

Original Research Article

COVID-19 is having a destructive impact on health-care workers' mental well-being

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Abstract

Background: The coronavirus disease 2019 (COVID-19) may aggravate workplace conditions that impact health-care workers' mental health. However, it can also place other stresses on workers outside of their work. This study determines the effect of COVID-19 on symptoms of negative and positive mental health and the workforce's experience with various sources of support. Effect modification by demographic variables was also studied.

Methods: A cross-sectional survey study, conducted between 2 April and 4 May 2020 (two waves), led to a convenience sample of 4509 health-care workers in Flanders (Belgium), including paramedics (40.6%), nurses (33.4%), doctors (13.4%) and management staff (12.2%). About three in four were employed in university and acute hospitals (29.6%), primary care practices (25.7%), residential care centers (21.3%) or care sites for disabled and mental health care. In each of the two waves, participants were asked how frequently (on a scale of 0–10) they experienced positive and negative mental health symptoms during normal circumstances and during last week, referred to as before and during COVID-19, respectively. These symptoms were stress, hypervigilance, fatigue, difficulty sleeping, unable to relax, fear, irregular lifestyle, flashback, difficulty concentrating, feeling unhappy and dejected, failing to recognize their own emotional response, doubting knowledge and skills and feeling uncomfortable within the team. Associations between COVID-19 and mental health symptoms were estimated by cumulative logit models and reported as odds ratios. The needed support was our secondary outcome and was reported as the degree to which health-care workers relied on sources of support and how they experienced them.

Results: All symptoms were significantly more pronounced during versus before COVID-19. For hypervigilance, there was a 12-fold odds (odds ratio 12.24, 95% confidence interval 11.11–13.49) during versus before COVID-19. Positive professional symptoms such as the feeling that one can

make a difference were less frequently experienced. The association between COVID-19 and mental health was generally strongest for the age group 30–49 years, females, nurses and residential care centers. Health-care workers reported to rely on support from relatives and peers. A considerable proportion, respectively, 18 and 27%, reported the need for professional guidance from psychologists and more support from their leadership.

Conclusions: The toll of the crisis has been heavy on health-care workers. Those who carry leadership positions at an organizational or system level should take this opportunity to develop targeted strategies to mitigate key stressors of health-care workers' mental well-being.

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

Introduction

Health-care workers are applauded as heroes for their diligence and commitment in providing patient care during the COVID-19 pandemic. Being at the frontline, however, comes with a price. The risk of anxiety and other negative mental health reactions among the workforce were described in a viewpoint by Shanafelt *et al.* [1]. Monocentric and small sample studies in China and Singapore have described the psychological impact of the current crisis [2–4]. In their NEJM (New England Journal of Medicine) perspective, Pfefferbaum and North describe that 'health care systems will need to address the stress on individual providers and on general operations by monitoring reactions and performance, altering assignments and schedules, modifying expectations, and creating mechanisms to offer psychosocial support as needed' [5]. The stressors, as a result of COVID-19, on individual level, team, organization and work–life, have an impact on teams. When team leaders and managers do not react in an effective way, it can result in poor teamwork that can have a negative impact on quality of care and patient safety [6].

In terms of absolute deaths and case fatality ratio, Belgium is, together with the UK, France and Italy, among the most severely affected European countries [7]. The first COVID-19-related death in Belgium was on 10 March 2020 and a total lockdown was set from 18 March 2020 until 4 May 2020 [8]. The prolonged exposure to severely ill patients, the constant threat of personal protective equipment depletion and the lack of rapid testing for COVID-19 among health-care workers in an already poorly staffed system made Belgium's leaders worry about the crisis further eroding the well-being of the health workforce. To support the government in launching an evidence-based resilience plan, a multi-stakeholder consortium including health-care associations, scientific societies and universities under the auspices of the competent authorities launched an online survey to follow up on the mental health and wider well-being of the health workforce [9]. The aim was to gain more insight on the effect of COVID-19 on symptoms of negative and positive mental health as well as on the workforce's use of various sources of support. In a secondary analysis, we investigated whether the association between COVID-19 and mental health differed between age group, gender, profession and care sector.

Methods

Procedures

Health-care professionals were invited to participate in an online survey that was launched in two waves between 2 April 2020 and 4 May 2020. The survey was distributed via social media platforms to health-care workers in Flanders, Belgium. The social media platforms were Twitter, LinkedIn, website of DeZorgsamens.be, Facebook and Instagram. Participation was entirely voluntary, and confidentiality and anonymity were guaranteed. Each participant gave written informed consent.

Outcomes

In each of the two survey waves, participants who had worked during the past week were asked how frequently they experienced negative and positive mental health symptoms 'in normal circumstances' and 'during the past week', hereafter referred to as 'before' and 'during' the COVID-19 crisis, respectively. Response categories were anchored between 0 (never) and 10 (always). Respondents were also asked about their reliance on and experience with a number of sources of support during the crisis. Single survey items were based on prior research assessing the psychological impact on health-care workers of being involved in adverse events [10]. Also demographic information was collected.

Statistical analysis

The occurrence of mental health symptoms (on a scale of 0–10) before and during COVID-19 was summarized in a butterfly chart. An arbitrarily chosen cutoff score of 7 was used to order symptoms by descending prevalence during COVID-19. For each mental health symptom, we fitted a cumulative logit model to estimate the association between COVID-19 and the occurrence of this symptom (using the original 11-point scale). We accounted for repeated measures on health-care workers and included age, gender, profession and care sector as control variables. Effect modification was assessed by including interaction terms between demographic variables (age group <30 years, 30–49 years and 50 years or older), gender, profession and care sector) and the COVID-19 indicator, using a separate model for each variable. In total, 4503 respondents were included in this analysis as unknown gender ($n = 6$) was excluded. Estimates represent odds ratios with 95% confidence intervals. We then described the degree to which health-care workers relied on sources of support and how they experienced them.

Patient and public involvement

No patients were involved in setting the research question or developing plans for design of the study, nor were they asked to advise on interpretation or writing up of results.

Results

The 4509 survey respondents included paramedics (40.6%), nurses (33.4%), doctors (13.4%) and management staff (12.2%), with about three in four being employed in hospitals (29.6%), primary care practices (25.7%) or residential care centers (21.3%) (Table 1).

Figure 1 depicts the symptoms of negative mental health escalated during COVID-19 versus before COVID-19. The percentage of respondents giving a score of 7 or higher for 'feeling stressed', for instance, was 57.5% during COVID-19 compared to 25.1% in normal circumstances, whereas the corresponding percentages for 'doubting knowledge and skills' were 23.4 and 10.0%, respectively.

Table 1 Demographic information

Characteristics	Mean \pm SD or <i>n</i> (%)
Age (years)	41.8 \pm 11.4
Age group, years	
<30	807 (17.9)
30–49	2390 (53.0)
\geq 50	1312 (29.1)
Gender	
Female	3858 (85.6)
Male	645 (14.3)
Unknown	6 (0.1)
Profession	
Paramedic	1831 (40.6)
Nurse	1508 (33.4)
Doctor	603 (13.4)
Management	552 (12.2)
Other	15 (0.3)
Care sector	
Hospital	1334 (29.6)
Primary care	1158 (25.7)
Residential care center	962 (21.3)
Care for disabled	572 (12.7)
Mental health care	409 (9.1)
Other	74 (1.6)

Controlling for all other predictors in the cumulative logit model, a significant association between COVID-19 and mental health was observed for all 19 symptoms. Results for negative symptoms showed up to 12-fold odds of being categorized in a higher level of occurrence of the symptom during COVID-19 versus before COVID-19 (Figure 1). For the positive professional symptoms, odds ratios were significantly smaller than 1, indicating that respondents tended to report lower occurrence during COVID-19 compared to before COVID-19, e.g. the percentage of respondents scoring the item ‘feeling part of a team’ seven or higher during COVID-19 was 63.4%, compared to 66.6% before COVID-19. For many symptoms, we observed significant effect modification by age group (10 out of 19 symptoms), gender (14 symptoms), profession (18 symptoms) and care sector (17 symptoms) (Supplementary Tables S1–S4). Associations of COVID-19 with negative mental health symptoms were significant in all age groups, genders, professions (except in the small ‘other’ group) and care sectors, whereas associations with positive symptoms were only significant in some groups. Odds ratios for negative symptoms were mostly highest for the age group 30–49 years, women, nurses (followed by management staff) and residential care centers (followed by hospitals). The care for disabled sector scored lower than other sectors. Interestingly, whereas odds ratios for positive mental health symptoms were often below 1, odds ratios significantly higher than 1 were observed for the symptom ‘Part of a team’ in doctors and for the symptom ‘Make a difference’ in management staff.

In terms of sources of support (Figure 2), respondents reported that most positive conversations took place with their partner, own colleagues and friends. Noteworthy is that almost 1 in 10 reported to have had a negative conversation with their partner. Respondents also have had positive conversations with other health-care professionals (50%) and colleagues via social media (37%). At the very bottom of the sources of support are online resources. Similarly, also a very minor percentage of respondents indicated to have had a positive conversation with a psychologist or general practitioner, and

while about four in five indicated they did not feel the need for such conversation, a considerable proportion indicated they needed to but had not managed to. Although about half of respondents reported to have had positive conversations with their supervisor/coordinator, this is also the source of support with the highest percentage of negatively experienced conversations (12%), and the second highest source of support with whom respondents indicated they needed to have a conversation, but which had not taken place at the time of the survey.

Discussion

The toll of the crisis has been heavy on health-care workers. During COVID-19, a higher level of occurrence was found for all measured negative personal symptoms and negative professional symptoms, e.g. hypervigilance, fear, fatigue, difficulty sleeping, unhappy and dejected (negative personal symptoms) and doubting knowledge and skills, feeling on their own and avoiding risks (negative professional symptoms). The founded association between COVID-19 and mental health was generally the strongest for the age group 30–49 years, females, nurses and residential care centers. A higher impact on the 30–49 years’ age group and female group was found. One of the possible reasons for this impact could be the specific demands on work–life balance in this group. This is the age group where the private situation of health-care professionals changes due to expanding their family or by having younger children. This goes hand in hand with additional responsibilities to their younger children and family. This can lead to a higher workload and the need for more multitasking, in lots of cases mainly in the mother’s role. This multitasking can lead to additional stress, which can have an additional impact on their mental well-being. We know from other studies that impact on mental well-being is higher in the female population [11]. More than 7 out of 10 participants reported that they had talked with partner, own/close colleagues and/or friends/relatives outside of the organization and found this a positive experience. However, 18% reported the need for more professional guidance from psychologist and 27% reported more need from their leadership.

This study is the largest to date to correlate the COVID-19 pandemic with health-care workers increasingly struggling with symptoms of negative mental health. Nevertheless, in response to Pfefferbaum and North’s call for monitoring psychosocial effects in the context of COVID-19, empirical evidence was obtained from a large number of participants, generating novel insights into the consequences of COVID-19 [5]. Previous studies mainly performed in China and the USA focused mainly on anxiety [12–15], depression [12, 14–21], fatigue [12], sleep problems [12] and insomnia [12–15, 19]. Besides depression, which was not directly measured in our study, the results and are in line with ours. Hypervigilance, which is our highest increased symptoms during COVID-19, was not measured in previous studies. Symptoms as distress [12, 13, 16] and decreased appetite or indigestion are also frequently reported [12]. Our results are also in line with negative professional symptoms as stopping with the present job [15, 22]. COVID-19-related studies showed that the prevalence in nurses for probable anxiety and depression was higher compared to doctors. This was also the case for female health-care workers and younger workers (\leq 40 years) [23]. The same was found for stress [24], anxiety and fear [25]. The impact of COVID-19 on symptoms can be influenced by the used/available support mechanisms. Mediation models showed that resilience could

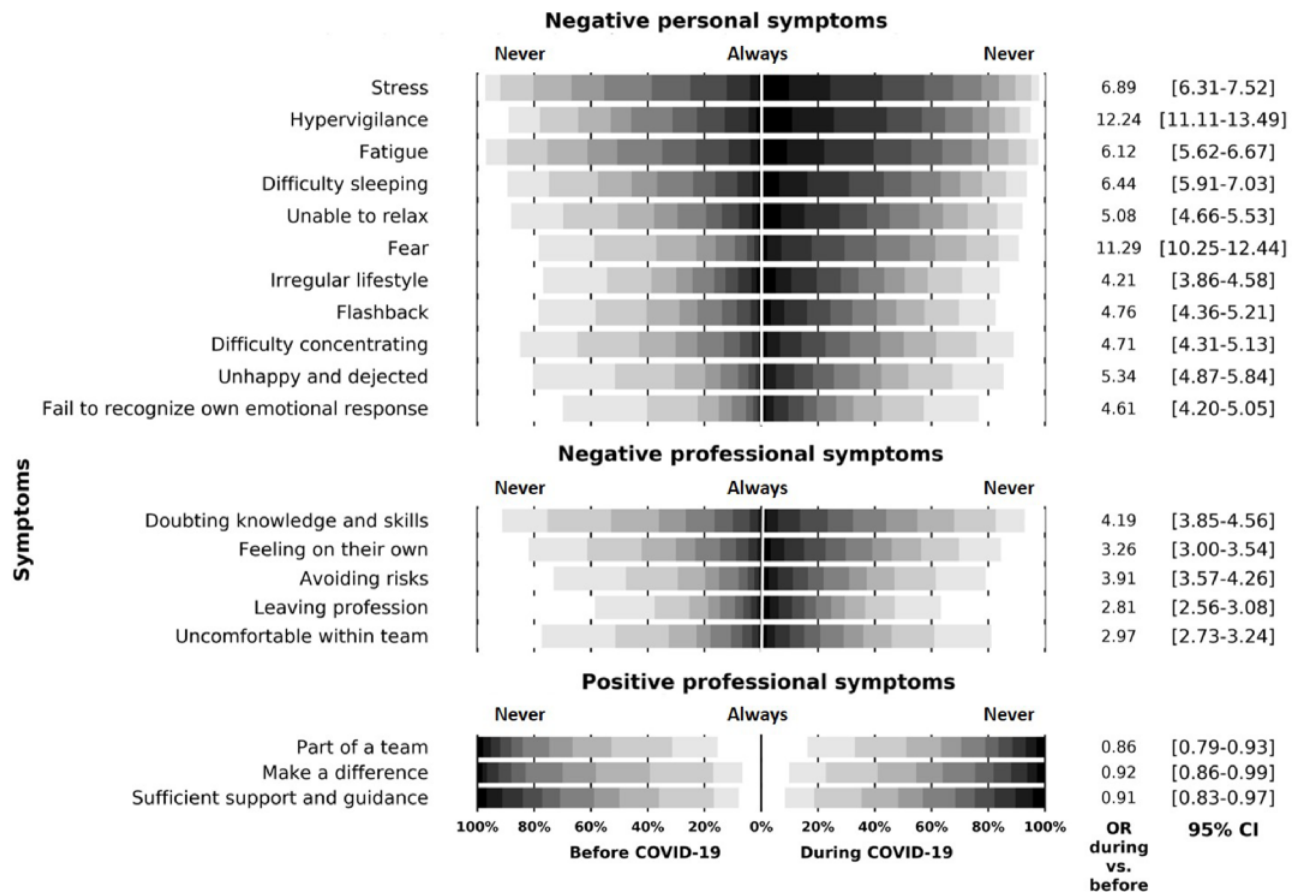


Figure 1 Symptoms of negative and positive mental health before and during COVID-19. The symptoms are ordered by descending prevalence of a score of 7 or more during COVID-19.

only partly mediate the effect of social support on mental health among health-care workers. However, this partly mediation was moderated by age group [26]. Our results, regarding the used support mechanisms, are in line with previous research where chatting with family and friends but also the positive attitude from colleagues in reducing stress [22]. Support from colleagues is seen as very important in stressful and emotional demanding situations [24]. However, our results show lower results for talking with a psychologist (46.8%) [22].

With COVID-19, our respondents reported an increase in symptoms that can be related to acute stress. Prior research suggests that the prevalence and duration of such symptoms may last for months [10]. Should another wave occur, the general expectation and hope is that our system will be better prepared in formulating and disseminating evidence-based rules and protocols. Several weaknesses of the system have been exposed and solutions are now in place to prevent them from manifesting again. It is our expectation that trauma-related outcomes will therefore be less pronounced. On the other hand, in a pandemic that feels like a marathon with no clear finish line, we may see symptoms from excessive work pressure aggravate. This is a serious threat to health-care continuity and quality since these symptoms are related to higher turnover intention and poor quality of care [27]. Additional causes for concern are the large amounts of care activities that have been interrupted or postponed because of COVID-19 and that are currently being rescheduled. This will again impact fatigue and challenge resilience of both clinicians

and managers. Hospital CEOs and human resource managers therefore need to keep the finger on the pulse on the organization, team and individual level and make support mechanisms easy to access.

Health-care workers are continuously at risk of negative mental health. The COVID-19 pandemic is an opportunity to hook people in toward reconfiguration of our human resource model and our support of the workforce, not only by applauding their work, but by creating positive work environments and long-lasting support mechanisms to increase the workforce resilience. For maintaining the resilience of health-care workers, a supportive work culture is vital [28]. Health-care workers need to receive clear messages by organizations that they are valued and that the ultimate goal is to manage the pandemic together [28]. They do not only rely on the support and coping mechanisms offered by their close relatives and peers. An important number of health-care workers is in need of psychological support by professionals, and even more so, of their leadership. Health-care workers do not rely only on the support that is given by external but they can, more as a preventive action, support themselves by having a positive lifestyle behavior [29]. More interest in self-rescue and more urgency to seek help for psychological support was seen for nurses [30]. Besides this, there is a need for support organized by the organizations themselves and, specific for COVID-19, this should be divided in support for all the health-care workers but also for health-care workers in isolation or quarantine [29, 31]. This support can be given at three different levels, depending on the personal needs of the health-care professionals [32–34]. The first level

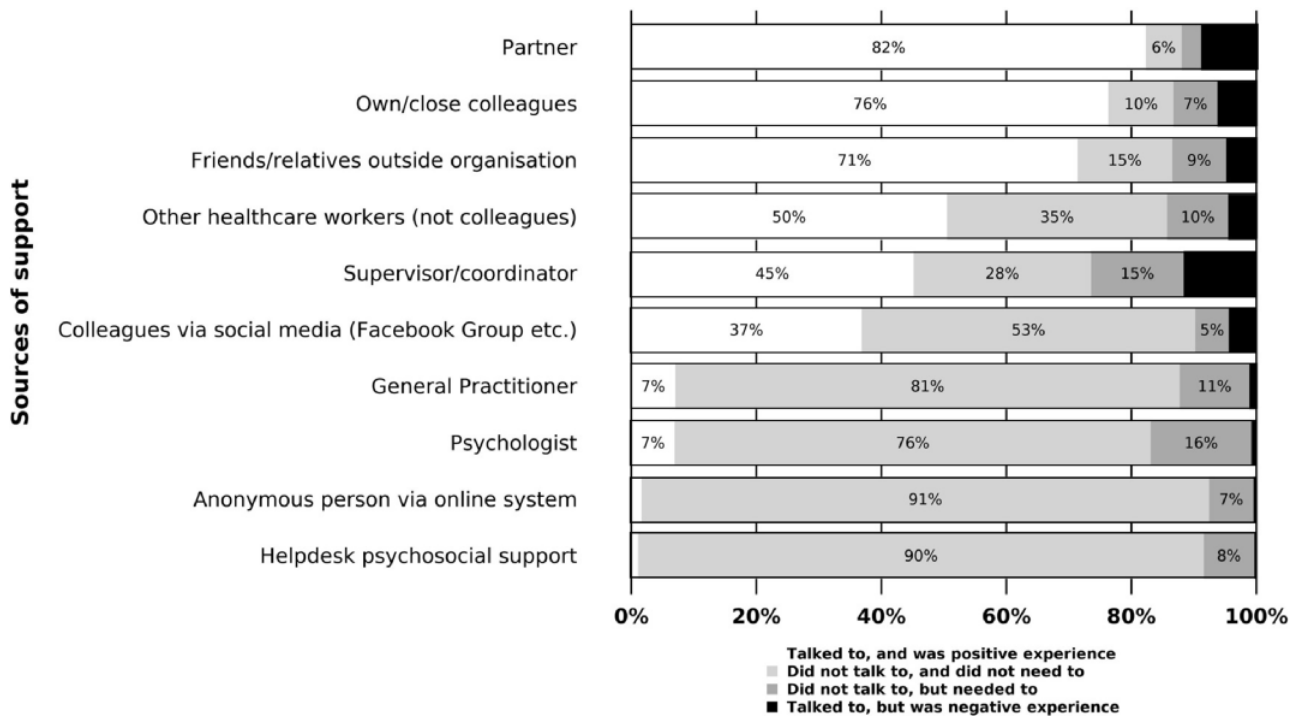


Figure 2 Sources of support during COVID-19.

is ‘basic support’. Support all the health-care workers with adequate working conditions but also with ‘emotional first aid’. The working conditions can include, e.g. provide effective personal protective equipment, clarify work hours, communicate current best practices, share challenges and successes [28]. If this is insufficient, support can be given by focused (person-to-person) non-specialized support. The last level is referring the health-care worker to specialized services [32–34]. Previous non-COVID-19 research showed that only a minority (10%) need this highest level of support [20, 33, 34]. Other useful methods such as Wu’s RISE (Resilience in Stressful Events) model [35] or Shanafelt’s list of requests to health-care organizations [1] can guide and support health-care managers in this endeavor. The support programs should be designed using a range of strategies to overcome the cultural and structural barriers that cause many programs to fail [36].

This study has several limitations that should be taken into account for interpreting the results. 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 the respondents was not confirmed in both waves. This implies that participants cannot be followed up in both waves due to the cross-sectional nature of the study. 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. Last, no psychometrically validated measures were used for evaluating the impact on symptoms and support mechanisms. Future research should convert the single measures (19 items for symptoms) into one validated instrument.

A pandemic asks for rapid adaptation of organizations and health-care workers. Therefore, is it necessary that organizations start immediately in how they can support their health-care workers.

Support systems which would be set up for health-care professionals involved in an adverse event, also known as second victims [35], can be expanded to support health-care workers in this COVID-19 pandemic. Organizations should take this pandemic as an opportunity to develop targeted strategies to mitigate key stressors of health-care workers’ mental well-being also during normal circumstances. Our study shows the significant impact of this COVID-19 crisis on the mental health of our health-care professionals and we know that only healthy and resilient workers can take care of patients and their kin.

Supplementary material

Supplementary material is available at *International Journal for Quality in Health Care* online.

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References

- Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA* 2020; 323(21): 2133–2134. [10.1001/jama.2020.5893](https://doi.org/10.1001/jama.2020.5893)
- Kang L, Ma S, Chen M *et al.* Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during

- the 2019 novel coronavirus disease outbreak: a cross-sectional study. *Brain Behav Immun* 2020; 87: 11–17. [10.1016/j.bbi.2020.03.028](https://doi.org/10.1016/j.bbi.2020.03.028)
3. Tan BYQ, Chew NWS, Lee GKH et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med* 2020; 173(4). [10.7326/M20-1083](https://doi.org/10.7326/M20-1083)
 4. Chen Q, Liang M, Li Y et al. Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatr* 2020; 7: e15-6. [10.1016/S2215-0366\(20\)30078-X](https://doi.org/10.1016/S2215-0366(20)30078-X)
 5. Pfefferbaum B, North CS. Mental health and the COVID-19 pandemic. *N Engl J Med* 2020; 383: 510–512. [10.1056/NEJMp2008017](https://doi.org/10.1056/NEJMp2008017)
 6. Tannenbaum SI, Traylor AM, Thomas EJ et al. Managing teamwork in the face of pandemic: evidence-based tips. *BMJ Qual Saf* 2020; 0: 1–5: [bmjqs-2020-011447](https://doi.org/10.1136/bmjqs-2020-011447). [10.1136/bmjqs-2020-011447](https://doi.org/10.1136/bmjqs-2020-011447)
 7. John Hopkins University & Medicine. *Mortality Analyses 2020*. <https://coronavirus.jhu.edu/data/mortality> (21 May 2020, date last accessed).
 8. *Sciensano*. <https://epistat.wiv-isp.be/momo/> (13 October 2020, date last accessed).
 9. *De Zorgsamen Consortium*. www.dezorgsamen.be (25 May 2020, date last accessed).
 10. Vanhaecht K, Seys D, Schouten L et al. Duration of second victim symptoms in the aftermath of a patient safety incident and association with the level of patient harm: a cross-sectional study in the Netherlands. *BMJ Open* 2019; 9: e029923. [10.1136/bmjopen-2019-029923](https://doi.org/10.1136/bmjopen-2019-029923)
 11. Van Gerven E, Bruyneel L, Panella M et al. Psychological impact and recovery after involvement in a patient safety incident: a repeated measures analysis. *BMJ Open* 2016; 6: e011403. [10.1136/bmjopen-2016-011403](https://doi.org/10.1136/bmjopen-2016-011403)
 12. Muller AE, Hafstad EV, Himmels JPW et al. The mental health impact of the COVID-19 pandemic on healthcare workers, and interventions to help them: a rapid systematic review. *Psychiatry Res* 2020; 293: 113441. [10.1016/j.psychres.2020.113441](https://doi.org/10.1016/j.psychres.2020.113441)
 13. Lai J, Ma S, Wang Y et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open* 2020; 3: e203976. [10.1001/jamanetworkopen.2020.3976](https://doi.org/10.1001/jamanetworkopen.2020.3976)
 14. Shechter A, Diaz F, Moise N et al. Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic. *Gen Hosp Psychiatr* 2020; 66: 1–8. [10.1016/j.genhosppsych.2020.06.007](https://doi.org/10.1016/j.genhosppsych.2020.06.007)
 15. Song L, Wang Y, Li Z et al. Mental health and work attitudes among people resuming work during the COVID-19 pandemic: a cross-sectional study in China. *Int J Environ Res Public Health* 2020; 17: 1–15. [10.3390/ijerph17145059](https://doi.org/10.3390/ijerph17145059)
 16. Si MY, Su XY, Jiang Y et al. Psychological impact of COVID-19 on medical care workers in China. *Infect Dis Poverty* 2020; 9: 113. [10.1186/s40249-020-00724-0](https://doi.org/10.1186/s40249-020-00724-0)
 17. Wang LQ, Zhang M, Liu GM et al. Psychological impact of coronavirus disease (2019) (COVID-19) epidemic on medical staff in different posts in China: a multicenter study. *J Psychiatr Res* 2020; 129: 198–205. [10.1016/j.jpsychires.2020.07.008](https://doi.org/10.1016/j.jpsychires.2020.07.008)
 18. Evanoff BA, Strickland JR, Dale AM et al. Work-related and personal factors associated with mental well-being during the COVID-19 response: survey of health care and other workers. *J Med Internet Res* 2020; 22: e21366. [10.2196/21366](https://doi.org/10.2196/21366)
 19. Zhang WR, Wang K, Yin L et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom* 2020; 89: 242–50. [10.1159/000507639](https://doi.org/10.1159/000507639)
 20. Dong ZQ, Ma J, Hao YN et al. The social psychological impact of the COVID-19 pandemic on medical staff in China: a cross-sectional study. *Eur Psychiatr J Assoc Eur Psychiatr* 2020; 63: e65. [10.1192/j.eurpsy.2020.59](https://doi.org/10.1192/j.eurpsy.2020.59)
 21. Liang Y, Wu K, Zhou Y et al. Mental health in frontline medical workers during the 2019 novel coronavirus disease epidemic in China: a comparison with the general population. *Int J Environ Res Public Health* 2020; 17: 1–12. [10.3390/ijerph17186550](https://doi.org/10.3390/ijerph17186550)
 22. Cai H, Tu B, Ma J et al. Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. *Med Sci Monit Int Med J Exp Clin Res* 2020; 26: e924171. [10.12659/MSM.924171](https://doi.org/10.12659/MSM.924171)
 23. Ning X, Yu F, Huang Q et al. The mental health of neurological doctors and nurses in Hunan Province, China during the initial stages of the COVID-19 outbreak. *BMC Psychiatr* 2020; 20: 436. [10.1186/s12888-020-02838-z](https://doi.org/10.1186/s12888-020-02838-z)
 24. Babore A, Lombardi L, Viceconti ML et al. Psychological effects of the COVID-2019 pandemic: perceived stress and coping strategies among healthcare professionals. *Psychiatry Res* 2020; 293: 113366. [10.1016/j.psychres.2020.113366](https://doi.org/10.1016/j.psychres.2020.113366)
 25. Huang L, Lei W, Xu F et al. Emotional responses and coping strategies in nurses and nursing students during COVID-19 outbreak: a comparative study. *PLoS One* 2020; 15: e0237303. [10.1371/journal.pone.0237303](https://doi.org/10.1371/journal.pone.0237303)
 26. Hou T, Zhang T, Cai W et al. Social support and mental health among health care workers during coronavirus disease 2019 outbreak: a moderated mediation model. *PLoS One* 2020; 15: e0233831. [10.1371/journal.pone.0233831](https://doi.org/10.1371/journal.pone.0233831)
 27. Thomas C, Quilter-Pinner H. Care fit for carer: ensuring the safety and welfare of NHS and social care workers during and after COVID-19. *Inst Public Policy Res* 2020.
 28. Dewey C, Hingle S, Goelz E et al. Supporting clinicians during the COVID-19 pandemic. *Ann Intern Med* 2020; 172: 752–3. [10.7326/m20-1033](https://doi.org/10.7326/m20-1033)
 29. Balasubramanian A, Paleri V, Bennett R et al. Impact of COVID-19 on the mental health of surgeons and coping strategies. *Head Neck* 2020; 42: 1638–44. [10.1002/hed.26291](https://doi.org/10.1002/hed.26291)
 30. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the COVID-19 pandemic—a review. *Asian J Psychiatr* 2020; 51: 102119. [10.1016/j.ajp.2020.102119](https://doi.org/10.1016/j.ajp.2020.102119)
 31. Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care* 2020; 9: 241–7. [10.1177/2048872620922795](https://doi.org/10.1177/2048872620922795)
 32. Fukuti P, Uchôa CLM, Mazzoco MF et al. How institutions can protect the mental health and psychosocial well-being of their healthcare workers in the current COVID-19 pandemic. *Clinics (Sao Paulo)* 2020; 75: e1963. [10.6061/clinics/2020/e1963](https://doi.org/10.6061/clinics/2020/e1963)
 33. Scott SD. Three-tiered emotional support system generates positive feedback from providers who become “second victims” of an unanticipated clinical event. *AHRQ Health Care Innov Exchange* 2010.
 34. Seys D, Scott S, Wu A et al. Supporting involved health care professionals (second victims) following an adverse health event: a literature review. *Int J Nurs Stud* 2013; 50: 678–87. [10.1016/j.ijnurstu.2012.07.006](https://doi.org/10.1016/j.ijnurstu.2012.07.006)
 35. Wu AW, Connors C, Everly GS Jr. COVID-19: peer support and crisis communication strategies to promote institutional resilience. *Ann Intern Med* 2020; 172(2). [10.7326/M20-1236](https://doi.org/10.7326/M20-1236)
 36. Shapiro J, McDonald TB. Supporting clinicians during COVID-19 and beyond—learning from past failures and envisioning new strategies. *N Engl J Med* 2020. [10.1056/NEJMp2024834](https://doi.org/10.1056/NEJMp2024834)