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Original Research Article

The evolving personal, professional and physical impact on healthcare professionals during three COVID-19 waves: A cross-sectional study

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Abstract

Background: The COVID-19 pandemic has led to huge pressure on not only healthcare systems, but also on healthcare professionals.

Objective: As the pandemic continues, the aim of this study is to evaluate how 10 reactions of healthcare professionals evolved during the first 18 months of COVID-19.

Methods: A repeated cross-sectional study was performed with eight measurement points between April 2020 and September 2021 in Belgium. Participants were asked how frequently (on a scale of 0–10) they experienced positive and negative reactions during normal circumstances and during past week, referred to as before and during COVID-19, respectively. These reactions were stress, fatigue, difficulty sleeping, muscle strain, hypervigilance, leaving profession, headache, doubting knowledge and skills, flashbacks and fear.

Results: In total, 13 308 respondents were included in our study. During both the first (March 2020) and second COVID-19 peak (November 2020), the measured personal, professional and physical reactions were significantly higher compared to before COVID-19. The third wave in April 2021 was shorter and less severe with regard to hospital admissions and deaths, yet an important impact on healthcare professionals could still be observed. 'Fatigue,' 'stress,' 'difficulty sleeping' and 'muscle strain' are the most worrying reactions in September 2021, which are increasing compared to the previous measurements.

Conclusion: Our results showed that acute stress reactions decreased over time but that chronic stress reactions and professional reactions, such as 'intent to leave,' increased. Healthcare organizations and policy makers should realize that 18 months after the start of COVID-19 almost all of the measured reactions continue to be more prevalent than before COVID-19. Moreover, the continuous increase over the last three measurement periods of the number of healthcare professionals who want to leave their profession is alarming. Continuous follow-up of the personal, professional and physical reactions is more than necessary.

Key words: professions, workforce and workload, COVID-19, mental health, corona, pandemic

Introduction

The COVID-19 pandemic has put severe pressure on not only the healthcare systems but also on individual healthcare professionals. Early 2020, healthcare professionals were considered heroes, applauded for their diligence and commitment. As the COVID-19 pandemic evolved, however, individual, team, organizational and work-life stressors were getting the upper hand [1–4]. COVID-19 has had a significant impact on the mental wellbeing of care professionals with an increase in the incidence of depression, anxiety, psychological distress and poor sleep quality in healthcare professionals [4–8].

In Belgium, the first COVID-19 death occurred on 10 March 2020 [9]. Since then, Belgium's leaders saw the urgency to take action as the crisis further eroded the wellbeing of healthcare professionals. On the one hand, there was a constant threat of personal protective equipment depletion, prolonged exposure to severely ill patients and a lack of rapid testing for COVID-19 among healthcare professionals working an already poorly staffed system. On the other hand, at the start of the pandemic, Belgium was one of the most severely affected European countries along with the UK, France and Italy in terms of absolute deaths and case fatality ratio [10]. This resulted in the set-up of the multi-stakeholder consortium, De ZorgSamen, which aimed to support the government in launching an evidence-based resilience plan for healthcare organizations. As part of this plan, the consortium launched an online survey from April 2020 onwards to follow-up on the mental health and wider wellbeing of the health workforce. Since December 2020, the survey was distributed on a national level (Sciensano) [11].

As the COVID-19 symptoms of patients are better known and alternating protective rules are integrated into the daily work of healthcare professionals, the impact of the pandemic on the workforce can evolve. To date, no study has evaluated the impact of COVID-19 on healthcare professionals for more than three timepoints during the pandemic [7, 12, 13]. Therefore, the aim of this paper is to evaluate

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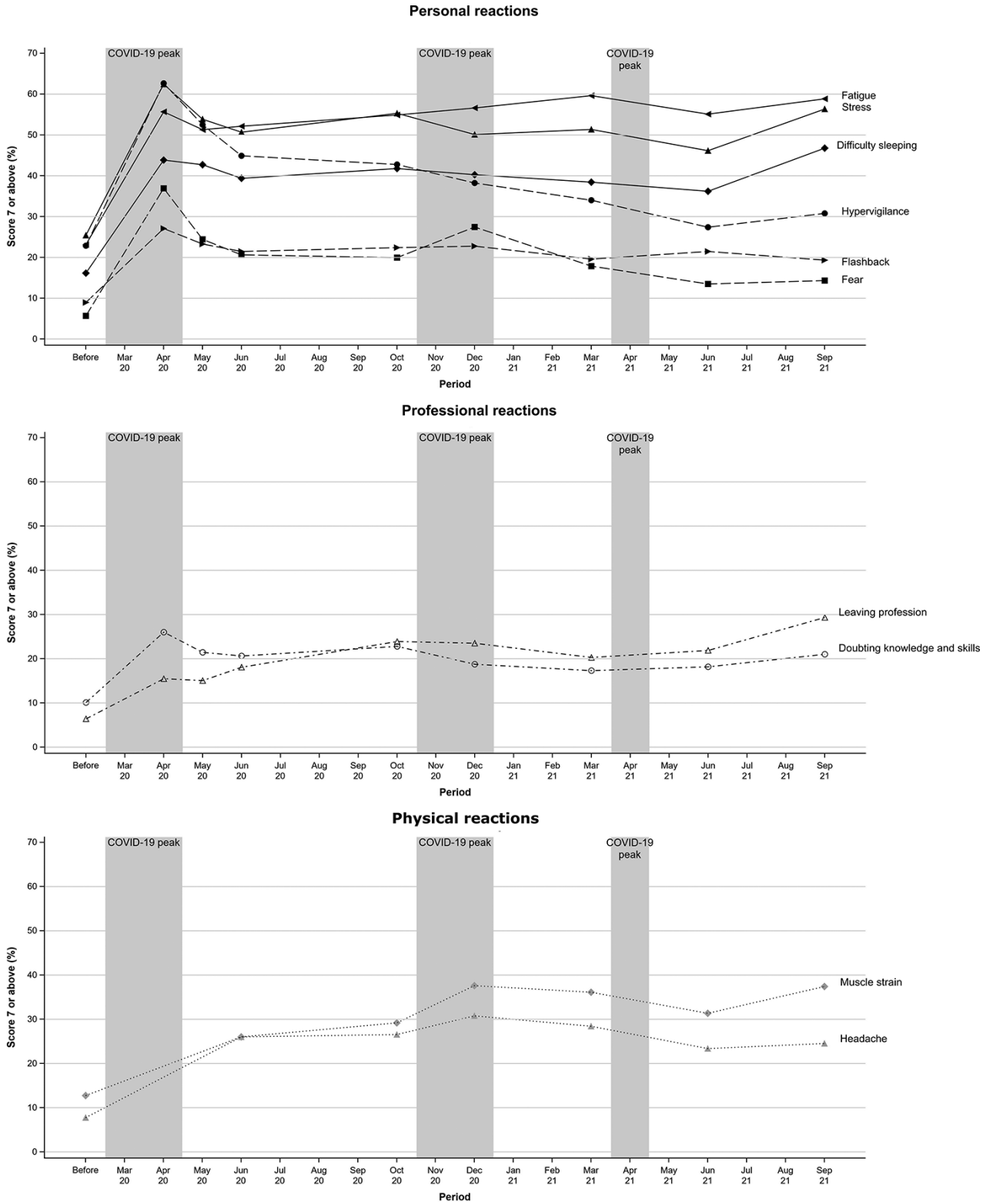

Figure 1 Evolution of the personal, professional and physical reactions during COVID-19. For the personal reactions, the solid lines are the reactions which are linked to chronic reactions. The grey vertical blocks are the COVID-19 peaks in Belgium. In the period between February 2020 and June 2021, Belgium went through three COVID-19 peaks.

how the reactions to the pandemic by healthcare professionals have evolved during the first 18 months of the COVID-19 pandemic.

Materials and methods

In this repeated cross-sectional study, a convenience sample of healthcare workers (paramedics, nurses, doctors,

Table 1 Odds ratios personal reactions each measurement period versus before COVID-19

		Odds ratio [95% CI]	*P*-value
Personal reactions			
Fatigue	April 2020 vs before COVID-19	2300 [2108;2509]	<0.001
	May 2020 vs before COVID-19	1836 [1695;1989]	<0.001
	Jun 2020 vs before COVID-19	1558 [1414;1717]	<0.001
	Oct 2020 vs before COVID-19	1394 [1235;1574]	<0.001
	Dec 2020 vs before COVID-19	2447 [2245;2666]	<0.001
	Mar 2021 vs before COVID-19	2418 [2196;2661]	<0.001
	Jun 2021 vs before COVID-19	1265 [1102;1454]	<0.001
	Sep 2021 vs before COVID-19	1280 [1091;1503]	<0.05
Stress	April 2020 vs before COVID-19	2814 [2577;3073]	<0.001
	May 2020 vs before COVID-19	1957 [1806;2121]	<0.001
	Jun 2020 vs before COVID-19	1444 [1311;1590]	<0.001
	Oct 2020 vs before COVID-19	1367 [1210;1544]	<0.001
	Dec 2020 vs before COVID-19	1411 [1296;1538]	<0.001
	Mar 2021 vs before COVID-19	1365 [1240;1504]	<0.001
	Jun 2021 vs before COVID-19	1013 [0.883;1163]	0.850
	Sep 2021 vs before COVID-19	1182 [1008;1387]	<0.05
Difficulty sleeping	April 2020 vs before COVID-19	1867 [1712;2037]	<0.001
	May 2020 vs before COVID-19	1856 [1714;2011]	<0.001
	Jun 2020 vs before COVID-19	1409 [1280;1551]	<0.001
	Oct 2020 vs before COVID-19	1265 [1121;1428]	<0.001
	Dec 2020 vs before COVID-19	1486 [1365;1619]	<0.001
	Mar 2021 vs before COVID-19	1209 [1097;1332]	<0.001
	Jun 2021 vs before COVID-19	1035 [0.902;1189]	0.624
	Sep 2021 vs before COVID-19	1149 [0.976;1353]	0.095
Hypervigilance	April 2020 vs before COVID-19	3639 [3331;3975]	<0.001
	May 2020 vs before COVID-19	2431 [2241;2636]	<0.001
	Jun 2020 vs before COVID-19	1425 [1294;1569]	<0.001
	Oct 2020 vs before COVID-19	1213 [1076;1366]	<0.001
	Dec 2020 vs before COVID-19	1049 [0.963;1142]	0.271
	Mar 2021 vs before COVID-19	0.815 [0.740;0.898]	<0.001
	Jun 2021 vs before COVID-19	0.773 [0.674;0.886]	<0.001
	Sep 2021 vs before COVID-19	0.877 [0.747;1028]	0.106
Flashback	April 2020 vs before COVID-19	1677 [1538;1829]	<0.001
	May 2020 vs before COVID-19	1363 [1258;1476]	<0.001
	Jun 2020 vs before COVID-19	1154 [1048;1271]	<0.001
	Oct 2020 vs before COVID-19	1072 [0.950;1211]	0.259
	Dec 2020 vs before COVID-19	1164 [1067;1269]	<0.001
	Mar 2021 vs before COVID-19	0.916 [0.831;1010]	0.078
	Jun 2021 vs before COVID-19	1010 [0.878;1162]	0.889
	Sep 2021 vs before COVID-19	0.991 [0.845;1163]	0.912
Fear	April 2020 vs before COVID-19	3661 [3354;3996]	<0.001
	May 2020 vs before COVID-19	2143 [1978;2322]	<0.001
	Jun 2020 vs before COVID-19	1281 [1163;1411]	<0.001
	Oct 2020 vs before COVID-19	1111 [0.984;1254]	0.090
	Dec 2020 vs before COVID-19	1938 [1777;2114]	<0.001
	Mar 2021 vs before COVID-19	0.876 [0.794;0.966]	<0.001
	Jun 2021 vs before COVID-19	0.832 [0.724;0.957]	<0.05
	Sep 2021 vs before COVID-19	0.872 [0.741;1026]	0.100
Professional reactions			
Leaving profession	April 2020 vs before COVID-19	1054 [0.964;1151]	0.248
	May 2020 vs before COVID-19	1029 [0.948;1116]	0.496
	Jun 2020 vs before COVID-19	1133 [1026;1251]	<0.05
	Oct 2020 vs before COVID-19	1279 [1130;1446]	<0.001
	Dec 2020 vs before COVID-19	1503 [1378;1641]	<0.001
	Mar 2021 vs before COVID-19	1124 [1017;1242]	<0.05
	Jun 2021 vs before COVID-19	1092 [0.947;1260]	0.224
	Sep 2021 vs before COVID-19	1136 [0.957;1349]	0.144
Doubting knowledge and skills	April 2020 vs before COVID-19	2023 [1855;2207]	<0.001
	May 2020 vs before COVID-19	1758 [1624;1905]	<0.001
	Jun 2020 vs before COVID-19	1371 [1245;1508]	<0.001
	Oct 2020 vs before COVID-19	1228 [1088;1387]	<0.001
	Dec 2020 vs before COVID-19	1165 [1069;1269]	<0.001
	Mar 2021 vs before COVID-19	0.826 [0.748;0.911]	<0.001

(continued)

Table 1 (Continued)

		Odds ratio [95% CI]	*P*-value
	Jun 2021 vs before COVID-19	0.932 [0.809;1074]	0.333
	Sep 2021 vs before COVID-19	0.998 [0.846;1178]	0.983
Physical reactions			
Muscle strain	Jun 2020 vs before COVID-19	1646 [1462;1852]	<0.001
	Oct 2020 vs before COVID-19	1593 [1381;1839]	<0.001
	Dec 2020 vs before COVID-19	2696 [2411;3014]	<0.001
	Mar 2021 vs before COVID-19	2204 [1950;2491]	<0.001
	Jun 2021 vs before COVID-19	1859 [1591;2172]	<0.001
	Sep 2021 vs before COVID-19	2400 [2013;2861]	<0.001
Headache	Jun 2020 vs before COVID-19	2485 [2208;2796]	<0.001
	Oct 2020 vs before COVID-19	2199 [1904;2539]	<0.001
	Dec 2020 vs before COVID-19	3057 [2735;3416]	<0.001
	Mar 2021 vs before COVID-19	2763 [2447;3120]	<0.001
	Jun 2021 vs before COVID-19	1824 [1560;2134]	<0.001
	Sep 2021 vs before COVID-19	2261 [1901;2690]	<0.001

management and other) across multiple care settings (hospitals, primary care, residential care, care for disabled, mental healthcare and other) participated, after giving informed consent, in eight measurement points between April 2020 and September 2021. This time frame encompassed three COVID-19 peaks in Belgium (March 2020, November 2020 and April 2021) [9]. The first four surveys were led by the ZorgSamen and KU Leuven (Wave 1) [11]. The last four surveys were part of the Power To Care project, led by the Belgian Institute for Health, Sciensano (Wave 2) [14–16]. The survey was distributed via social media, such as Twitter, LinkedIn, Facebook and Instagram as well as on the respective websites of De Zorgsamen and Sciensano. Healthcare professionals who had worked during the past week were invited to participate to an online survey (Qualtrics) on how they experienced personal, professional and physical reactions 'in normal circumstances' and 'during the past week.' The personal reactions are divided into acute stress reactions ('fear,' 'hypervigilance' and 'flashback') and chronic reactions ('fatigue,' 'stress' and 'difficulty sleeping'). The professional reactions included 'leaving your profession' and 'doubting your knowledge and skills.' The response categories were set between 0 (never) and 10 (always) and were presented by an arbitrarily chosen cut-off score of 7 (Supplementary Appendix 1) [8, 17]. Only for the first three waves the reactions 'in normal circumstances' were included in the score for before COVID-19. The physical reactions ('headache' and 'muscle strain') were collected from the third survey onwards. The survey is based on prior research assessing the psychological impact on healthcare workers involved in adverse events [17].

For each reaction, we fitted a partial proportional odds model to estimate the association between COVID-19 and the occurrence of this reaction (using the original 11-point scale from 0 (never) until 10 (always)), controlling for demographic variables (age, gender, profession and care sector). This because the proportional odds assumption was rejected. Only completely filled in questionnaires were considered for the analysis. Descriptive analyses and figure were produced using SAS V.8.2. Chi square and one-way ANOVA were used for, respectively, categorical and continuous variables to analyse the difference between the different waves. This study was approved by the Ethics Committee of UZ-KU Leuven (S63914).

Results

A total of 13 308 respondents were included to evaluate the personal, professional and physical impact of COVID-19. The average age was 42.9 years old, and 81.8% were female. Age, gender, professional group and care setting between the different waves were significantly different (Supplementary Appendix 2). In Figure 1, the percentage of healthcare professionals with a score of 7 or above on each of the 10 reactions and the occurrence of three COVID-19 peaks (March 2020, November 2020 and April 2021) are presented. During the first COVID-19 peak, compared to before COVID-19, all eight measured personal and professional reactions were significantly increased ($P < 0.001$) (average increase 26.4% range 9.1–39.8%), of which 'hypervigilance' and 'stress' had the highest score (62.6% and 62.5%, respectively) and the slope of 'fear' was the steepest. During the second COVID-19 peak (November 2020), all of the reactions, with the exception of hypervigilance, remained significantly higher compared to before COVID-19 ($P < 0.001$). Comparing the measurement in December 2020 with before COVID-19, the physical reactions 'muscle strain' and 'headache' further increased along with 'fear' and fatigue (Figure 1 and Table 1).

Comparing our most recent measurement (September 2021) with the first COVID-19 wave (April 2020), on the one hand, a significantly increase was found for 'muscle strain.' And, on the other hand, 'hypervigilance' was significantly decreased ($P < 0.001$) (Table 2). 'Fatigue,' 'stress,' 'difficulty sleeping' and 'muscle strain' are the most worrying reactions in our most recent measurement, which are increasing when compared to the previous measurements (Figure 1).

Discussion

Statement of principal findings

In a pandemic, such as COVID-19, acute and chronic stress reactions experienced by healthcare professionals are somewhat expected reactions [7, 12]. Healthcare professionals have been feeling different types of pressure during the studied 18-month period not only on a professional level, but also on a personal level. There was not only pressure of being a good healthcare professional, but also a good partner, family member, etc., implying additional stress on their work–life balance. At the beginning, there was personal protective equipment depletion [18] and lack of rapid testing for COVID-19. Later, they felt misunderstood as the COVID-19 safety measures became less strict for the citizens, while there

Table 2 Odds ratios personal reactions each measurement period versus first measurement during COVID-19

		Odds ratio [95% CI]	*P*-value
Personal reactions			
Fatigue	May 2020 vs April 2020	1152 [1039;1277]	<0.001
	Jun 2020 vs April 2020	1125 [1000;1265]	<0.05
	Oct 2020 vs April 2020	1107 [0.966;1267]	0.144
	Dec 2020 vs April 2020	1312 [1179;1460]	<0.001
	Mar 2021 vs April 2020	1324 [1180;1485]	<0.001
	Jun 2021 vs April 2020	1070 [0.919;1245]	0.383
	Sep 2021 vs April 2020	1087 [0.916;1289]	0.340
Stress	May 2020 vs April 2020	1244 [1121;1381]	<0.001
	Jun 2020 vs April 2020	1127 [1001;1268]	<0.05
	Oct 2020 vs April 2020	1156 [1008;1326]	<0.05
	Dec 2020 vs April 2020	1048 [0.940;1168]	0.399
	Mar 2021 vs April 2020	1053 [0.937;1184]	0.383
	Jun 2021 vs April 2020	0.951 [0.816;1108]	0.516
	Sep 2021 vs April 2020	1080 [0.910;1282]	0.376
Hypervigilance	May 2020 vs April 2020	1589 [1431;1765]	<0.001
	Jun 2020 vs April 2020	1104 [0.981;1242]	0.102
	Oct 2020 vs April 2020	1037 [0.906;1187]	0.597
	Dec 2020 vs April 2020	0.713 [0.640;0.795]	<0.001
	Mar 2021 vs April 2020	0.570 [0.507;0.641]	<0.001
	Jun 2021 vs April 2020	0.620 [0.532;0.724]	<0.001
	Sep 2021 vs April 2020	0.755 [0.634;0.899]	<0.001
Difficulty sleeping	May 2020 vs April 2020	1278 [1153;1417]	<0.001
	Jun 2020 vs April 2020	1144 [1018;1286]	<0.05
	Oct 2020 vs April 2020	1121 [0.979;1283]	0.100
	Dec 2020 vs April 2020	1118 [1004;1245]	<0.05
	Mar 2021 vs April 2020	0.987 [0.879;1109]	0.827
	Jun 2021 vs April 2020	0.963 [0.826;1121]	0.625
	Sep 2021 vs April 2020	1078 [0.905;1284]	0.400
Flashback	May 2020 vs April 2020	1108 [0.999;1229]	0.053
	Jun 2020 vs April 2020	1028 [0.913;1156]	0.650
	Oct 2020 vs April 2020	1002 [0.874;1148]	0.979
	Dec 2020 vs April 2020	0.995 [0.892;1109]	0.924
	Mar 2021 vs April 2020	0.791 [0.703;0.889]	<0.001
	Jun 2021 vs April 2020	0.952 [0.816;1110]	0.530
	Sep 2021 vs April 2020	0.942 [0.793;1119]	0.494
Fear	May 2020 vs April 2020	1460 [1316;1620]	<0.001
	Jun 2020 vs April 2020	1093 [0.972;1231]	0.138
	Oct 2020 vs April 2020	1023 [0.892;1173]	0.743
	Dec 2020 vs April 2020	1416 [1270;1579]	<0.001
	Mar 2021 vs April 2020	0.801 [0.712;0.901]	<0.001
	Jun 2021 vs April 2020	0.814 [0.697;0.952]	<0.001
	Sep 2021 vs April 2020	0.858 [0.718;1025]	0.091
Professional reactions			
Leaving profession	May 2020 vs April 2020	0.965 [0.869;1071]	0.501
	Jun 2020 vs April 2020	1066 [0.946;1200]	0.296
	Oct 2020 vs April 2020	1202 [1048;1379]	<0.001
	Dec 2020 vs April 2020	1306 [1172;1456]	<0.001
	Mar 2021 vs April 2020	1051 [0.933;1183]	0.413
	Jun 2021 vs April 2020	1059 [0.906;1237]	0.473
	Sep 2021 vs April 2020	1103 [0.921;1323]	0.287
Doubting knowledge and skills	May 2020 vs April 2020	1481 [1336;1642]	<0.001
	Jun 2020 vs April 2020	1229 [1094;1382]	<0.001
	Oct 2020 vs April 2020	1144 [0.999;1310]	0.053
	Dec 2020 vs April 2020	1071 [0.961;1192]	0.215
	Mar 2021 vs April 2020	0.828 [0.736;0.932]	<0.001
	Jun 2021 vs April 2020	0.935 [0.800;1092]	0.397
	Sep 2021 vs April 2020	0.988 [0.827;1000]	0.897
Physical reactions			
Muscle strain	Oct 2020 vs Jun 2020	1083 [0.937;1251]	0.282
	Dec 2020 vs Jun 2020	1767 [1579;1978]	<0.001
	Mar 2021 vs Jun 2020	1397 [1234;1580]	<0.001
	Jun 2021 vs Jun 2020	1188 [1016;1389]	<0.05
	Sep 2021 vs Jun 2020	1506 [1262;1797]	<0.001
Headache	Oct 2020 vs Jun 2020	1089 [0.941;1260]	0.251

Table 2 (Continued)

	Odds ratio [95% CI]	*P*-value
Dec 2020 vs Jun 2020	1407 [1257;1575]	<0.001
Mar 2021 vs Jun 2020	1238 [1094;1400]	<0.001
Jun 2021 vs Jun 2020	0.856 [0.730;1002]	0.054
Sep 2021 vs Jun 2020	1009 [0.847;1202]	0.921

were still a high amount of patients dying or admitted to hospital. COVID-19 could also have led to stress for infecting their loved ones [18–20]. Healthcare organizations and policy makers should realize that 18 months after the start of COVID-19, nine measured reactions continue to be more prevalent than before COVID-19. While the third wave in April 2021 was shorter and less severe with regard to patients infected and admitted with COVID-19 as well as COVID-19 mortality [9], an important impact on healthcare professionals could still be observed. Among the most worrying reactions are the increase of the participants' desire to leave their profession during the last three measurements, as well as the prevalence of chronic stress reactions. Although the results should be interpreted with caution because of the applied design and sample [8], our results confirm what clinicians and managers have experienced.

Strengths and limitations

This study is the largest to date to correlate the COVID-19 pandemic with healthcare workers increasingly struggling with negative reactions. This study evaluated the impact on different types of healthcare workers in different healthcare settings. Despite these strengths, some limitations should be taken into account. First of all, due to the way of distributing the survey, no response rate can be calculated and selection bias could have occurred. To protect the privacy of our participants, the identity of respondents was not confirmed in this study. This implies that participants cannot be followed up in this study due to the cross-sectional nature of the study. Besides this, at the end of the survey, difficulties were found to reach the respondents possibly due to survey fatigue, COVID-19 was less the priority of each day as less infections were detected. Second, our questionnaire is based on self-reporting and as we asked at the same moment to score the impact, for each symptom, before and during COVID-19, recall bias can occur as participants may have minimized or exaggerated their symptoms. Third, the demographics were different between each wave. Each wave showed a snapshot of how the wellbeing of healthcare professionals was at that moment, which was part of the aim at the time to provide political advice on the wellbeing of healthcare staff. Last, no psychometrically validated measures were used for evaluating the impact on symptoms.

Interpretation within the context of the wider literature

If we compare the data, at the beginning of the COVID-19 pandemic, for 'difficulty sleeping,' 'stress' and 'fatigue,' these are in line with other studies (respectively 41–43% [18, 21], 33–51% [18, 21] and 53% [21]) [18, 19, 21–23]. During the second COVID-19 peak (November 2020), our results for 'anxiety' were lower than a study performed in the USA (27% instead of 43% [24]) and these for 'difficulty sleeping' are similar (40% versus 32% [24]). 'Fear' was also lower in our study when compared to others (average in other studies of 71%) [23]. Even though a decrease in acute stress reactions could be observed throughout our study period, chronic stressors remained, with reactions, such as 'fatigue,' 'stress' and 'difficulty sleeping' still being pronounced in >40% of respondents. As a result, healthcare professionals can enter a vicious circle. Previous studies showed that the higher reported reactions in our study, 'fatigue' and 'difficulty sleeping' are not only linked with general wellbeing and associated with higher levels of psychological stress [25], but could potentially be linked with medical errors [26]. This implies that not only healthcare professionals are suffering from the long-term effect of the pandemic, but it could also have impacted the quality of delivered care and thus also patients and the healthcare system as a whole. If healthcare professionals are tired, then the chances of performing a medical error are increased, which subsequently can lead to bad quality of care.

Implications for policy, practice and research

As the COVID-19 pandemic is reaching its two-year anniversary, we need to stop looking back to the 'before' area and start finding ways to deal with this 'new normal'. Actions should be taken to help healthcare professionals dealing with the chronic personal reactions on the one hand and on the other hand, actions should be taken to avoid that they leave their profession (which was still measured highly in September 2021). Besides the negative personal and professional reactions and risk for post-traumatic stress disorder, COVID-19 can also be a trigger for developing posttraumatic growth as it is disruptive enough to affect the individual's values and perspectives and can be a possible reason for the high amount of healthcare professionals who want to leave their profession. This development will depend on how healthcare organizations and individuals respond to COVID-19 and the used coping strategy. An adaptive coping strategy could, e.g. lead to stress-related growth, creative solutions and new perspectives [27]. This is also the case for writing gratitude notes, which is found to reduce stress and depression [28]. Lastly, in healthcare, small, unexpected, surprising, nearly unnoticeable acts or gestures during daily care activities, which are of great value in the care experience of patients, residents, families and/or healthcare professionals can happen. They happen during normal care activities and are different from events like 'make a wish' or 'VIPs visiting the children's hospital'. They are known as Mangomoments and these small unexpected positive acts of kindness or unexpected gestures, can improve joy in work and should also receive attention from clinicians and managers [29].

Conclusion

Our data show that the impact of COVID-19 on healthcare professionals should not be underestimated and is evolving over time. Healthcare organizations and policy makers should be aware that, although acute reactions have decreased, the

chronic reactions remain high. Moreover, the continuous increase of the number of healthcare professionals who want to leave the profession is alarming. Organizations and policy makers should keep a finger on the pulse by monitoring the mental wellbeing of the healthcare professionals on regular moments. In this way, sufficient actions can be taken or previous actions can be evaluated and adjusted if necessary to achieve sustainable results.

Supplementary material

Supplementary material is available at *INTQHC* Journal online.

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Contributorship

All authors were involved in study design, data analysis and data interpretation. D.S. and K.V. prepared the manuscript draft. All authors critically revised the report, commented on drafts of the manuscript and approved the final report.

Ethics and other permissions

We conducted this study with approval from the Ethics Committee Research UZ/KU Leuven (S63914). Informed consent was obtained from all subjects involved in the study.

Data sharing statement

Not applicable.

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