quarantine can improve well-being. It is important to address stigma toward quarantined individuals and to provide more resources to support HCWs in quarantine and after their return to work.

Key words: health care workers, quarantine, COVID-19, psychological well-being, work satisfaction

INTRODUCTION

Health care workers (HCWs) play a vital role in the coronavirus disease (COVID-19) pandemic that erupted during February–March 2020, and spread worldwide. They risk their lives in order to keep others safe and healthy (WHO, 2020a). It is estimated that 14% of COVID-19 cases reported to the World Health Organization (WHO) were among HCWs. In some countries, the proportion was as high as 35%. In addition, it is estimated that thousands of HCWs infected with COVID-19 lost their lives worldwide (WHO, 2020a).

COVID-19 has put an enormous strain on the already strained healthcare system, which resulted in many challenges and risks for HCWs, including high infection risk, increased work overload and challenging working conditions such as wearing heavy protective gear for long periods of time, longer shifts and working outside of regular hours (Greenberg, 2020; Neto *et al.*, 2020; WHO, 2020a). Previous studies showed that these challenges and risks can contribute to psychological distress, anxiety, depression and post-traumatic stress (PTS) symptoms among HCWs (Maciaszek *et al.*, 2020; Williamson *et al.*, 2020). In a recent review, it was found that during COVID-19, one in four healthcare workers reported depression and anxiety, and one in three suffered from insomnia (Pappa *et al.*, 2020).

Exposure to an infection presumes an occupational risk for HCWs. In order to keep staff and patients safe and protected during infection outbreaks, hospitals are working under strict guidelines and practice face covering, hygiene and physical distancing. Another important precaution implemented is a quarantine policy for workers who had been exposed or infected with COVID-19. Quarantine is the separation of someone who might have been exposed to the virus from others (Centers for Disease Control and Prevention—CDC, 2021). During the COVID-19 outbreak, HCWs who had been exposed to a verified coronavirus patient or returned from overseas, were obligated to quarantine for 14 days and to provide a negative COVID-19 test before returning to work (WHO, 2020b).

Quarantine is essential among HCWs as they are not only at a higher risk to be infected, but are also at a higher risk of transferring the virus to vulnerable individuals and other HCWs (WHO, 2020b). Even though quarantine can reduce the infection rate, it was found to have some negative consequences among the general population such as psychological distress, loneliness, PTS symptoms, loss of resources and lack of access to food and medications (Greenberg *et al.*, 2020; Matias *et al.*, 2020; Xiao *et al.*, 2020). In previous outbreaks, HCWs were found to experience acute stress and symptoms of depression, PTS and alcohol dependency during quarantine and long after. HCWs also reported fear of infection for themselves and their loved ones, and were concerned about stigmas associated with the infection (Huremović, 2019; Gómez-Durán *et al.*, 2020).

Research on factors associated with psychological wellbeing among HCWs during quarantine situations reveal that it is associated with feelings of shame and guilt, as HCWs are concerned about the fate of their patients and co-workers during their absence, and feel powerless to help (Blake *et al.*, 2020). HCWs might also feel guilty about potentially exposing their patients and loved ones to the virus (Shanafelt *et al.*, 2020). HCWs might also be worried they will be labeled or discriminated against as a result of being in quarantine or positive to the virus, and be shamed in public or in their workplace (Greenberg *et al.*, 2020; Ramaci *et al.*, 2020). Clear guidelines and positive communication between HCWs and their supervisors were also found to be beneficial to reduce frustration, stress and anxiety (Huremović, 2019; Wong *et al.*, 2012).

Even though the emotional and physical wellbeing of HCWs is of great importance, these are often difficult to maintain, especially during a major health crisis. Quarantine is an essential procedure during pandemics; however, it may have some negative effects, especially for HCWs who are experiencing pandemic-related ongoing stress and work overloads. Furthermore, the extent of the uncertainty, longevity and global dissemination of this virus have never been seen by today's HCWs. Therefore, there is a need to examine

their experience of quarantine during the current COVID-19 pandemic, in order to identify at-risk groups within the healthcare community and provide adequate long-term help.

AIM

The study goals are to examine the psychosocial effects of quarantine, due to exposure to COVID-19, among HCWs in a tertiary hospital.

METHODS

A cross-sectional study was conducted during October–November 2020 among HCWs in a large tertiary hospital, in the north of Israel, using an online survey to study their psychological wellbeing, needs and resources.

According to [Israeli Ministry of Health \(IMOH\) \(2021\)](#) guidelines, HCWs exposed to a verified COVID-19 patient, either during or outside of work, were obligated to be quarantined at home for 10–14 days (The IMOH guidelines regarding quarantine periods changed throughout the year 2020 according to new developments and information regarding the illness (IMOH, 2020)). The quarantine duration also varied according to the time when individuals were notified about their exposure. Some had longer quarantines due to reasons such as symptoms of the disease that were still present after 14 days, or the development of the disease among other family members during the quarantine period (IMOH, 2020).

SAMPLE AND SAMPLING METHODS

The sample included 148 hospital HCWs. The inclusion criteria were: currently employed by the hospital in one of four sectors: physician, nurse, paramedical or administrative; having an active organizational email address; and being in quarantine at least once during the COVID-19 outbreak. The exclusion criteria were: HCWs who did not experience quarantine at least once during the COVID-19 outbreak, and HCWs who did not have the capacity to answer an online survey.

After receiving the hospital Institutional Review Board's approval, data were collected using an anonymous online questionnaire. The questionnaire was distributed via a link sent to HCWs' organizational email or personal mobile phone. Participants were approached based on the organizational records of workers in quarantine due to testing positive to COVID-19 or exposure to a patient/worker who tested positive to COVID-19. Participation in the survey was voluntary. Study

participants received two reminders to complete the online survey. Questionnaire completion took 10–15 min.

QUESTIONNAIRE

The questionnaire was built for the purpose of this study based on previous literature on psychological wellbeing, coping with epidemics and quarantine as a result of exposure to infections ([Goldberg, 1972](#); [Brooks et al., 2020](#); [Lu et al., 2021](#)). The questionnaire was further developed in consultation with mental health professionals, and was tested for internal validity (Cronbach's alpha).

MEASURES

Dependent variables

1. Psychological wellbeing was measured using the General Health Questionnaire-12. The questionnaire included items on a seven-point Likert scale (1 = never, 7 = always) including symptoms of stress and depression during quarantine (e.g. 'Feeling unhappy and depressed', 'Loss of sleep over worry'). A mean score was calculated. Higher score indicated stronger psychological wellbeing ([Goldberg, 1972](#)); $\alpha = 0.87$.
2. Needs during quarantine were taken from a rapid review that identified common emotional, physical and social stressors during quarantine ([Brooks et al., 2020](#)). Those stressors were converted to phrases (e.g. 'I was afraid my family will be infected', 'It was difficult to be apart from my family') and measured on a five-point Likert scale (1 = not at all, 5 = very much). A mean score was calculated. Higher score indicated higher levels of needs; $\alpha = 0.84$.
3. Personal resources questionnaire was built for the purposes of this study based on ways of mitigating the consequences of quarantine ([Brooks et al., 2020](#)). Items were measured on a five-point Likert scale (1 = not at all, 5 = very much) and included questions on resources such as family support, social support, and faith. A higher score indicated more resources available for the individual.
4. Satisfaction from workplace support during quarantine (information provided, emotional support, continuous communication, etc.) based on the organizational response to HCWs' needs during quarantine and on previous literature regarding HCWs' quarantine ([Brooks et al., 2020](#)). Items were measured on a five-point Likert scale (1 = not at all, 5 = very much). A mean score was calculated. A higher score indicated a higher level of satisfaction

from work (e.g. ‘How satisfied were you the amount of contact you had with your department during your quarantine?’); $\alpha = 0.79$.

Independent variables

1. Questions regarding quarantine characteristics developed for the present study including: reasons for quarantine (returning from overseas, exposure to a verified patient in the hospital, exposure to a verified patient outside of the hospital or being positive to COVID-19), place of quarantine (home, relatives, hotel, rented apartment), duration of quarantine (days), level of separation from family members during quarantine (1 = not at all, 5 = very much), working from home during quarantine (yes/no).
2. Confidence in safety at work: a single item developed for the present study regarding the perceived level of confidence in the safety and protection procedures and equipment at the workplace (1 = not at all, 5 = very much): ‘To what extent did you feel safe at work in terms of feeling the hospital maintains the proper guidelines of physical distancing, proper isolation of infected patients and providing enough protective equipment for staff?’
3. Public shaming: a single item on a five-point Likert scale (1 = not at all, 5 = very much) developed for the present study, regarding experiencing public shaming, i.e. experiences of public scrutiny or ridicule by sources such as family members, friends, co-workers or strangers, due to being quarantined or infected with COVID: ‘To what extent did you experience public shaming by family, friends, co-workers, strangers, due to being in quarantine?’
4. Feelings of shame/guilt: a single item on a five-point Likert scale (1 = not at all, 5 = very much) developed for the present study, refereeing to personal feelings of embarrassment, wrongdoing and powerlessness due to being quarantined or infected and may also be a result of public shaming: ‘To what extent did you feel shame or guilt due to being in quarantine?’
5. Socio-demographic characteristics: gender, living arrangement, number of children under the age of 18 years and number of people residing with you.
6. Professional sector (physician, nurse, paramedical and administrative).

Statistical analysis

Descriptive statistics were computed for the study populations’ demographics and dependent variables in order to examine patterns of wellbeing, needs, resources,

satisfaction from work support during quarantine and to identify confusion or unanswered items. Pearson correlations were used to examine the relationships between the four main variables. ANOVA, *t*-tests and Chi-square were conducted to compare the level of psychological wellbeing, needs, resources and satisfaction from work support among the sector and socio-demographic characteristics (gender and number of children). Bonferroni *post-hoc* test was used to identify significance for each pair of groups.

A series of general linear model analyses (ANCOVA) were conducted in order to predict the factors associated with psychological wellbeing and needs of HCWs during quarantine. Parameters included in these regressions were socio-demographic characteristics (e.g. number of children under 18 years), quarantine characteristics (number of days in quarantine, working from home during quarantine, level of separation from family members), confidence in safety at work and professional sector (physician, nurse, paramedical, administrative). *p*-Value was set as $p < 0.05$ for statistical significance. All statistical processing and analysis were performed in SPSS software, version 25 (IBM Corp., Armonk, NY, USA).

RESULTS

Sample characteristics are presented in Table 1. Out of 1172 eligible HCWs, 148 answered the research questionnaire (13% response rate). The sample included physicians, nurses, paramedical and administrative staff (25%, 30.4%, 27.7%, and 16.9%, respectively). Most respondents were women (70.3%), living with a partner (60.8%). More than a third of respondents had three or more children under 18 years old. Most quarantine periods were reported during July–September 2020, and respondents were in quarantine once (81.8%) or twice (15.5%). Most of the respondents were in quarantine due to exposure to COVID-19 outside of work (38.5%) or exposure at work (19.6%); 16% were from verified patients. The average number of quarantine days was 11.5 ± 5.43 . Close to 40% of respondents reported that they were ‘very much’ to ‘extremely’ separated from other family members.

The mean scores of the main variables: psychological wellbeing, needs, satisfaction from work support and different resources used during quarantine are presented in Table 2. The overall mean of psychological wellbeing was above mid-scale 5.22 ± 1.11 . The majority of respondents scored 5 or above (60%) and 30% scored 6 or above. This indicate that in general, participants felt high psychological well-being. Physicians had significant

Table 1: Socio-demographic and quarantine characteristics of the total sample of patients ($n = 148$)

Socio-demographic and quarantine characteristics	<i>n</i>	%
Gender		
Men	44	29.7
Women	104	70.3
Sector		
Physician	37	25.0
Nurse	45	30.4
Paramedical	41	27.7
Administrative	25	16.9
Reason of quarantine		
Returning from overseas	17	11.5
Exposure to COVID-19 at work	29	19.6
Exposure to COVID-19 not at work	57	38.5
Children exposed to COVID-19	21	14.2
Verified patient	24	16.2
Level of separation from family members		
Not at all-medium	94	63.5
Very much-extremely	54	36.5
Living arrangement		
Alone	10	6.8
Partner	90	60.8
Parents	9	6.1
Other family members	39	26.4
Children under 18 years		
None	55	37.2
1–2	41	27.7
3+	52	35.1
Mean days in quarantine	SD	Range
11.5	5.43	3–35

higher psychological wellbeing in comparison to nurses. In contrast, overall mean of needs was moderate (2.49 ± 0.87). Physicians had significant lower needs as compared to nurses and administrative staff. The overall mean of satisfaction from work support was quite high (3.17 ± 0.97) with no significant differences among sectors. The most common resources used during the quarantine period were family/social support, co-workers' support and social media. Significant differences were found among sectors in using different resources. Physicians used less family/social support and social media as compared to other respondents.

Table 3 shows the associations between the study's main variables. Psychological wellbeing was associated with low perception of needs, public shaming and feelings of shame/guilt; fewer days of quarantine, and less separation from family during quarantine. Needs were positively associated with higher reported public

shaming, feelings of shame/guilt and more days in quarantine. Confidence in safety at work was negatively correlated with needs and positively correlated with satisfaction from work support.

Having children under 18 years was associated with satisfaction with work support ($p = 0.007$). Working on-line from home was related to higher psychological wellbeing (5.61 vs. 5.1, respectively, $p = 0.007$), satisfaction from work support (3.6 vs. 3.0, respectively, $p = 0.001$) and having fewer needs (20.1 vs. 2.6, respectively, $p < 0.0001$); data are not shown in table.

Table 4 presents the general linear model analyses (ANCOVA) of psychological wellbeing, needs and satisfaction with work support. All models were found to be significant ($F = 7.53$, $p < 0.001$; $F = 10.86$, $p < 0.001$; $F = 4.12$, $p = 0.001$ respectively). Measures that were found to be associated with the three indexes were entered as covariates. These included: sector (physician, nurse, paramedical, administrative), working from home (yes/no), number of days in quarantine, level of separation from family during quarantine (1 = not at all, 5 = very much), public shaming (1 = not at all, 5 = very much), feelings of shame/guilt (1 = not at all, 5 = very much), number of children under 18 years and confidence in safety at work (1 = not at all, 5 = very much).

The results of the regression analysis show that all three models were found to be significant ($p < 0.001$ to $p = 0.001$). Being a nurse, being separated from family during quarantine, experiencing public shaming and longer quarantine period, all predicted lower levels of psychological wellbeing and higher needs during quarantine. Working from home and confidence in safety at works ($p = 0.05$) predicted fewer needs during quarantine. Working from home also predicted greater satisfaction from work support.

DISCUSSION

The current study is one of the first studies to examine the psychosocial effects of quarantine due to exposure to COVID-19 among HCWs. Our findings reveal that the psychological wellbeing was high and the reported needs and satisfaction from work support were moderate. Being a nurse, longer quarantine period, being separated from family during quarantine and experiencing public shaming were associated with lower psychological wellbeing and higher needs. Working from home was associated with less needs and higher satisfaction from work support.

Previous cross-sectional surveys have shown poor mental health outcomes among HCWs in quarantine (Brooks *et al.*, 2020; Gómez-Durán *et al.*, 2020). In a study conducted in China among hospital employees

Table 2: Mean scores of the main variables: psychological wellbeing, needs, satisfaction from work support and resources (one-way ANOVA)

Main variables	Physician (<i>n</i> = 37)	Nurse (<i>n</i> = 45)	Paramedical (<i>n</i> = 41)	Administrative (<i>n</i> = 25)	Total (<i>n</i> = 148)	<i>p</i> ^a (sector)
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Psychological wellbeing (1–7)	5.58 ± 1.05	4.83 ± 1.21	5.24 ± 1.08	5.36 ± 0.90	5.22 ± 1.11	0.004 ^b
Needs (1–5)	2.11 ± 0.79	2.75 ± 0.92	2.39 ± 0.79	2.72 ± 0.86	2.49 ± 0.87	0.002 ^b 0.007 ^c
Satisfaction from work support (1–5)	3.14 ± 0.98	3.37 ± 0.97	3.12 ± 0.91	2.95 ± 1.01	3.17 ± 0.97	0.33
Resources—family/social support (1–5)	3.11 ± 1.45	3.82 ± 1.18	3.62 ± 1.22	4.08 ± 1.17	3.63 ± 1.29	0.03 ^b 0.004 ^c
Resources—social media (1–5)	2.94 ± 1.39	3.86 ± 1.24	3.36 ± 1.31	3.09 ± 1.34	3.36 ± 1.35	0.002 ^b 0.17
Resources—co-workers' support (1–5)	2.18 ± 1.23	2.91 ± 1.41	2.87 ± 1.26	2.48 ± 1.44	2.66 ± 1.36	0.07
Resources—spiritual believe (1–5)	1.52 ± 0.89	2.13 ± 1.22	2.20 ± 1.49	2.07 ± 1.62	1.98 ± 0.89	0.14
Resources—professional help (1–5)	1.23 ± 0.68	1.62 ± 1.10	1.66 ± 1.13	1.53 ± 1.26	1.52 ± 1.05	0.37

^aBonferroni *post-hoc* test.^bPhysician vs. nurses.^cPhysicians vs. administrative.**Table 3:** Correlation between study's main variables (r Pearson)

	2	3	4	5	6	7	8
1. Psychological wellbeing	−0.73**	0.08	−0.34**	−0.23**	−0.38**	−0.25**	.016
2. Needs	–	−0.008	0.34**	0.25**	0.44**	0.19*	−0.21*
3. Work support	–	–	−0.04	0.01	−0.04	0.03	0.17*
4. Public shaming	–	–	–	**0.62	0.14	0.15	−0.10
5. Feelings of shame/guilt	–	–	–	0.10	0.03	−0.02	−0.02
6. Separation from family	–	–	–	–	0.09	−0.11	−0.11
7. Days in quarantine	–	–	–	–	–	−0.05	−0.05
8. Confidence in safety at Work	–	–	–	–	–	–	–

p* < 0.05.*p* < 0.01.

(physicians, nurses and administrative staff) during the 2006 SARS pandemic, being in quarantine was associated with higher odds of PTS (Wu *et al.*, 2009). Another study that examined the mental health of HCWs post SARS-quarantine revealed that the mental health of

participants was low after self-quarantine (Chen *et al.*, 2007). Our findings contradict the previous ones by showing the psychological wellbeing of HCWs in quarantine was relatively high in the total sample, indicating that stress and anxiety levels were mild.

Table 4: General linear model analyses (ANCOVA) on predictors of psychological wellbeing, needs and work support

	Psychological wellbeing			Needs			Satisfaction from work support		
	B	SE	<i>p</i>	B	SE	<i>p</i>	B	SE	<i>p</i>
Nurse ^a	-0.5	0.22	0.03	0.35	0.17	0.04	0.36	0.22	0.10
Para medical ^a	-0.17	0.22	0.44	0.10	0.16	0.52	0.14	0.21	0.51
Administrative ^a	0.005	0.26	0.98	0.31	0.19	0.10	-	-	-
Work from home	0.28	0.18	0.13	-0.28	0.13	0.04	0.55	0.18	0.002
Days in quarantine	-0.04	0.01	0.009	0.02	0.01	0.03	-	-	-
Isolated from family	-0.19	0.05	0.001	0.18	0.04	0.0001	-	-	-
Public shaming	-0.25	0.10	0.02	0.23	0.08	0.004	-	-	-
Feelings of shame/guilt	-0.07	0.10	0.49	0.04	0.07	0.58	-	-	-
Children under 18 years	-	-	-	-	-	-	-0.10	0.05	0.05
Confidence in safety at work	-	-	-	0.13	0.06	0.05	0.14	0.08	0.10
Overall model	$F = 7.53, p < 0.001$ $R^2 = 0.30$			$F = 10.86, p < 0.001$ $R^2 = 0.39$			$F = 4.12, p = 0.001$ $R^2 = 0.15$		

^aReference group = physicians.

One explanation to this contradiction could be the low response rate that may have resulted in overestimation of high psychological well-being among HCWs. In addition, in previous studies, all HCWs who were quarantined were involved directly in infected patient-care, which may have contributed to increased stress and low mental well-being (Chen *et al.*, 2007). In the current study, HCWs were quarantined due to a variety of reasons and not necessarily were involved in COVID patient-care. Another explanation to the findings regarding psychological wellbeing observed in this study is the sense of solidarity and belonging among HCWs, due to support from co-workers, the organization and other HCWs who share the same experience (Brooks *et al.*, 2020). Moreover, a sense of professional satisfaction may have increased, as HCWs were praised globally due to their hard work and the sacrifices they made to help others. All this might have impacted the HCWs psychological wellbeing during quarantine. These results may also reflect the high level of preparedness and adjustment to crises that is common in tertiary hospitals in Israel (Hirshberg *et al.*, 2001; Adini and Peleg, 2017). This may have decreased some of the stress and anxiety that are usually associated with quarantine, by providing reassurance, certainty and information regarding the quarantine procedures.

According to the IMOH guidelines, people in quarantine are required to be in a confined space with no physical contact with other people, including other home residents (IMOH, 2020). However, some do not have the capacity to be completely separated from other household residents. Hence, there were different levels

of separation from family during quarantine. Our study showed that participants who were not completely separated from other household residents reported higher psychological wellbeing and less needs. Similarly, we found that working from home alleviated some of the negative effects of quarantine. This is in agreement with previous findings that showed that separation from loved ones and loss of freedom have a detrimental effect on mental and physical health during quarantine (Ko *et al.*, 2006; Brooks *et al.*, 2020; Lei *et al.*, 2020). These findings also highlight the importance of familial and social support to mental health during quarantine by relieving the boredom, social isolation and sense of disconnectedness from daily life (Bauer *et al.*, 2020; Chen *et al.*, 2020).

Our findings showed that nurses had the lowest psychological wellbeing and the most reported needs compared to other sectors during quarantine. In previous studies, nurses were found to have a high sense of commitment to patients and co-workers that might sometimes result in a 'presentism-culture' (feelings of shame/guilt of being absent from work and putting work ahead of personal needs) (Baydoun *et al.*, 2016; Rainbow, 2019). These feelings, together with the high sense of commitment, may explain why in our study nurses' psychological wellbeing during quarantine was lower compared to the other sectors. Another explanation for the low psychological wellbeing among nurses is that they were less likely to work from home during quarantine compared to those working in other sectors. Working from home during quarantine was associated in this study with higher psychological wellbeing

and less needs. Therefore, nurses were more likely to feel socially disconnected from the work environment, which may have affected their psychological wellbeing.

Experiencing public shaming and feelings of shame/guilt due to being in quarantine was another factor that was associated with lower psychological wellbeing and higher needs among HCWs in this study. Previous studies have demonstrated stigmas and negative attitudes toward those who are in quarantine due to exposure to COVID-19 (Zolnikov and Furio, 2020; Bhanot et al., 2021). Individuals may feel shame or guilt as a result of these negative attitudes, which in turn may influence their mental health (Guo et al., 2020). Among HCWs, these feelings might be even more intense because of the heavy responsibility they carry toward patients and their own families (Blake et al., 2020; Greenberg et al., 2020; Ramaci et al., 2020). HCWs might be worried of transmitting the virus to their patients, co-workers or families (Maunder et al., 2003; Ramaci et al., 2020). Our findings reflect the influence of shame and guilt on the wellbeing of HCWs.

During quarantine, the hospital provided support to quarantined HCWs. This included a phone call from the hospital's social workers who identified workers in need and offered support, and a call-center which provided information for workers about quarantine procedures. Contact with supervisors and co-workers varied between departments, depending on the staff in each department. Some departments had frequent contact with quarantined workers, while others had less contact. Literature shows the importance of work support during previous epidemics (Chan and Huak, 2004; Maunder et al., 2008). Adaptability and flexibility at work in times of crisis were also found to be critical to increase resilience and wellbeing among HCWs (Wald, 2020). Our findings show that satisfaction from work support was moderate and not associated with the psychological wellbeing or needs of the HCWs during quarantine. These findings suggest that workers did not feel that support from work affected their psychological wellbeing during isolation, and may warrant further examination about how to provide more support for HCWs who are in quarantine. Satisfaction from work support was increased among HCWs who reported working from home during quarantine, which may indicate that those who worked from home had more contact with other co-workers and supervisors and opportunity to receive support, as compared to those not working from home who might have felt isolated from the workplace.

STUDY LIMITATIONS

The current study had a few limitations. First, the response rate was 13%, which could have implications on selection bias. The low response rate could reflect survey fatigue, as HCWs are a popular research population, especially during the COVID-19 crisis period. It could also reflect lack of time, as the survey was sent after HCWs return to work. Even though the survey did not include personal information, it could be that some HCWs were concerned regarding their privacy. These reasons were also previously found to be the main reasons for lack of response to online surveys among HCWs (Cunningham et al., 2015; Parkinson et al., 2015).

Second, most respondents were women, which may limit the generalizability of the findings. However, the general balance of gender in the hospital is in favor of women (65%). Therefore, our gender representation is close to the true gender proportions in the hospital. Third, since this was a retrospective study and based on self-reports, there is likely to be some information and recall bias. In addition, since this is a sensitive issue, there might have been social desirability effect. However, as the survey asked about recent behaviors, it is likely that recall bias is reduced. In order to increase the accuracy of the self-reported information, the subjects received full confidentiality and anonymity. Participants' personal details were reduced as much as possible to eliminate the possibility of being identified. Since this is a sensitive population and quarantine and COVID-19 infections are sensitive topics, socio-demographics such as age and seniority were not included in the questionnaire, which may limit the understanding and analysis of the results. The possible effects of confounding variables, such as sector, were adjusted for in the multivariate analyses.

CONCLUSIONS

Our findings reveal that among HCWs in quarantine, psychological wellbeing was relatively high and needs were moderate. Although in this study, HCWs presented relatively high psychological wellbeing, as the crisis continues, recourses might be depleted. It is therefore important to monitor HCWs' mental health and create opportunities for them to receive support. More efforts should be attempted and embedded in hospitals' policy, in order to support HCWs in quarantine and after they return to work (Wu et al., 2020). These could include weekly conversations with a social worker, supervisors

and co-workers. In addition, it is vital to raise awareness among hospital staff regarding the importance of keeping in touch with quarantined workers, reduce stigma toward quarantined individuals and increase a sense of connectedness and solidarity. Technology can be used in order to communicate with workers by using Apps, sending uplifting messages or creating virtual support groups. Future studies can examine the psychosocial experience of HCWs in quarantine compared to those in other helping professions such as teachers, police officers and toward the general population. Future studies can also examine further feelings of shame/guilt and factors associated with it. Providing more details on the coping mechanisms that promote personal growth would assist to prevent psychological distress and increase resilience among HCWs.

ACKNOWLEDGEMENTS

This study was approved by Rambam Medical Center IRB (approval number RMB-0366-19).

CONFLICT OF INTEREST STATEMENT

We have no conflicts of interests to disclose.

REFERENCES

- Adini, B. and Peleg, K. (2017) Integrated care concerning mass casualty incidents/disasters: lessons learned from implementation in Israel. In Amelung, V., Stein, V., Goodwin, N., Balicer, R., Nolte, E., and Suter, E. (eds), *Handbook Integrated Care*. Springer International Publishing AG, Cham, Switzerland, pp. 439–448.
- Bauer, L. L., Seiffer, B., Deinhart, C., Atrott, B., Sudeck, G., Hautzinger, M. *et al.* (2020) Associations of exercise and social support with mental health during quarantine and social-distancing measures during the COVID-19 pandemic: a cross-sectional survey in Germany. *MedRxiv* (Preprint). Last accessed 5 February 2022. <https://www.medrxiv.org/content/10.1101/2020.07.01.20144105v1.full>.
- Baydoun, M., Dumit, N. and Daouk-Öyry, L. (2016) What do nurse managers say about nurses' sickness absenteeism? A new perspective. *Journal of Nursing Management*, **24**, 97–104.
- Bhanot, D., Singh, T., Verma, S. K. and Sharad, S. (2021) Stigma and discrimination during COVID-19 pandemic. *Frontiers in Public Health*, **8**, 577018.
- Blake, H., Bermingham, F., Johnson, G. and Tabner, A. (2020) Mitigating the psychological impact of COVID-19 on healthcare workers: a digital learning package. *International Journal of Environmental Research and Public Health*, **17**, 2997.
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N. *et al.* (2020) The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet*, **395**, 912–920.
- Centers for Disease Control and Prevention (CDC). COVID-19. When to quarantine. Last accessed 12 March 2021. <https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/quarantine.html>
- Chan, A. O. and Huak, C. Y. (2004) Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health care workers in a medium size regional general hospital in Singapore. *Occupational Medicine*, **54**, 190–196.
- Chen, D., Song, F., Tang, L., Zhang, H., Shao, J., Qiu, R. *et al.* (2020) Quarantine experience of close contacts of COVID-19 patients in China: a qualitative descriptive study. *General Hospital Psychiatry*, **66**, 81–88.
- Chen, N. H., Wang, P. C., Hsieh, M. J., Huang, C. C., Kao, K. C., Chen, Y. H. *et al.* (2007) Impact of severe acute respiratory syndrome care on the general health status of healthcare workers in Taiwan. *Infection Control & Hospital Epidemiology*, **28**, 75–79.
- Cunningham, C. T., Quan, H., Hemmelgarn, B., Noseworthy, T., Beck, C. A., Dixon, E. *et al.* (2015) Exploring physician specialist response rates to web-based surveys. *BMC Medical Research Methodology*, **15**, 32.
- Goldberg, D. P. (1972) *The Detection of Psychiatric Illness by Questionnaire*. London, UK: Oxford University Press.
- Gómez-Durán, E. L., Martín-Fumadó, C. and Forero, C. G. (2020) Psychological impact of quarantine on healthcare workers. *Occupational and Environmental Medicine*, **77**, 666–674.
- Greenberg, N. (2020) Mental health of health-care workers in the COVID-19 era. *Nature Reviews Nephrology*, **16**, 425–426.
- Greenberg, N., Docherty, M., Gnanapragasam, S. and Wessely, S. (2020) Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*, **368**, m1211.
- Guo, Q., Zheng, Y., Shi, J., Wang, J., Li, G., Li, C. *et al.* (2020) Immediate psychological distress in quarantined patients with COVID-19 and its association with peripheral inflammation: a mixed-method study. *Brain, Behavior, and Immunity*, **88**, 17–27.
- Hirshberg, A., Holcomb, J. B. and Mattox, K. L. (2001) Hospital trauma care in multiple-casualty incidents: a critical view. *Annals of Emergency Medicine*, **37**, 647–652.
- Huremović, D. (2019) Quarantine and isolation: effects on healthcare workers. In Huremović, D. (ed.), *Psychiatry of Pandemics*. Springer International Publishing AG, Cham, Switzerland, pp. 119–125.
- Israeli Ministry of Health. *All About Isolation: Who Must Enter, Shortening, Disputing, Benefit, and One-off Exit*. Israel, 2021. Last accessed 4 February 2022. <https://www.gov.il/en/departments/guides/corona-quarantine>
- Ko, C. H., Yen, C. F., Yen, J. Y. and Yang, M. J. (2006) Psychosocial impact among the public of the severe acute

- respiratory syndrome epidemic in Taiwan. *Psychiatry and Clinical Neurosciences*, **60**, 397–403.
- Lu, H., Nie, P. and Qian, L. (2021) Do quarantine experiences and attitudes towards COVID-19 affect the distribution of mental health in China? A quantile regression analysis. *Applied Research in Quality of Life*, **16**, 1925–1942.
- Lei, L., Huang, X., Zhang, S., Yang, J., Yang, L. and Xu, M. (2020) Comparison of prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 epidemic in Southwestern China. *Medical Science Monitor*, **26**, e924609.
- Maciaszek, J., Ciulkowicz, M., Misiak, B., Szczesniak, D., Luc, D., Wiczorek, T. et al. (2020) Mental health of medical and non-medical professionals during the peak of the COVID-19 pandemic: a cross-sectional nationwide study. *Journal of Clinical Medicine*, **9**, 2527.
- Matias, T., Dominski, F. H. and Marks, D. F. (2020) Human needs in COVID-19 isolation. *Journal of Health Psychology*, **25**, 871–882.
- Maunder, R., Hunter, J., Vincent, L., Bennett, J., Peladeau, N., Leszcz, M. et al. (2003) The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ*, **168**, 1245–1251. PMID: [PMC154178](https://pubmed.ncbi.nlm.nih.gov/154178/)
- Maunder, R. G., Leszcz, M., Savage, D., Adam, M. A., Peladeau, N., Romano, D. et al. (2008) Applying the lessons of SARS to pandemic influenza. *Canadian Journal of Public Health*, **99**, 486–488.
- Neto, M. L. R., Almeida, H. G., Esmeraldo, J. D. A., Nobre, C. B., Pinheiro, W. R., de Oliveira, C. R. T. et al. (2020) When health professionals look death in the eye: the mental health of professionals who deal daily with the 2019 coronavirus outbreak. *Psychiatry Research*, **288**, 112972.
- Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsis, E. and Katsaounou, P. (2020) Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain, Behavior, and Immunity*, **88**, 901–907.
- Parkinson, A., Jorm, L., Douglas, K. A., Gee, A., Sargent, G. M., Lujic, S. et al. (2015) Recruiting general practitioners for surveys: reflections on the difficulties and some lessons learned. *Australian Journal of Primary Health*, **21**, 254–258.
- Rainbow, J. G. (2019). Presenteeism: Nurse perceptions and consequences. *Journal of Nursing Management*, **27**, 1530–1537.
- Ramaci, T., Barattucci, M., Ledda, C. and Rapisarda, V. (2020) Social stigma during COVID-19 and its impact on HCWs outcomes. *Sustainability*, **12**, 3834.
- Shanafelt, T., Ripp, J. and Trockel, M. (2020) Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA*, **323**, 2133–2134.
- Wald, H. S. (2020) Optimizing resilience and wellbeing for healthcare professions trainees and healthcare professionals during public health crises – practical tips for an ‘integrative resilience’ approach. *Medical Teacher*, **42**, 744–755.
- Williamson, V., Murphy, D. and Greenberg, N. (2020) COVID-19 and experiences of moral injury in front-line key workers. *Occupational Medicine*, **70**, 317–319.
- Wong, E. L., Wong, S. Y., Lee, N., Cheung, A. and Griffiths, S. (2012) Healthcare workers’ duty concerns of working in the isolation ward during the novel H1N1 pandemic. *Journal of Clinical Nursing*, **21**, 1466–1475.
- World Health Organization (WHO) (2020a) Protecting health workers from COVID-19. Last accessed 5 February 2022. <https://www.who.int/news/item/17-09-2020-keep-health-workers-safe-to-keep-patients-safe-who>.
- WHO (2020b) Prevention, identification and management of health worker infection in the context of COVID-19. Last accessed 5 February 2022 <https://www.who.int/publications/i/item/10665-336265>.
- Wu, A. W., Connors, C. and Everly, Jr G. S. (2020) COVID-19: peer support and crisis communication strategies to promote institutional resilience. *Annals of Internal Medicine*, **172**, 822–823.
- Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z. et al. (2009) The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *The Canadian Journal of Psychiatry*, **54**, 302–311.
- Xiao, H., Zhang, Y., Kong, D., Li, S. and Yang, N. (2020) Social capital and sleep quality in individuals who self-isolated for 14 days during the coronavirus disease 2019 (COVID-19) outbreak in January 2020 in China. *Medical Science Monitor*, **26**, e923921.
- Zolnikov, T. R. and Furio, F. (2020) Stigma on first responders during COVID-19. *Stigma and Health*, **5**, 375–379.