

Impact of the COVID-19 pandemic on healthcare workers in the frontline

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Abstract

Background: Previous studies have shown that frontline healthcare workers (HCWs) have higher rates of pre-existing mental health problems and may be therefore at risk for worsening of mental health problems during the COVID-19 pandemic. This includes an increased prevalence for anxiety, depression, acute stress and post-traumatic stress disorders. The aim of this study was to assess the subjective and professional burden of the HCWs working in frontline departments of our hospital.

Objective: The aim was primarily to identify the psychological and professional impact of the COVID-19 pandemic on HCWs working in the frontline during the first two waves.

Design and setting: This was a single-centre multidisciplinary survey.

Methods: A printed survey was distributed to all HCWs (N=240) working in the intensive care unit and emergency department during the first and second COVID-19 outbreak. We evaluated the subjective and professional burden using 4-point Likert scale questions. Three-group comparisons based on years of work experience were made using Kruskal-Wallis tests. Comparisons per participant between two successive waves were made using Wilcoxon signed rank tests.

Results: A total number of 171 HCWs (71.3%) participated in the survey. Participants mainly feared infecting their family and friends. A majority of the participants showed a high motivation working in the COVID-zone. More than half of the participants reported that their quality of sleep was unaffected by the pandemic. Despite a higher workload, work performance and interactions with colleagues were not negatively affected by the pandemic. No significant difference was found based on years of work experience. Participants had an overall decrease in personal impact during the second wave. However, work motivation decreased ($p < 0.001$). Participants felt better protected by the offered equipment ($p = 0.004$), but felt less appreciated ($p = 0.01$).

Conclusions: The pandemic appeared to have affected the subjective and professional burden of our participants. However, they were not as severely impacted as HCWs in some other studies. Acquired knowledge should be utilized in developing preventive and interventional strategies to support HCWs affected by the COVID-19 pandemic and potential pandemics in the future.

Keywords: COVID-19, pandemic, mental health, healthcare workers, survey.

Introduction

The SARS-Cov-2 virus outbreak in 2020 was one of the most devastating pandemics since the Spanish flu in 1918. It exceeded most viral outbreaks of the last two decades in terms of infectiousness, speed of spreading, worldwide mortality (4.5 million deaths around the end of

2021) and had left many of us with the feeling that ‘no-one’ is safe.

Worldwide there was a major interest in vaccination, treatment and how the healthcare system copes with the COVID-19 pandemic. However, the focus on the mental health of healthcare workers (HCWs), received less attention at the beginning^{1,2}. But the interest in mental health

Internal Review Board approval: This survey was approved by the institutional ethics committee of Onze-Lieve-Vrouw Hospital in Aalst, Moorselbaan 164 9300 Aalst, Belgium, with Leloup A. as chairperson of the committee. Approval was given with internal reference code 2021/015 on February 16th 2021.

of HCWs and number of studies investigating the impact of the COVID-19 pandemic on mental health has improved. Previous studies before the COVID-19 pandemic have established that HCWs show higher rates of pre-existing mental health problems and may be therefore at risk of worsening of mental health problems during an outbreak^{3,4,5,6}.

Challenges for HCWs during an outbreak include not only the increased workload, but also fear of contagion for their families and themselves, working with new and frequently changing protocols, personal protective equipment, caring for critically ill and quickly deteriorating patients, and last, caring for colleagues who have also fallen ill⁷. Furthermore, routine clinical practice has been significantly changed, and many professionals have been transferred from their usual workplace to a higher-risk 'frontline'⁸. Working in the frontline under extreme pressure, together with aforementioned challenges, appears to be a significant risk factor for psychological problems, such as an increased prevalence for anxiety, depression, acute stress and post-traumatic stress disorders^{9,10,11,12}. A meta-analysis by Aymerich et al. showed, on a large scale and at a global level, a significant prevalence rate of anxiety, depression, stress, insomnia, post-traumatic symptoms and burn out in the HCWs group exposed to the care of COVID-19 patients⁸.

This survey was conducted at the Onze-Lieve-Vrouw Hospital Aalst in Belgium and serves as a non-academic tertiary referral centre, with the knowledge and capability of treating severely ill patients needing invasive ventilation and extracorporeal support like ECMO/ECCO2R. A sudden influx of severely ill COVID-19 patients during the first wave in March 2020 impacted the hospital and required a reorganisation of HCWs and resources. During the first year (2020) of the COVID pandemic 911 patients were admitted of which 165 patients died and in 2021 respectively 892 patients were admitted of which 140 died. The total number of admitted COVID-19 patients requiring a transfer to the intensive care unit was 153 during the first and second wave. 64 of the patients transferred to the intensive care unit required invasive ventilation. A total number of 16 patients needed extracorporeal support like ECMO/ECCO2R. The overall mortality on the intensive care unit was around 25%. As described previously, this situation likely impacted the mental health of the HCWs of our hospital.

The aim of this single-centre survey was primarily to identify the psychological and professional impact of the first two COVID-19 pandemic waves on HCWs working in the

frontline at the Onze-Lieve-Vrouw Hospital Aalst (Belgium), because data of HCWs from Belgium in the frontline remains scarce. Secondly, did years of work experience impact the vulnerability to psychological distress and thirdly could the survey contribute to assess where mental health interventions could be focused on an effort to support psychological well-being.

Methodology

Participants and survey

This single-centre multidisciplinary survey was approved by the institutional ethics committee of Onze-Lieve-Vrouw Hospital Aalst (Moorselbaan 164, 9300 Aalst, Belgium) with internal reference 2021/015 on February 16th 2021. Chairperson of the ethics committee was dr. A. Leloup. A printed anonymous survey was distributed on February 28th 2021 to all HCWs (N=240) working in the intensive care unit (ICU) and emergency department (ED) during the first and second COVID-19 outbreak at Onze-Lieve-Vrouw Hospital Aalst. The superiors of the beforementioned departments provided a list with contact information of all HCWs. The printed survey contained a letter explaining the objectives of the study and a statement that all data was handled anonymously. Participation was on a voluntary basis and there were no exclusion criteria. An email was also sent to all 240 potential participants to explain the aim of the survey. Time span for filling out the survey was from February 28th 2021 until April 1st 2021. A gently reminder for participation was sent by email after two weeks and two days before the deadline. A dedicated sealed box was placed in each department for return of the completed surveys and emptied after two weeks and after one month.

Survey structure

The survey was first developed by TDG and revised by NDM, KDD, PVH, AVDV, DP and approved by the head of the departments. The survey was provided in Dutch language and translated for this publication. The survey consisted of 23 four-point Likert scale questions ranging from 1 (strongly agree) to 4 (disagree) and five three-point Likert scale questions. Four dichotomous (Yes/No) questions were also present in the survey. The survey addressed different issues such as demographics of participants, impact of the COVID-19 pandemic on personal level and on work environment. Finally, the participants were asked about their feelings about the future. Twenty-five survey questions addressed the difference issues and feelings between the first and second COVID-

19 outbreak. We assumed that the first wave started approximately around half way March 2020 till June 2020 and the second wave approximately from October 2020 till January 2021.

Statistical analysis

Every answer possibility was coded into a number and all data from the survey were exported to IBM SPSS for Windows (version 28) and were used for statistical analysis. After data cleaning was performed, descriptive statistics were conducted. These descriptive statistics included frequencies and medians. Microsoft Excel (version 2016) was used to draw tables. Sample sizes with an number smaller than 171 are indicating for missing responses for the respective variables. Questions not answered were coded as 'missing'. Three-group comparisons between groups of years of work experience were conducted with non-parametric Kruskal-Wallis tests assuming the Likert scale as an ordinal dependent variable. In case of significant difference, post-hoc subgroup comparisons were performed using Mann-Whitney U-tests. The significance level was set on $\alpha=0.05$. With a p-value of $p<0.05$ indicating statistical significance. This significance level was not Bonferroni-adjusted for multiple comparisons. We chose not to do so because of the overly conservative aspect of the adjustment and the more exploring reasons of this research. Comparisons between two paired groups, namely the first and second wave, were conducted using the non-parametric Wilcoxon signed rank test for the four-point and three-point Likert scale questions. One pairwise dichotomous question (question 28) was analysed using a McNemar test. Using a p-value of $p<0.05$ indicating statistical significance.

Results

Out of 240 HCWs working at the ICU and ED, 171 filled in the survey (71.3%). None of the participants were excluded. For a more complete overview of data, the results were divided into three topics: personal impact, professional impact and future. The personal impact topic consisted of questions about mental/psychological items as well as social/familial items. The focus of the professional impact topic aimed on interactions with colleagues, workload, communication of the hospital management and the offered protective equipment. Questions about further working in the healthcare system and preparedness for future pandemics were central within the future topic. A couple of questions of the survey were not included in the descriptive data nor in the statistical analysis. We chose to do so because

of the futility of the question (questions 8, 29, 30 and 34) or because the question had already been asked before in the survey (question 33). Finally a total of 27 questions were used for analysis.

Demographic information

Table I displays the demographic information of the participants. However not every participant did answer these questions. This is the reason why frequencies of the total number per item does not match with the total number of participants (N=171). Other professions consists of other HCWs like physiotherapists and administrative personnel.

Overall response patterns

Regarding the personal impact of the pandemic, high ratings were reached on questions of fear for the well-being of the families of the participants (question 26) and the fear of catching the virus with the risk to pass it on to family or friends (questions 27 and 28). A slight majority of the participants felt mentally strained by the pandemic (question 10) and were worrying about the future (question 35). A majority of the participants showed a high motivation working in the COVID-zone (question 31). Sleep quality was unaffected by the pandemic (question 11) for most of the participants. A rather neutral answer was given by the participants regarding the question about increasing stress on the daily life (question 25).

On the topic of professional impact of the pandemic, a majority reported an increased daily workload. However, without effect on work performance, worsening satisfaction or negative impact on interaction with colleagues (questions 9, 12, 16 and 13). In terms of the practical and organisational items, most participants reported an appropriate preparedness and more than half of the participants felt well protected regarding the equipment provided by the hospital (questions 19, 23 and 32). In terms of communication, the participants showed a moderate positive answer on the question about sharing information by the employer/superiors (questions 14 and 15). A majority felt supported by their superiors, but not by the hospital management though (questions 17 and 18). The same trend was reported regarding the appreciation by the superiors and the hospital management, respectively (questions 21 and 22).

Regarding the future topic, most participants were willing to continue their work in the healthcare system after the pandemic and most of them would stay at the same department (questions 36 and 37). Oddly, all participants answered question 37, while three of them stated to stop working in healthcare after the pandemic. A majority reported to be better

Table I. — Demographic characteristics of the complete sample.

	Overall (%)
Item	N=171
Gender	166 (97.1%)
Female	121 (73.3%)
Male	45 (27.2%)
Age (years)	166 (97%)
20 - 29	52 (31.3%)
30 - 49	78 (47.0%)
>50	36 (21.7%)
Profession	166 (97.1%)
MD	21 (12.7%)
Nurse	131 (78.9%)
Other professions	14 (8.4%)
Work experience (years)	166 (97.1%)
<5	57 (34.3%)
5 - 10	28 (16.8%)
>10	81 (48.8%)
Family situation	166 (97.1%)
Single	42 (25.3%)
In relationship with children	60 (36.1%)
In relationship without children	64 (38.6%)
MD = doctor of medicine Other professions = administrative personnel, physiotherapists, etc.	

prepared for a possible next pandemic (question 38) and almost all participants were ready to be vaccinated against the COVID-19 virus (question 39). See Table II for the frequencies and descriptive statistics of all answers of the complete sample.

Comparisons based on years of work experience

All questions with a four-point Likert scale, were compared between three groups based on years of work experience (<5 years, 5-10 years and >10 years). We assumed that HCWs with more work experience would have a different impact on their personal and professional life. Using non-parametric Kruskal-Wallis tests, the results showed no significant differences ($p>0.05$) between groups. Even when the original significance level of $\alpha=0.05$ was maintained. Post-hoc comparisons between two groups using Mann-Whitney-U tests were not applied because no significant differences were detected. See Table III for results of the three-group comparison based on years of work experience. Total numbers less than 171 indicate missing answers in respective questions.

Comparisons between first and second wave

In almost all questions of the survey, participants were asked to give an answer how they felt during the first wave and the second wave of rising COVID infections. Wilcoxon signed ranks tests were used

to detect a significant difference in impact. In about half of the questions, significant differences were found on personal and professional impact between the first and second wave.

Regarding personal impact, all items showed a significant difference ($p<0.05$) between the two waves. Participants reported significant less mental strain, more quality of sleep, less stress in daily life and less fear getting infected during work in the second wave compared to the first wave. Participants also indicated to have more time for personal life and less fear for the well-being of their family in the second wave. However, there was significant less motivation to work in the COVID zone during the second wave compared to the first wave ($Z=-4.705$, $p<0.001$). Question 28, fear of spreading the COVID virus to family, consisted of a dichotomous answer possibility and was therefore analysed using a McNemar test. Resulting in a significant difference between the second and first wave ($p=0.002$).

In terms of professional impact, significant differences between the first and second wave were found on the items about daily workload (question 9), measures taken by the hospital (question 19), preparedness of the department (question 23), quality of protection (question 32) and appreciation by the hospital management (question 21). Participants indicated their daily workload was less heavy in the second wave ($Z=-2.02$, $p<0.042$). The more practical items about measures taken by the hospital ($Z=-3.656$, $p<0.001$), preparedness of the department ($Z=-5.232$, $p<0.001$) and the quality of provided protection material ($Z=-2.802$, $p=0.004$) indicated a significant better preparedness and quality of protection in the second wave compared to the first wave. However, the feeling of being appreciated by the hospital management declined during the second wave ($Z=-2.598$, $p=0.01$). See Table IV for the results and statistical analysis comparing the differences between the first and second wave. Total numbers less than 171 indicate missing answers in respective questions.

Discussion

This survey showed the assessment regarding the personal and professional impact of HCWs in the frontline of the Onze-Lieve-Vrouw Hospital in Aalst (Belgium) during the first two waves of the COVID-19 pandemic. An overall assessment was made of the impact on all HCWs participating in this survey. Statistical analysis was conducted to look for significant differences based on years of work-experience and to detect if participants were affected differently between two waves of increasing infections.

Table II. — Descriptive data of the complete sample 1/2.

Item	Valid N	Missing	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Mdn
Personal impact							
Due to the pandemic I felt mentally strained (Q10)	162	9	54 (33.3%)	51 (31.5%)	33 (20.4%)	24 (14.8%)	2.0
Since the pandemic. my quality of sleep was less than normal (Q11)	163	8	25 (15.3%)	30 (18.4%)	26 (16.0%)	82 (50.3%)	4.0
My daily life was more stressful because of the pandemic (Q25)	163	8	50 (30.7%)	34 (20.9%)	36 (22.1%)	43 (26.4%)	2.0
I was afraid of catching the COVID virus myself during work (Q27)	162	9	71 (43.8%)	39 (24.1%)	25 (15.4%)	27 (16.7%)	2.0
Due to the pandemic. I am worrying more about the future. (Q35)	169	2	68 (40.2%)	46 (27.2%)	26 (15.4%)	29 (17.2%)	2.0
Due to the pandemic. I had significant less personal time (Q24)	160	11	54 (33.8%)	34 (21.3%)	26 (16.3%)	46 (28.8%)	2.0
Due to the pandemic. I was worrying more often about the well-being of my family (Q26)	165	6	105 (63.6%)	26 (15.8%)	22 (13.3%)	12 (7.3%)	1.0
Due to my daily exposure at work. I feared to pass the COVID virus to friends or relatives (Q28)	159	12		144 (90.6%)		15 (9.4%)	
			<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Absent</u>	
My motivation working in the COVID-zone was: (Q31)	150	21	65 (43.3%)	59 (39.3%)	20 (13.3%)	6 (4.0%)	2.0
Professional impact							
			<u>Strongly agree</u>	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>	
The pandemic did increase my daily workload (Q9)	160	11	64 (40.0%)	47 (29.4%)	27 (16.9%)	22 (13.8%)	2.0
The pandemic had an impact on the way I perform at work (Q12)	163	8	10 (6.1%)	20 (12.3%)	39 (23.9%)	94 (57.7%)	4.0
Since the outbreak of the pandemic. my satisfaction with my job has worsened (Q16)	161	10	18 (11.2%)	37 (23.0%)	42 (26.1%)	64 (39.8%)	3.0
The pandemic had a negative impact on my interaction with colleagues. (Q13)	161	10	7 (4.3%)	9 (5.6%)	24 (14.9%)	121 (75.2%)	4.0
The measures taken by the hospital were appropriate (Q19)	163	8	44 (27.0%)	53 (32.5%)	40 (24.5%)	26 (16.0%)	2.0
My department was well prepared for the COVID pandemic (Q23)	161	10	46 (28.6%)	60 (37.3%)	27 (16.8%)	28 (17.4%)	2.0
I felt well protected by the equipment (Q32)	159	12	94 (59.1%)	35 (22.0%)	18 (11.3%)	12 (7.5%)	1.0
My employers informed me sufficient about the pandemic (Q14)	158	13	34 (21.5%)	59 (37.3%)	40 (25.3%)	25 (15.8%)	2.0
My superiors informed me sufficient about the pandemic (Q15)	159	12	46 (28.9%)	64 (40.3%)	30 (18.9%)	19 (11.9%)	2.0
The communication about the pandemic from the hospital management was appropriate (Q20)	156	15	19 (12.2%)	49 (31.4%)	52 (33.3%)	36 (23.1%)	3.0
I felt left alone by the hospital management (Q17)	157	14	28 (17.8%)	70 (44.6%)		59 (37.6%)	2.0
I felt left alone by my superiors (Q18)	156	15	7 (4.5%)	43 (27.6%)		106 (67.9%)	3.0
I felt that my efforts at work during the pandemic were being appreciated by the management of the hospital (Q21)	159	12	16 (10.1%)	44 (27.7%)	50 (31.4%)	49 (30.8%)	3.0
I felt that my efforts at work during the pandemic were being appreciated by my superiors (Q22)	158	13	72 (42.1%)	50 (31.6%)	23 (14.6%)	13 (8.2%)	2.0

Table II. — Descriptive data of the complete sample 2/2.

Future			Yes	In doubt	No	
I will continue my work in healthcare after the pandemic (Q36)	171	0	142 (83.0%)	26 (15.2%)	3 (1.8%)	
I will continue my work in healthcare after the pandemic. but on a different department (Q37)	171	0	24 (14.0%)	22 (12.9%)	125 (73.1%)	
We are better prepared for a new pandemic (Q38)	169	2	117 (69.2%)		52 (30.8%)	
I will get my vaccination against the COVID-19 virus (Q39)	171	0	168 (98.2%)	2 (1.2%)	1 (0.6%)	
Q = Question number						

The survey was able to show a high level of concern for the well-being of family members as well as a high level of fear infecting family and friends by HCWs working in the frontline. Cai et al.¹³, brought up the concerns about family members as one of the main stress factors. The safe-being of family had a large impact in reducing stress. However, this last point was not assessed in other studies. In our results, the pandemic slightly impacted the subjective stress of HCWs in terms of mental strain and stress during daily life. This finding is in line with results of other studies reflecting more stress and anxiety among frontline personnel, varying in intensity from mild to severe. Interestingly, the majority of our participants reported no substantial impact of the pandemic on subjective quality of sleep. In contrast to our findings, the systemic review of Aymerich et al. (reporting 55 studies about insomnia)⁸ and publications from Italy and China, indicated high levels of insomnia during the pandemic^{2,14}. This possibly leads towards the hypothesis that HCWs in Belgium experienced less psychological stress during the pandemic compared to other countries like Italy and China, whom were severely impacted by the pandemic. This could be explained by a higher mortality rate and unpreparedness of the HCWs in both countries. These 55 studies included a total sample of 37,068 participants⁸, making our findings less relevant on the impact of the pandemic on sleep quality. Another interesting finding was the high level of motivation working in the COVID zone, despite the higher workload than normal and higher chance of getting infected. This fits in the overall sentiment within the general population of ‘all of us against the COVID-19 virus’ and ‘the heroes of the healthcare’ at the time of the first COVID-19 wave.

A majority of the HCWs, experienced an increased level of workload without negative effects on performance, work satisfaction or interactions with colleagues. While longer working hours and increased work intensity were found as risk factor for developing mental health problems 15, the HCWs seemed unaffected by the higher

workload in terms of professional impact. Against our expectations and in contrast to media reports, the general response patterns indicated a positive evaluation of the preparedness and quality of provided protective equipment by the hospital. The lack of personal protective equipment for HCWs facing a higher risk of infection especially during the first wave of the pandemic was a large debated issue in many countries and also defined as a source of anxiety among HCWs.

A particular finding was the difference between how participants felt treated by their supervisors and employers. Healthcare workers felt more appreciated and supported by their superiors contrary to their employers. A possible explanation for this, is the fact that HCWs work closer with their superiors than their employers. In case of stress, anxiety or other problems, it was easier for superiors to listen and to intervene. Moreover, the superiors could reflect their appreciation more directly than employers.

Our survey investigated if significant differences were seen between the different groups based on years of work experience. We assumed that HCWs with less years of work experience would have a more negative effect on their personal and professional life. In the literature contradictory conclusions were found. Ranging from the highest level of stress among younger professionals, higher stress among older professionals or no conclusive results were found¹⁶. A study from Cyprus written by Chatzittofis et al. reported that HCWs with fewer years of work experienced depressive symptoms and PTSD more frequently. This was explained by development of adaptive coping mechanisms through the years of work¹⁷. Our results did not show any statistical significant difference. It seemed our participants were affected on a same scale without any differences between number of years of work experience.

We investigated the difference of impact on HCWs between the first two waves. Our results showed significant differences in all questions regarding the personal impact. Personal and mental health items

Table III. — Results of the three-group comparisons based on years of work experience 1/2.

Item	Years of work experience	N	Mean Rank	H	df	p
Due to the pandemic I felt mentally strained (Q10)	<5y	55	86.86	2.741	2	0.254
	5-10y	26	86.65			
	>10y	80	75.13			
	Total	161				
Since the pandemic, my quality of sleep was less than normal (Q11)	<5y	55	85.13	0.773	2	0.679
	5-10y	27	82.83			
	>10y	80	78.56			
	Total	162				
My daily life was more stressful because of the pandemic (Q25)	<5y	55	78.97	0.798	2	0.671
	5-10y	26	87.67			
	>10y	79	79.20			
	Total	160				
I was afraid of catching the COVID virus myself during work (Q27)	<5y	55	81.89	1.344	2	0.511
	5-10y	26	88.13			
	>10y	79	77.02			
	Total	160				
My motivation working in the COVID-zone was (Q31)	<5y	48	76.88	3.032	2	0.219
	5-10y	25	62.36			
	>10y	76	77.97			
	Total	149				
Due to the pandemic, I am worrying more about the future. (Q35)	<5y	60	77.30	5.010	2	0.082
	5-10y	28	100.79			
	>10y	79	83.14			
	Total	167				
Due to the pandemic, I had significant less personal time (Q24)	<5y	55	73.64	1.285	2	0.526
	5-10y	25	81.12			
	>10y	77	82.14			
	Total	157				
Due to the pandemic, I was worrying more often about the well-being of my family (Q26)	<5y	56	75.39	4.214	2	0.122
	5-10y	27	94.83			
	>10y	79	81.27			
	Total	162				
The pandemic did increase my daily workload (Q9)	<5y	54	85.07	1.186	2	0.553
	5-10y	25	79.64			
	>10y	80	76.69			
	Total	159				
The pandemic had an impact on the way I perform at work (Q12)	<5y	55	89.97	4.463	2	0.107
	5-10y	26	71.10			
	>10y	80	78.05			
	Total	161				
Since the outbreak of the pandemic, my satisfaction with my job has worsened (Q16)	<5y	54	88.81	5.196	2	0.074
	5-10y	26	85.77			
	>10y	79	72.08			
	Total	159				

Table III. — Results of the three-group comparisons based on years of work experience 2/2.

The pandemic had an negative impact on my interaction with colleagues. (Q13)	<5y	53	87.08	3.781	2	0.151
	5-10y	26	80.75			
	>10y	80	75.06			
	Total	159				
The measures taken by the hospital were appropriate (Q19)	<5y	54	86.49	1.640	2	0.440
	5-10y	26	80.56			
	>10y	80	76.44			
	Total	160				
My department was well prepared for the COVID pandemic (Q23)	<5y	54	83.33	0.572	2	0.751
	5-10y	26	75.87			
	>10y	79	79.08			
	Total	159				
I felt well protected by the equipment (Q32)	<5y	52	81.06	0.211	2	0.900
	5-10y	26	78.60			
	>10y	79	77.78			
	Total	157				
My employers informed me sufficient about the pandemic (Q14)	<5y	53	80.13	0.434	2	0.805
	5-10y	26	81.81			
	>10y	77	76.26			
	Total	156				
My superiors informed me sufficient about the pandemic (Q15)	<5y	54	79.10	0.300	2	0.861
	5-10y	26	74.31			
	>10y	76	79.51			
	Total	156				
The communication about the pandemic from the hospital management was appropriate (Q20)	<5y	51	77.92	1.049	2	0.592
	5-10y	25	84.88			
	>10y	78	74.86			
	Total	154				
I felt that my efforts at work during the pandemic were being appreciated by the management of the hospital (Q21)	<5y	52	78.14	0.888	2	0.641
	5-10y	26	86.29			
	>10y	79	77.16			
	Total	157				
I felt that my efforts at work during the pandemic were being appreciated by my superiors (Q22)	<5y	53	80.37	0.394	2	0.821
	5-10y	26	74.08			
	>10y	77	78.71			
	Total	156				
Using Kruskal-Wallis tests. Significance level $p < 0.05$; H: H-statistic; df: degrees of freedom.						

like anxiety about getting infected, quality of sleep, personal stress and subjective well-being were less negatively affected during the second wave. HCWs of our hospital seemed to adapt to the negative effects. In the first wave the level of knowledge about the COVID-19 virus was low. There was no effective treatment available. The feeling that ‘no-one’ was safe and fear for contagion were present at that time. In the second wave, it seemed our HCWs were less affected by the problems or were getting used to it and we therefore assume it had a lower impact on their personal lives. Improving

knowledge about the virus, an increased availability and quality of protective material and news of upcoming vaccinations were proposed reasons of declining feeling of anxiety. Longitudinal studies assessing the impact of the COVID-19 pandemic among HCWs showed mixed results. Some studies indicate the persistence of psychological stress¹⁸ while others suggest a lowering of depression and anxiety, in particular after five or more months from the start of the pandemic¹⁹. A large longitudinal study (containing 8996 HCWs) from Spain by Alonso et al. suggested that mental health impact was maintained

Table IV. — Results of the comparisons between first and second wave 1/2.

Comparison items second and first wave		N	Ranks		Test statistics	
			Mean Rank	Sum of Ranks	Z	p
Mental strain wave 2 - Mental strain wave 1 (Q10)	Negative Ranks	18	34.22	616		
	Positive Ranks	48	33.23	1595	-3.349	0.001
	Ties	95				
	Total	161				
Quality of sleep wave 2 - Quality of sleep wave 1 (Q11)	Negative Ranks	12	21.75	261		
	Positive Ranks	34	24.12	820	-3.191	0.001
	Ties	116				
	Total	162				
Stress daily life wave 2 - Stress daily life wave 1 (Q25)	Negative Ranks	15	25.80	387		
	Positive Ranks	33	23.91	789	-2.162	0.031
	Ties	114				
	Total	162				
Fear infection during work wave 2 - Fear infection during work wave 1 (Q27)	Negative Ranks	2	16.50	33		
	Positive Ranks	52	27.92	1452	-6.3	<0.001
	Ties	107				
	Total	161				
Motivation working COVID zone wave 2 - Motivation working COVID zone wave 1 (Q31)	Negative Ranks	16	23.00	368		
	Positive Ranks	48	35.67	1712	-4.705	<0.001
	Ties	80				
	Total	144				
Time for personal life wave 2 - Time for personal life wave 1 (Q24)	Negative Ranks	9	23.33	210		
	Positive Ranks	33	21.00	693	-3.199	0.001
	Ties	117				
	Total	159				
Well-being family wave 2 - Well-being family wave 1 (Q26)	Negative Ranks	6	17.75	106.5		
	Positive Ranks	27	16.83	454.5	-3.397	0.001
	Ties	131				
	Total	164				
Daily workload wave 2 - Daily workload wave 1 (Q9)	Negative Ranks	25	41.26	1031.5		
	Positive Ranks	49	35.58	1743.5	-2.02	0.042
	Ties	85				
	Total	159				
Impact performance work wave 2 - Impact performance work wave 1 (Q12)	Negative Ranks	10	14.05	140.5		
	Positive Ranks	17	13.97	237.5	-1.22	0.252
	Ties	135				
	Total	162				
Satisfaction at work wave 2 - Satisfaction at work wave 1 (Q16)	Negative Ranks	16	24.91	398.5		
	Positive Ranks	30	22.75	682.5	-1.636	0.100
	Ties	113				
	Total	159				
Negative impact interactions colleagues wave 2 - Negative impact interactions colleagues wave 1 (Q13)	Negative Ranks	10	12.15	121.5		
	Positive Ranks	11	9.95	109.5	-0.223	0.811
	Ties	139				
	Total	160				

Table IV. — Results of the comparisons between first and second wave 2/2.

Measures by hospital wave 2 - Measures by hospital wave 1 (Q19)	Negative Ranks	52	36.19	1882		
	Positive Ranks	19	35.47	674	-3.656	<0.001
	Ties	91				
	Total	162				
Preparedness department wave 2 - Preparedness department wave 1 (Q23)	Negative Ranks	61	37.20	2269		
	Positive Ranks	12	36.00	432	-5.232	<0.001
	Ties	87				
	Total	160				
Quality of protection wave 2 - Quality of protection wave 1 (Q32)	Negative Ranks	33	22.05	727.5		
	Positive Ranks	11	23.86	262.5	-2.802	0.004
	Ties	111				
	Total	155				
Info by employers wave 2 -Info by employers wave 1 (Q14)	Negative Ranks	24	22.65	543.5		
	Positive Ranks	25	27.26	681.5	-0.737	0.457
	Ties	108				
	Total	157				
Info by superiors wave 2 - Info by superiors wave 1 (Q15)	Negative Ranks	20	21.20	424		
	Positive Ranks	24	23.58	566	-0.896	0.379
	Ties	114				
	Total	158				
Communication by management wave 2 - Communication by management wave 1 (Q20)	Negative Ranks	16	14.19	227		
	Positive Ranks	12	14.92	179	-0.593	0.621
	Ties	127				
	Total	155				
Left alone by hospital wave 2 - Left alone by hospital wave 1 (Q17)	Negative Ranks	16	21.25	340		
	Positive Ranks	24	20.00	480	-1.067	0.361
	Ties	115				
	Total	155				
Left alone by superiors wave 2 - Left alone by superiors wave 1 (Q18)	Negative Ranks	10	11.00	110		
	Positive Ranks	12	11.92	143	-0.6	0.692
	Ties	132				
	Total	154				
Appreciation by hospital wave 2 - Appreciation by hospital wave 1 (Q21)	Negative Ranks	10	16.00	160		
	Positive Ranks	24	18.13	435	-2.598	0.010
	Ties	124				
	Total	158				
Appreciation by superiors wave 2 - Appreciation by superiors wave 1 (Q22)	Negative Ranks	8	13.75	110		
	Positive Ranks	18	13.39	241	-1.819	0.088
	Ties	130				
	Total	156				
Q: Question number. Using Wilcoxon signed ranks test with significance level $p < 0.05$.						

during the second wave of the pandemic, in contrast with studies in the general population, which showed that high impact at the beginning of the first wave tended to decline after a couple of weeks²⁰. A recent Polish publication with 1243 participants investigating the impact of four successive waves,

even showed an increase in the percentage of HCWs suffering from anxiety disorders. This increasing anxiety in successive waves seemed related to delayed psychiatric reactions to overwhelming clinical workload²¹. These longitudinal findings about anxiety are in contrast to our findings. To

put things in perspective, Babicki et al. used validated scales, their survey contained a larger sample of participants and they did measurements investigating four waves with increasing infections. Our results also showed differences on professional items. Our survey displays a significant decreased level of workload and improved quality of protective equipment. Interactions between colleagues were not affected between the waves. The feeling of being appreciated by the hospital, declined in the second wave. A Dutch survey by van Elk and colleagues, consisting of 1915 HCWs, reported an improvement in support from colleagues, but a decline in support from supervisors. A possible explanation could be that colleagues worked together to reach a bigger goal, while supervisors might have had other responsibilities, at the expense of supporting personnel²².

Our survey has a few limitations. First, we did not use scientifically designed and validated scales for measuring depression, anxiety or quality of life. Like for example BDI-II, GAD-7 or MANSAS scales respectively. Because of this, we were not able to clearly measure subjects like anxiety or depression in a standardized way. Furthermore, our results are less likely to be used in possible upcoming systemic reviews and contribute to the knowledge of the overall impact of COVID in HCWs. Secondly, we did not use the same Likert scale for every question. Using a larger Likert scale should have been used like it is usual in the psychosocial literature, gaining more differentiated information. Thirdly, our findings were not controlled for pre-existing mental conditions despite it had already been stated that pre-existing mental conditions have a large impact on how people were affected by the pandemic. We chose not to take existing mental health issues into account for privacy reasons. Finally, this was a single-centre survey with a total of 171 participants. So the relevance of our survey, with contrary findings, is rather small in comparison with large and multi-centre studies mentioned earlier. The advantages of our survey are firstly the longitudinal design and being able to receive answers from two waves. This was in contrast to most studies investigating the impact on mental health, assessing the impact on one moment in time. Secondly, we addressed profession-specific impact of the pandemic rather than only addressing psychological well-being. Studies assessing the professional impact of the COVID-19 pandemic among HCWs are scarce because researchers mainly focus on personal mental health. We suggest to acquire a more complete insight of the impact of the pandemic on HCWs in the future, so upcoming studies should also assess the professional impact.

To conclude, this was an assessment of the burden and views regarding the personal and professional impact of the COVID-19 pandemic among Belgian HCWs of the Onze-Lieve-Vrouw Hospital in Aalst. Our findings showed no clear impact on sleep quality, in contrast to other studies from Italy and China. High levels of fear about infecting family and friends were in line with other publications. Despite a higher workload, HCWs did not show a significant negative effect on their performances and willingness to work. We did not observe a significant difference of impact based on years of work experience of the HCWs. Our survey showed significant differences in both personal as professional impact between the first two waves of COVID-19 infections. A decline in personal anxiety and stress was reported during the second wave compared to the first wave. However, these findings were sometimes in contrast with larger studies whom recently have been published. It seemed our participants were not as severely impacted by the pandemic as other HCWs from other studies. Personal and professional impact of the pandemic should not be neglected. Acquired knowledge should be utilized in developing preventive and interventional strategies to support HCWs affected by the COVID-19 pandemic and potential pandemics to come in the future.

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Availability of data and material: Data and supplementary material can be requested from the corresponding author.

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