

Psychological impact of quarantine on healthcare workers

Esperanza L Gómez-Durán ^{1,2}, Carles Martin-Fumadó,^{1,3} Carlos G Forero¹

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/oemed-2020-106587>).

¹School of Medicine, Universitat Internacional de Catalunya, Sant Cugat del Valles, Spain

²Integral care Program for Sick Healthcare Professionals, Fundació Galatea, Barcelona, Spain

³Praxis Area, Col·legi Oficial de Metges de Barcelona, Barcelona, Catalunya, Spain

Correspondence to

Dr Esperanza L Gómez-Durán, School of Medicine, Universitat Internacional de Catalunya, Sant Cugat del Valles, Spain; elgomez@uic.es

Received 3 April 2020
Revised 13 May 2020
Accepted 18 May 2020
Published Online First
10 June 2020

ABSTRACT

Objectives Exposure to infection is an inherent occupational risk for healthcare workers and may lead them to undergo quarantine during disease outbreaks. Both front-line battle and quarantine are stressful experiences that may make psychological support for healthcare workers necessary. Psychological support measures based on the best available evidence should be included in emergency plans worldwide. We summarise the research evidence on the psychological impact of quarantine on healthcare workers.

Methods We retrieved 470 articles on the psychological impact of quarantine on healthcare workers from the Web of Science and included in this review all 12 articles that met our inclusion criteria.

Results The reviewed studies reported acute stress during quarantine and long-lasting depressive, post-traumatic stress and alcohol dependency and abuse symptoms. Healthcare workers fear infection for themselves, but more so for their loved ones, and are also concerned about the stigma that may affect their families, most especially their children.

Conclusions The safety of healthcare workers and their families during disease outbreaks needs to be ensured. Suitable alternative accommodation and personalised monitoring during quarantine are useful intervention measures to prevent adverse effects in healthcare workers. Clear public health communication will help reduce uncertainty, guilt and stigma. Financial aid should be considered for the more severely affected workers. Finally, mental healthcare for healthcare workers should be a priority, as quarantines can be a mental distress trigger. The development of efficient referral paths and the provision of counselling or psychotherapy during the confinement period are an opportunity for early mental health interventions.

Quarantine is the separation and restriction of movement of people who potentially have been exposed to a contagious disease to see if they become sick. The aim is to reduce the risk of infecting others.¹ Quarantine, a useful public health measure to prevent the spread of infectious diseases that was used during the severe acute respiratory syndrome (SARS) outbreak in 2003 and the Ebola outbreak in 2014, is a primary measure adopted against coronavirus diseases, such as COVID-19. However, mandatory quarantine may have adverse psychological effects on people's well-being.²

In the case of healthcare workers (HCWs), exposure to infection is an inherent occupational risk, in terms of risk of infection and death, as they are on the front line.³ During the international battle against SARS in 2003, around 20% of all persons

Key messages

What is already known about this subject?

- Quarantine is stressful for the general population but is especially so for front-line healthcare workers fighting an epidemic or pandemic.
- Quarantine confinements are opportunities for psychological interventions that may be difficult when the healthcare worker is on the front line.
- Maintaining staff mental health during a disease outbreak is essential.

What are the new findings?

- Healthcare workers quarantined during a disease outbreak experience considerable psychological distress in the form of acute stress disorder, post-traumatic stress symptoms and depressive symptoms, often manifested in alcohol abuse or dependency.
- Healthcare workers feel conflicted by their professional and family roles and are even more afraid of infecting their loved ones than of infecting themselves.
- They also experience stigma, which they tend to understand except when it concerns their children.

How might this impact on policy or clinical practice in the foreseeable future?

- The mental health of healthcare workers must be a primary consideration in epidemic and pandemic responses.
- This review suggests the need to develop mental health actions aimed at protecting healthcare workers and to establish a consensus regarding psychological interventions for healthcare workers during quarantine.

affected were HCWs (43% in Canada and 41% in Singapore).⁴ In any infectious outbreak, many HCWs are likely to be quarantined.

Epidemic outbreaks are exceptionally stressful events for HCWs, as they experience extremely traumatic situations.^{5,6} Since HCWs are crucial to the health system's response during a pandemic, maintaining their mental health is essential to better control infectious diseases.⁷ Their incapacitation is likely to increase all-cause mortality and disease burden in the population.⁶ While HCWs may claim that they need rest or supplies more than they need a psychologist,⁷ what about HCWs in quarantine? Could mental health professionals assist their colleagues in quarantine when they have been removed from the front line?



© Author(s) (or their employer(s)) 2020. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Gómez-Durán EL, Martin-Fumadó C, Forero CG. *Occup Environ Med* 2020;**77**:666–674.

Despite its importance, the mental health of HCWs is often neglected. Many HCWs are likely to be quarantined during an infectious outbreak, and their experience of quarantine is likely to be different from that of the general population. However, we lack reviews regarding this issue. A recent review of the psychological impact of quarantine by Brooks *et al*⁸ does not focus on HCWs; therefore, the specificities of the HCW experience, such as the duality of roles, are not adequately discussed. Given the current worldwide COVID-19 context, in line with WHO recommendations,⁹ we performed a rapid review of evidence on the psychological impact of quarantine on HCWs, evaluating data regarding previous infectious outbreaks, in order to better understand the needs and concerns of quarantined HCWs so that we could identify actions applicable to this COVID-19 outbreak.

METHODS

This rapid review is according to WHO recommendations and standards.⁹ We applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, when applicable, to protocol development, review reporting and process tracking. A literature search was implemented in several databases by a single reviewer, and two researchers independently screened and assessed the quality of retrieved articles. Any discrepancies were discussed with a third researcher and the knowledge was put together in a narrative summary.

Papers were identified by searches in Web of Science databases, including Medline, Science Citation Index Expanded, Social Sciences Citation Index, Emerging Sources Citation Index and SciELO Citation Index. The search, performed on 15 April 2020, was based on combining the broader term “quarantine” with the psychological terms “psych*” OR “mental health” OR “depress*” OR “posttrauma*”. No language or temporal restrictions were applied. Inclusion criteria were that studies had to report primary research, include HCWs in quarantine, report data on mental illness or psychological well-being in relation to quarantine, and be published in peer-reviewed journals. References of selected studies and previous reviews were hand-searched for further references.

The quality of cohort and cross-sectional studies was assessed using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies published by the US National Heart, Lung, and Blood Institute (NIH); 14 criteria are measured to determine an overall quality rating of ‘good’, ‘fair’ or ‘poor’ for each study. Scoring was based on reported information in the manuscript.¹⁰ Two investigators (ELG-D and CM-F) independently scored each manuscript. Inter-rater agreement indicated that >85% of the NIH criteria scores and 100% of the NIH global scores were identical for the two reviewers.

RESULTS

The original search retrieved 470 articles, of which 12 included relevant data and were selected for this review. Figure 1 illustrates the selection process, and table 1 summarises the characteristics of the 12 selected studies, conducted in five different countries and all referring to SARS, except for two which refer to Ebola.

Study designs varied; while there was just one prospective cohort study, there were seven cross-sectional studies and four qualitative studies. While the quality of the prospective cohort and cross-sectional studies was rated as fair, they were considered of sufficient quality to be included in this review. Results for the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies are provided in the online supplementary

material. The most frequent criteria for which manuscripts failed to receive a ‘yes’ were as follows: reporting the participation rate, justifying sample size, measuring exposure beforehand, assessing exposure more than once, covering a sufficient time-frame, blinding assessors, reporting losses to follow-up and measuring/adjusting for potential confounding variables. Many of these failures related to the cross-sectional nature of most of the studies.

Mental health issues

Seven studies compared psychological outcomes for people in quarantine compared with people not in quarantine. Only one of these studies conducted prospectively confirmed the mental health/role emotional impact of quarantine, as measured by the general health Medical Outcome Study Short-Form 36 Survey (MOS SF-36). Chen *et al*¹¹ measured the general health status of HCWs using the MOS SF-36 immediately after caring for patients with SARS and 4 weeks later, after 2 weeks of self-quarantine and 2 weeks of off-duty shifts. These authors used as a control group hospital administrators and employees with no history of contact with patients with SARS or no quarantine experience. The lowest MOS SF-36 values were found for the mental health subscales (vitality, social role functioning and mental health), immediately after front-line care and after quarantine-off-duty shifts. Although each subscale improved over the 4-week period, the mean change, and SD, for scores between measurements was significant only for physical role functioning (8.5, SD=29.5, $p<0.05$), emotional role functioning (11.1, SD=33.9, $p=0.01$) and social role functioning (19.3, SD=22.2, $p<0.001$). Emotional role functioning scores improved from 79.6 (SD=31.5 (0–100)) to 90.7 (SD=24.0 (0–100)). Subscale scores for emotional role functioning, social role functioning, vitality, mental health and bodily pain, but not for physical role functioning and general health, were significantly lower for HCWs than for the controls ($p<0.05$, by *t* test), even though the HCWs were, on average, 7 years younger. Larger differences were observed for the social role functioning and emotional role functioning subscales.¹¹

Bai *et al*'s¹² cross-sectional study surveyed SARS-related stress reactions among all hospital staff members during the SARS outbreak. They compared 41 quarantined staff (37 of them were doctors, physicians' assistants and nursing staff members) with 297 non-quarantined staff. Nearly a fifth (17%; 7 of 41) of the HCWs met the criteria for an acute stress disorder. Quarantine was the factor most associated with acute stress disorder ($\beta=1.41$, SE=0.65, OR=4.8, 95% CI 1.19 to 14.48). Quarantined staff were more likely than non-quarantined staff to report exhaustion, detachment, anxiety when dealing with febrile patients, irritability, insomnia, poor concentration and indecisiveness, fear of going home/infecting family, deteriorated work performance, reluctance to work or consideration of resignation, and stigmatisation/rejection from neighbours due to hospital work.

Three cross-sectional studies sharing the same HCW sample reported psychological symptoms 3 years after the SARS outbreak,^{13–15} including depressive symptoms among HCWs quarantined at work or at home. Although quarantined HCWs accounted for just 19% of the sample overall, they accounted for nearly 60% of the individuals in the severely depressed group; conversely, only 14.9% of the mildly depressed group had been quarantined.¹⁴ The effects of quarantine remained statistically significant after controlling for age, gender, marital status, family income and prior exposure to other traumatic events, with an adjusted OR of 4.90 (95% CI 2.19 to 10.99, $p=0.0001$).¹⁴ HCWs

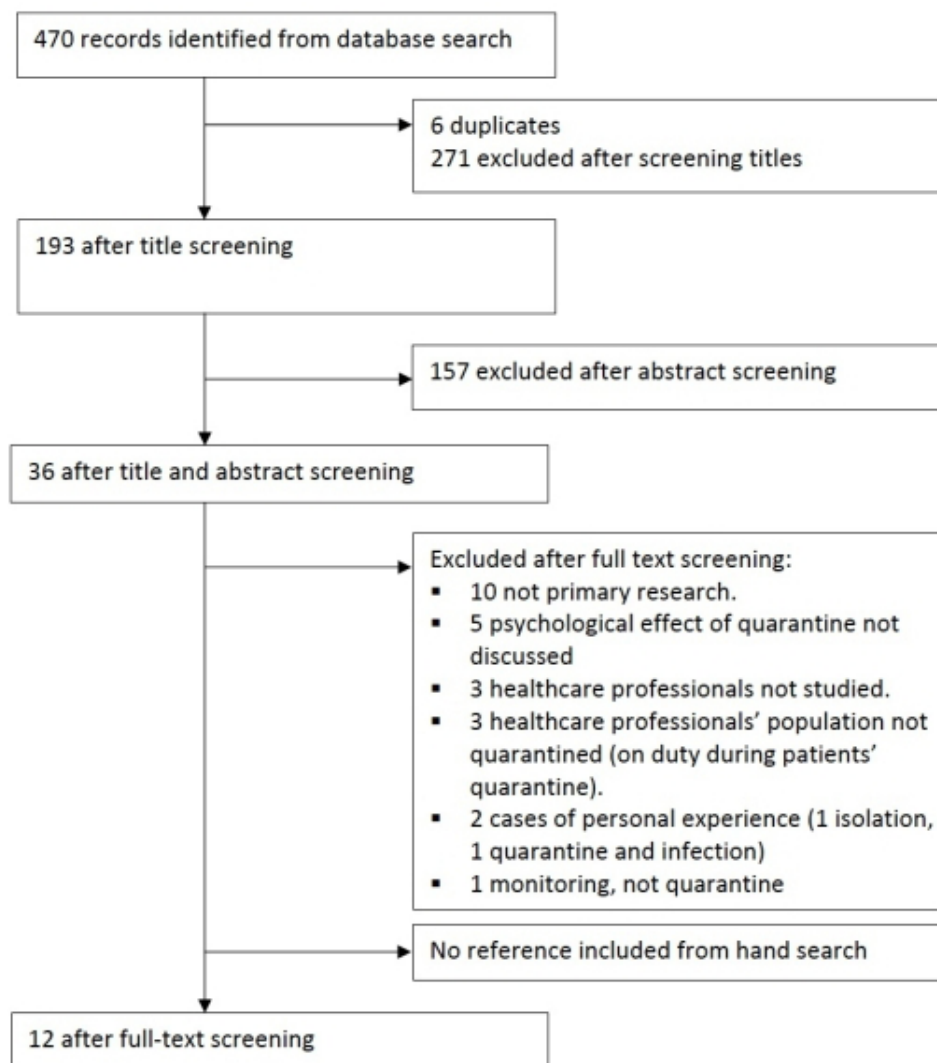


Figure 1 Screening flow diagram.

with high depressive scores were also found to be significantly more likely to have post-traumatic stress (PTS) symptomatology (adjusted OR=7.44, 95% CI 2.83 to 19.58, $p<0.0001$).¹⁴ Wu *et al*¹⁵ reported strong association between quarantine, work exposure level and close contacts with SARS during the outbreak in China and high PTS symptoms after 3 years, with an adjusted OR of 3.47 (95% CI 1.9 to 6.2, $p<0.001$), pointing at quarantine as a predictor of PTS symptoms. For the overall sample of HCWs (19% quarantined), about 40% had had high levels of PTS symptoms during the 3 years and still had symptoms by the end of that period.¹⁵ Altruistic acceptance of risk was negatively related to PTS symptoms for the overall sample, even after controlling for exposure levels and sociodemographic factors. High PTS symptom levels were also positively associated with fears of another SARS outbreak.¹⁵ Exposure to other traumatic events during or following the outbreak was related to higher levels of depressive symptoms,¹⁴ but not to PTS symptoms.¹⁵

Alcohol abuse or dependency levels after 3 years have also been reported to be high among HCWs quarantined during the Chinese SARS outbreak, with adjusted ORs ranging from 1.84 (95% CI 1.06 to 3.19) to 2.20 (95% CI 1.32 to 3.66), depending on the multivariate analysis model. Alcohol abuse or dependency was related to postexposure PTS symptoms (mediated by symptoms of hyperarousal) as well as to depression, and

the association between alcohol symptom counts and quarantine remained after controlling for demographics, depression and PTS symptoms.¹³

Other psychological impact issues have also been studied. Marjanovic *et al*¹⁶ reported, in a sample of general nurses, that the time spent in quarantine correlated positively with emotional exhaustion ($r=0.21$, $p<0.001$), state anger ($r=0.23$, $p<0.001$) and avoidance behaviour ($r=0.30$, $p<0.001$), and negatively with vigour ($r=-0.22$, $p<0.001$) and contact with patients with SARS ($r=-0.29$, $p<0.001$). These authors—who performed three linear multiple regression analyses with emotional exhaustion and state anger as outcome variables, avoidance behaviour as a coping variable, and vigour, organisational support, trust in equipment/infection control, contact with patients with SARS and time spent in quarantine as predictors—found that their predictive model indicated that less time spent in quarantine was predictive of lower levels of avoidance behaviour ($\beta=0.23$, $p<0.001$) and less state anger ($\beta=0.14$, $p=0.008$).

The remaining quantitative studies, which surveyed only individuals in quarantine, reported high levels of distress. Desclaux *et al*¹⁷ identified fear and anxiety-induced insomnia in the initial days or first week of quarantine during the Ebola outbreak in Senegal, while Hawryluck *et al*,¹⁸ in their study where 68.3% of the general sample were HCWs, reported a Center for

Table 1 Study characteristics

Author (year)	Country	Epidemic	Design	Methods	Exclusion criteria (excluded participants)/losses	Participants	Quarantine period	Outcome measure	Reported limitations
Maunder <i>et al</i> (2003) ²¹	Canada	SARS	Observational	Unstructured individual interviews by 2 authors, with 4 hospital core team members and 5 mental healthcare providers, about their informal observations.	Not specified (not specified)/not specified.	Unavailable (at least 99 staff members were quarantined at the hospital).	10 days voluntary quarantine.	Narrative description of psychological responses.	Non-systematic methods of data gathering and interpretation by expert opinion and consensus. One large teaching hospital may not be generalisable to other settings.
Hawryluck <i>et al</i> (2004) ¹⁸	Canada	SARS	Cross-sectional	Web-based survey completed after the quarantine period; exploring knowledge about SARS with a list of questions and psychological impact of quarantine with validated scales.	Not specified (not specified)/not specified.	86 healthcare professionals (129 total sample).	10 days median home or work quarantine (8–10 days).	IES-R and CES-D.	Low rate of respondents, possible self-selection effect, technological requirements, socioeconomic bias and only English-speaking.
Bai <i>et al</i> (2004) ¹²	Taiwan	SARS	Cross-sectional	A paper questionnaire with instructions, sent to staff members after returning to work from quarantine; composed of DSM-IV acute stress disorder criteria and related emotional and behavioural changes.	Not specified (not specified)/not specified.	37 (338 total sample).	9 days.	SARS-related stress survey.	Non-SARS treatment centre, moderate response rate, no face-to-face interviews, no tracing or investigation of non-responders.
Robertson <i>et al</i> (2004) ²²	Canada	SARS	Qualitative	Semistructured interviews (8 by telephone and 2 in person); focused on the quarantine experience and its effect, perceptions of contracting and spreading SARS, and the effect of SARS on participants' work.	Not specified (not specified)/not specified.	10 healthcare workers.	10 days home quarantine or work-home quarantine.	Narrative descriptions, coded into 3 main themes: loss, duty and conflict.	Sample restricted to Toronto HCWs, possibly not representative because of willingness to discuss their experiences, preliminary and exploratory data.
Marijanovic <i>et al</i> (2007) ¹⁶	Canada	SARS	Cross-sectional	Internet-mediated questionnaire: psychosocial issues, working conditions and demographics.	Not specified (not specified)/not specified.	Unclear, between 41 and 84 (total sample=333 nurses), both work and full quarantine.	Length unclear.	3 dependent variables: MBI-GS, STAXI-2, 6 items on avoidance conduct.	Self-selected sample, potentially biased and representativeness doubts, no physical interactivity.
Chen <i>et al</i> (2007) ¹¹	Taiwan	SARS	Prospective	During the SARS epidemic, the hospital members of the task force for treatment of patients with SARS were evaluated immediately after caring for patients with SARS and 4 weeks after self-quarantine and off-duty shifts.	Not specified (not specified)/not specified.	90 quarantined healthcare professionals and 82 control subjects.	14 days.	MOS SF-36.	Baseline variable differences between HCWs and control subjects not assessed.

continued

Table 1 continued

Author (year)	Country	Epidemic	Design	Methods	Exclusion criteria (excluded participants)/losses	Participants	Quarantine period	Outcome measure	Reported limitations
Reynolds et al (2008) ¹³	Canada	SARS	Cross-sectional	A standardised questionnaire mailed to eligible participants, with 2 reminders sent at 3-week intervals. Assessing respondents' understanding of the rationale for quarantine, quarantine behaviours, and socioeconomic and psychological impacts.	Not specified (persons who developed symptoms and were investigated for SARS, institutionalised adults and 13 individuals to whom legal orders were issued owing to non-compliance)/not specified.	269 healthcare workers out of 1057 study respondents.	Median length of 8.7 days (SD=2.5).	A list of feelings, fears of developing SARS, stigmatisation and symptoms of PTSD using the IES-R.	Response rate of 55%, underrepresentation of younger age persons, socioeconomic data not collected and household composition/number of quarantined members not analysed, self-reported data without validation, a study completed 1–4 months from quarantine.
Wu et al (2008) ¹⁵	China	SARS	Cross-sectional	Self-report questionnaire, 662 employees, stratified random sample from a major hospital, assessing exposure to the SARS outbreak or other traumatic events, television exposure, coping methods, sociodemographics, alcohol abuse/dependence symptoms, PTS symptoms and depression.	Not specified (not specified)/not specified.	140 hospital employees quarantined either at home or at work (total sample of respondents: 549).	Length unclear (most of them more than 10 days, median length 14 days).	NHSDA selected items.	Cross-sectional nature, pre-SARS alcohol use patterns were not collected, limited statistical power because of low mean alcohol symptom count, an instrument measuring symptoms only, no diagnosis could be made, <2% of the employee population during the SARS outbreak were no longer working there at the time of the survey.
Wu et al (2008) ¹³				Self-report questionnaire, a stratified random sample from a major hospital assessing exposure to the SARS outbreak or other traumatic events, perceptions of SARS-related risks, PTS symptoms, fear of SARS and demographics.				IES-R.	Cross-sectional nature, use of a modified version of the available Chinese IES-R (altered timeframe), recall bias because the study was conducted 3 years after the outbreak.
Liu et al (2012) ¹⁴				Self-report questionnaire, stratified random sample from a major hospital assessing exposure to the SARS outbreak or other traumatic events, perceptions of SARS-related risks, current high-stress job, depressive and PTS symptoms, and demographics.				CES-D.	Cross-sectional nature, no valid control group comparison (no employee ultimately without SARS exposure), CES-D not diagnostic of major depression.

continued

Table 1 continued

Author (year)	Country	Epidemic	Design	Methods	Exclusion criteria (excluded participants)/losses	Participants	Quarantine period	Outcome measure	Reported limitations
Desclaux <i>et al</i> (2017) ¹⁷	Senegal	Ebola	Qualitative	Indepth semistructured interviews with adult contact subjects and the volunteers who provided their daily follow-up.	Not specified (not specified) /13 contacts were unavailable or declined participation.	4 doctors or interns, 9 nurses or nursing assistants, 9 community health workers, 4 biologists and laboratory technicians, and 2 stretcher-bearers.	21 days home quarantine.	Narrative description of contact perceptions of quarantine.	Not specified.
Wester and Giesecke (2019) ²⁰	Sweden	Ebola	Qualitative	Semistructured interviews with HCWs who worked in Ebola outbreak in West Africa and with one close contact for each of them, exploring stigmatisation and risk perception.	Not specified (not specified)/not specified.	3 doctors, 2 nurses and 1 biomedical analyst that worked in Sierra Leona, and a contact person named by each of them.	3 weeks.	Thematic analysis based on the categories: information, stigma experiences, risk perception and compliance.	

CE5-D, Center for Epidemiological Studies Depression Scale; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders - IV; HCW, healthcare worker; IES-R, Impact of Event Scale-Revised; MBI-GS, Maslach Burnout Inventory-General Survey; NHSDA, National Household Survey on Drug Abuse; PTS, post-traumatic stress; PTSD, post-traumatic stress disorder; SARS, severe acute respiratory syndrome; MOS SF-36, Medical Outcome Study Short-Form 36 Survey; STAXI-2, State-Trait Anger Expression Inventory.

Epidemiological Studies Depression Scale score of over 16 in 31.2% of their sample, and that the presence of depressive symptoms correlated with the presence of PTS symptoms ($r=0.78$, $p<0.0001$) and that differences in professional status did not correlate with PTS or depressive symptoms. Reynolds *et al*¹⁹ compared quarantine experience between HCWs and the general population, finding that HCWs experienced greater stigmatisation, avoidant behaviours after quarantine (of people coughing or sneezing, crowded enclosed places and public spaces), had greater income losses and were consistently more impacted psychologically. Percentages for specific responses for quarantined HCWs compared with non-HCWs were as follows: 73.2% vs 53.2% for frustration, 72.9% vs 56.3% for isolation, 59.1% vs 52.6% for annoyance, 54.3% vs 35.1% for worry, 53.5% vs 33.2% for loneliness, 41.6% vs 23.9% for anger, 38.3% vs 29.3% for helplessness, 33.5% vs 18.5% for fear, 26% vs 15.3% for sadness, 24.2% vs 16.1% for nervousness, 16.4% vs 7.5% for guilt, and 2.6% vs 5.4% for happiness. The percentage of HCWs with an overall score of 20 or more on the Impact of Event Scale-Revised was significantly higher than for the non-HCWs (22.4% vs 11.8%, $p<0.001$); scores for each subscale were also significantly higher ($p<0.0001$).

Particular worries and feelings

Fears of infecting self or others

During the early days of quarantine, both the general population and HCWs feared being infected,¹⁷ and this fear was exacerbated if they experienced physical symptoms potentially related to the infection.¹⁷ Wester and Giesecke²⁰ reported that, when working with Ebola, HCWs initiated declared routines and rituals to increase their perceived control over the infection risk. These included, once at home, monitoring temperature and restricting social contact after even a slight increase in temperature.

Although their sense of duty was unequivocal, HCWs reported fears about their own health and fears of infecting others.^{12 17–19 21 22} Simultaneous roles as HCWs and members of families caused internal conflict—given the risk of infection posed to family members—resulting in feelings of guilt, fear, anxiety and remorse.²² HCWs who were home-quarantined felt that this unnecessarily exposed their families to risk.¹⁷ HCWs were especially worried about infecting vulnerable family members and friends,²² most especially where children were concerned.²⁰ Although Hawryluck *et al*,¹⁸ whose sample included 68.3% HCWs, found that having children was not associated with psychological outcomes, children were frequently mentioned in relation to the fear of infecting others.^{17 20} Compared with divorced or separated HCWs, married HCWs reported greater levels of fear of another outbreak of SARS, suggesting that family responsibilities increased fear and worry regarding disease outbreaks.¹⁵ Concerns about personal safety and the safety of family members were also evident for the Mount Sinai Hospital core team members and mental HCWs interviewed about their experience of SARS.²¹ Furthermore, restrictions regarding contact were reported to be more challenging to follow by HCWs with children.¹⁷

The tranquillity of loved ones

The tranquillity of their families was a significant concern of HCWs, who are, simultaneously, the primary source of information and a hazard for their families, thereby creating a unique situation when it comes to risk assessment.²⁰ For volunteers, Wester and Giesecke²⁰ highlighted that the decision to volunteer is part of the character of the person in that they consciously

assume the risk. However, while their families acknowledge this fact, not being able to explain the risks in person to the ones left behind was in some instances a cause of distress for volunteers away from home.

Most HCWs found it challenging to explain the situation to their children.²² Robertson *et al*²² described how HCWs with children reported that changes in usual roles and routines created stress to the entire family; partners were under further pressure as they had to assume family responsibilities, while HCWs' frustrations were exacerbated by not being able to take part in routine activities.¹⁸

Restrictions on physical contact

HCWs in quarantine are obliged to restrict physical contact, which results in loss of intimacy and social contact that culminates in physical and psychological isolation.²² Partners were physically isolated by having to sleep in separate rooms, thereby losing intimacy.²² Participants in Hawryluck *et al*'s¹⁸ study described a sense of isolation; the mandated lack of social contact enhanced their sensation of distance from the outside world, while the lack of any physical contact with family members was experienced as particularly difficult.

Colleagues

Work colleagues were mentioned several times in the literature. One concern of quarantined HCWs is regarding the understaffing that results from quarantines.²¹ While HCWs maintained much needed social contact with others in the same situation, given the shared sense of camaraderie, Robertson *et al*²² also described the inevitable conflict between HCWs who continued working in high-risk situations and the 'non-essential staff' who stayed home on paid leave. Colleagues were also protagonists of some of the stigma anecdotes that we describe in the Stigma section.

Being monitored

While being monitored may awaken feelings of being infected¹⁷ and generate fear, the literature highlighted other issues of note. It has been reported that HCWs compared with general population may be allowed a certain degree of freedom in interpreting recommendations, with personalised rules possibly applying to them.²⁰ HCWs also tend to be confident in their ability to determine if and when they show signs of infection,²⁰ so supervision of quarantine measures may be troublesome and make them feel uncomfortable. Furthermore, they may doubt the efficacy of follow-up agent visits and find it hard to follow orders delivered by persons they perceive to be less qualified HCWs.²⁰

Inadequate information

While HCWs compared with non-HCWs are more likely to understand the reason for quarantine,¹⁸ other issues regarding information emerged in our review. Hawryluck *et al*¹⁸ found that healthcare status did not influence whether respondents thought they had received adequate information regarding most home infection control measures (except mask changing), and highlighted that during the Toronto SARS outbreak many HCWs were informed of their quarantine by the media.

The lack of clear guidelines on how to minimise infection at home and in quarantine added to HCWs' frustrations, to their fears of contaminating family members and to their uncertainty regarding effective risk control.²² Lack of transparency about the risk associated with quarantined individuals led to people fearing the worst during the Ebola outbreak.¹⁷ Hence, enforcing infection control policies and procedures will increase staff feelings of

safety,²² while improved information by authorities and media to the general population may also mitigate stigma.²²

Financial losses

Financial losses during and after quarantine are another frequently reported risk factor for symptoms of psychological distress in the general population.⁸ Hawryluck *et al*¹⁸ specifically identified significantly greater PTS and depressive symptoms in people with low combined annual household incomes.

Financial losses were a central issue during Senegal's Ebola outbreak. Desclaux *et al*¹⁷ reported that HCWs became dependent on their families during quarantine, given their precarious jobs, limited and unpredictable incomes, and loss of pay when absent from their workplace; the problem was aggravated when those HCWs were the only breadwinners in the family unit.

Stigma

Stigma is a recurrent theme in the reviewed studies. HCWs, but not necessarily the public, are aware of the risks of infection and the measures to prevent infection. Quarantined HCWs were significantly more likely to report stigmatisation and rejection from neighbours than non-quarantined colleagues.¹² In Senegal, quarantined HCWs during the Ebola outbreak also reported being very selective in terms of informing of their status as contacts because they would be considered infected by people of varying degrees of proximity. Furthermore, the quarantine of female HCWs resulted in their husbands or mothers-in-law questioning their jobs.¹⁷

The risk of stigma faced by HCWs seems to vary widely worldwide. Swedish HCWs reported having to deal with some minor situations of friends and colleagues avoiding contact, but did not feel stigmatised for extended periods. The literature reflected anecdotal accounts of stigmatisation by partners, colleagues avoiding sharing lifts and discussions about the rights of HCWs' children to attend day care.²⁰

Even if hurtful, the HCWs understood this behaviour, but the experience changed when their children were stigmatised.²⁰ During the Toronto SARS outbreak, HCWs experienced stigma and felt a duty to protect their children from being taunted or stigmatised by association.²² While most of them rationalised stigma as a lack of understanding of the disease and its risks, they all reported feeling angry and hurt. Adverse reactions remained even after the outbreak, with many avoiding informing others about their HCW status.²²

DISCUSSION

This review reports evidence that quarantine among HCWs is associated with considerable psychological distress. Quarantined HCWs experience mental health problems, loss of social support and financial losses. Beyond the psychological impact described by Brooks *et al*⁸ for the general population, our results highlight the conflict experienced by HCWs regarding their professional and family roles. A recurring theme in the literature is HCWs' concerns about the impact of quarantine on their families and their families' safety, especially when children are involved. Furthermore, our review raises particular issues regarding the stigmatisation of HCWs and the monitoring of quarantined HCWs.

The review needs to be interpreted in the context of the following limitations. Most results are not causal, given the nature of the studies, mainly cross-sectional and qualitative studies, so no causal relationship between variables can be established. However, it should be acknowledged that the impact of

an epidemic is similar to that of a natural disaster in terms of generating distress, especially for HCWs on the front line. Many studies do not focus specifically on HCWs; rather, a small group of HCWs are included in the studies and the corresponding data are only partially analysed. Qualitative studies based on interviews may suffer from reporting bias; self-reported data probably mean that admitting emotions is easier, but the corresponding studies were not devised to conduct comprehensive assessments. Moreover, the impact of different types of quarantine reported may vary²; however, this rapid review was not able to differentiate between types of quarantine.

According to our review, quarantining HCWs is associated with considerable psychological distress and psychopathologies, such as acute stress disorder, PTSD symptoms, depressive symptoms and alcohol abuse or dependency symptoms.^{12–15 18} HCWs consequently merit psychological or psychiatric support, mainly because long-lasting symptoms can emerge even 3 years after the outbreak.^{13–15} Mixed evidence has been reported regarding the individual and demographic predictors of the psychological impact of quarantine.⁸ Vulnerability factors for mental health problems are likely to apply in quarantine situations as in the general population, while the increased workload and extra stress for those remaining on the front line are a severe threat to healthcare provision.³ Additional monitoring and support for HCWs with predisposing factors would be an invaluable preventive measure, while accessible and timely referral paths need to be developed for the small group of HCWs who require mental health services.²²

Leaving aside the fear of infection, stigmatisation of HCWs who have been quarantined was identified as a central theme in the literature.^{12 20} HCWs tend to understand the rejection in relation to themselves, but not in relation to their children.^{20 22} Clear and unequivocal media and health authority messages to the general public are likely to influence public reactions to quarantined HCWs. The fact that HCWs know how to confront infections and protect others implies responsibility and a psychological burden during an epidemic. Accurate and timely information to HCWs would help them manage the impact of uncertainty on their well-being.^{17 18 22} Thus, transparency about the severity of the pandemic, coordination and clear public health messages are essential to HCWs' psychological well-being.⁸ As for quarantine monitoring, there is a need to adapt it to the characteristics of individual HCWs, as they may feel uncomfortable with supervision,²⁰ while non-supervision may cause feelings of neglect, lead to conflict between the patient and professional roles, and raise fears of infection.¹⁷

The well-being of their families was a common concern of HCWs cited in the reviewed studies. While families may trust 'their' HCW, the precautionary principle in their actions may imply a loss of support.²⁰ HCWs need to respect the wishes of their loved ones, irrespective of the medical and scientific information they draw on.²⁰ Providing suitable alternative accommodation to HCWs could lessen their concerns for their loved ones.¹²

In light of the evidence regarding HCWs in epidemic and pandemic scenarios, we need to take proactive steps to protect their mental well-being, both to prevent psychological effects and to better help their patients. A physically and mentally healthy and well-equipped healthcare workforce is vital to a country's capacity to manage COVID-19 outbreaks, and several initiatives have included mental health interventions in COVID-19 emergency plans around the world.^{7 23 24} However, although HCWs may show signs of psychological distress, they may be reluctant to participate in group or individual psychology interventions prioritising rest.⁷

All mental health actions will encounter obstacles, especially due to the lack of time when HCWs are on duty. We strongly believe that a quarantine period offers a unique opportunity to address HCW distress and to enhance their psychological resources. Fast infection transmission would hinder conventional face-to-face psychological interventions, so interventions could be conducted using virtual means. According to our review, HCWs would benefit from timely, appropriate mental health support and general mental health promotion services during virus outbreaks.

CONCLUSIONS

Our review would confirm that HCWs experience psychological impact on being quarantined. We need to assume that a substantial proportion of quarantined persons will be distressed and that the long-lasting psychological consequences of quarantine will compromise the well-being of HCWs. Most HCWs are dedicated to their profession and to their duty of care, but being quarantined impacts them in several ways. One positive aspect of quarantine is that it can open the door to early psychological interventions that may not be possible when the HCW is working. We strongly believe that learning about the negative emotions of HCWs during quarantine would help in the essential goal of maintaining staff mental health during an epidemic or pandemic.

Just as has been confirmed in China,²⁴ the COVID-19 outbreak will result in many problems in terms of the provision of psychological care worldwide. Mental health considerations and emergency plans must become a specific part of the response to epidemics and pandemics.²⁵ Policymakers, public health authorities and mental health professionals need to be aware of the existing psychological support gap and the barriers to be overcome to mitigate the adverse consequences of disease outbreaks not just for the physical safety of HCWs and their families, but also for their mental well-being.

We need to be ready to provide timely and high-quality psychological services to HCWs, as their well-being is essential to tackle disease outbreaks and their consequences. We hope that this review, which has both public health and occupational health implications, leads to a consensus on core psychological interventions when HCWs undergo quarantine.

Contributors ELG-D designed the search strategy with input from CM-F and CG-F. ELG-D implemented the literature search. ELG-D and CM-F independently performed the screening and quality assessment, and any discrepancies were discussed with CG-F. ELG-D carried out the data extraction. ELG-D wrote the first draft of the review with input from CM-F and CG-F.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

ORCID iD

Esperanza L Gómez-Durán <http://orcid.org/0000-0001-8638-5615>

REFERENCES

- Centers for Disease Control and Prevention. Quarantine and isolation, 2017. Available: <https://www.cdc.gov/quarantine/index.html> [Accessed May 8 2020].
- Rubin GJ, Wessely S. The psychological effects of quarantining a City. *BMJ* 2020;368:m313.
- Sim MR. The COVID-19 pandemic: major risks to healthcare and other workers on the front line. *Occup Environ Med* 2020;77:281–2.

- 4 Hsin DH-C, Macer DRJ. Heroes of SARS: professional roles and ethics of health care workers. *J Infect* 2004;49:210–5.
- 5 Hull HF. Sars control and psychological effects of quarantine, Toronto, Canada. *Emerg Infect Dis* 2005;11:354–5.
- 6 Emanuel EJ, Persad G, Upshur R, *et al.* Fair allocation of scarce medical resources in the time of Covid-19. *N Engl J Med* 2020:1–7.
- 7 Chen Q, Liang M, Li Y, *et al.* Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry* 2020;7:e15–16.
- 8 Brooks SK, Webster RK, Smith LE, *et al.* The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet* 2020;395:912–20.
- 9 WHO. *Rapid reviews to strengthen health policy and systems: a practical guide*, 2017.
- 10 National Institutes of Health. Quality assessment tool for observational cohort and cross-sectional studies, 2014. Available: <https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools/cohort> [Accessed May 8 2020].
- 11 Chen N-H, Wang P-C, Hsieh M-J, *et al.* Impact of severe acute respiratory syndrome care on the general health status of healthcare workers in Taiwan. *Infect Control Hosp Epidemiol* 2007;28:75–9.
- 12 Bai Y, Lin C-C, Lin C-Y, *et al.* Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatr Serv* 2004;55:1055–7.
- 13 Wu P, Liu X, Fang Y, *et al.* Alcohol abuse/dependence symptoms among hospital employees exposed to a SARS outbreak. *Alcohol Alcohol* 2008;43:706–12.
- 14 Liu X, Kakade M, Fuller CJ, *et al.* Depression after exposure to stressful events: lessons learned from the SARS epidemic. *Compr Psychiatry* 2012;53:15–23.
- 15 Wu P, Fang Y, Guan Z, *et al.* The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry* 2009;54:302–11.
- 16 Marjanovic Z, Greenglass ER, Coffey S. The relevance of psychosocial variables and working conditions in predicting nurses' coping strategies during the SARS crisis: an online questionnaire survey. *Int J Nurs Stud* 2007;44:991–8.
- 17 Desclaux A, Badji D, Ndione AG, *et al.* Accepted monitoring or endured quarantine? Ebola contacts' perceptions in Senegal. *Soc Sci Med* 2017;178:38–45.
- 18 Hawryluck L, Gold WL, Robinson S, *et al.* Sars control and psychological effects of quarantine, Toronto, Canada. *Emerg Infect Dis* 2004;10:1206–12.
- 19 Reynolds DL, Garay JR, Deamond SL, *et al.* Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiol Infect* 2008;136:997–1007.
- 20 Wester M, Giesecke J. Ebola and healthcare worker stigma. *Scand J Public Health* 2019;47:99–104.
- 21 Maunder R, Hunter J, Vincent L, *et al.* The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ* 2003;168:1245–51.
- 22 Robertson E, Hershenfield K, Grace SL, *et al.* The psychosocial effects of being quarantined following exposure to SARS: a qualitative study of Toronto health care workers. *Can J Psychiatry* 2004;49:403–7.
- 23 Greenberg N, Docherty M, Gnanapragasam S, *et al.* Managing mental health challenges faced by healthcare workers during covid-19 pandemic early support. *BMJ* 2020;1211:1–4.
- 24 Duan L, Zhu G. Psychological interventions for people affected by the COVID-19 epidemic. *Lancet Psychiatry* 2020;7:300–2.
- 25 Douglas PK, Douglas DB, Harrigan DC, *et al.* Preparing for pandemic influenza and its aftermath: mental health issues considered. *Int J Emerg Ment Health* 2009;11:137–44.