

## Wales COVID-19 Evidence Centre (WC19EC) Rapid Review

**‘Rapid review on the impact of the COVID-19  
pandemic on the mental health of health and  
social care workers within the UK’**

**Report number – RR00002 (July 2021)**

### Rapid Review Details

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# 'Rapid review on the impact of the COVID-19 pandemic on the mental health of health and social care workers within the UK'

Report number – RR00002 (July 2021)

## TOPLINE SUMMARY

### Background / Aim of Rapid Review

Health and social care workers may be at risk of developing negative mental health outcomes due to their roles in providing care to patients with COVID-19 (Shaukat et al. 2020). Our aim was to **summarise the evidence from primary studies reporting on the mental health of health and social care workers (HSCWs) in UK settings during the COVID-19 pandemic.**

### Rapid Review Methods

A literature search was conducted in **May 2021** supplemented with studies from published systematic reviews. Studies were included if they reported a **prevalence of at least one mental health disorder** during the **COVID-19 pandemic** from 2020 onwards. Study quality of the included studies was assessed using the **Joanna Briggs Institute checklist** for cross-sectional studies.

### Key Findings

#### *Extent of the evidence base*

- The evidence is limited to **20 cross-sectional studies**; half were UK-wide, but none was specifically from Wales.
- The studies **provide a snapshot of mental health outcomes** at the time of the surveys but are **susceptible to selection and recall bias** and do not show causative effects.

#### *Recency of the evidence base*

- Most studies were during or following the **first wave of COVID-19**. One study was repeated in the second wave.

#### *Evidence of Impact*

- A **wide range of prevalence rates** of *anxiety (16-47%), depression (15-47%), PTSD (15-40%), Stress (28-45%), and Burnout (19-75%)* was *self-reported, generally using validated scales, for health and social care workers* in the UK, predominantly in the first wave.
- Other outcomes include poor concentration (60%), insomnia (52%), mental health decline (47%) and 'disorder' (45%), problem drinking (7%) and a wide range of prevalence of distress (1-92%).

- There was a **limited number of studies which involved social care workers**. A single study of specifically social care workers reported high rates of increased depression (60%) and increased tension (81%).

#### *Best quality evidence*

- Survey at two time points ([McFadden et al. 2021b](#)): Significant decrease in **Mental Wellbeing** and **Work-Related Quality of life in the second wave**, likely attributed to anxiety or depression.

#### *Risk factors for mental health impacts*

- In two studies with large sample sizes (>2,600) and a mix of healthcare workers, **being female**, having a **pre-existing or prior mental health disorder** and having **worries about COVID-19 transmission/Personal Protective Equipment (PPE)** were reported to be associated with adverse mental health outcomes.
- **Few data** were reported on the mental health of HSCWs in **ethnic minority groups**: two studies of NHS trust staff and GPs in Leicestershire had majority or total sample of ethnic minority respondents. Findings were not dissimilar to studies with predominantly white respondents.

### **Policy Implications**

- The evidence from 20 **cross-sectional UK studies** conducted predominantly in the **first wave** of the pandemic suggests that there was a substantial adverse impact on the mental health of health and social care workers **at that time**.
- Whilst the proportion of the workforce affected may be over-estimated by the study designs available, it is likely to be significant enough to warrant **availability of mental health support to staff being a priority**.
- Currently, factors such as **female staff members**, with a **pre-existing or prior mental health disorder** and having **worries about COVID-19 transmission/ PPE** could be used to identify staff most at risk for support.
- The quality of the evidence is low (cross-sectional studies) and **further research** including **actively monitoring and collecting data from health and social care staff** is needed to understand the **longer-term mental health impact** and the **severity of and risk factors for those impacts**.

### **Strength of the evidence**

- Currently the confidence in the strength of evidence is rated as “**low confidence**”, owing to limitations and bias of surveys compared to more rigorous study designs.

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## 1. BACKGROUND

This Rapid Review is being conducted as part of the Wales COVID-19 Evidence Centre Work Programme. Stakeholder input was provided by Technical Advisory Group (TAG) Risk Communication and Behavioural Insights and TAG Policy Modelling subgroup members.” The COVID-19 pandemic has had a vast impact globally. A scoping review reported that healthcare workers are at risk of developing both physical and negative mental health outcomes due to their role in providing care to patients with COVID-19 (Shaukat et al. 2020).

### 1.1 Purpose of this review

**Understanding the mental health burden** of the pandemic on health and social care workers (HSCWs) **will enable employers to consider the support needs of their staff.** It will also enable service providers to determine if services can be re-established and if those services need to be adapted.

Prior to preparing this review, a Rapid Evidence Summary, as part of the PHASE I rapid evidence review process was initiated (May 2021) to identify the mental health impact of the COVID-19 pandemic on HSCWs. Following searches of repositories specific to COVID-19 literature, **53 systematic reviews** were identified as relevant based on screening the title and abstracts. **A further 43 in progress systematic reviews and 16 rapid reviews were also identified.** However, based on screening only the titles and abstracts the **following areas of uncertainty** were noted:

- likely overlap of included studies between reviews
- unable to determine quality of systematic reviews and of the included studies
- not all abstracts stated the study design of the included studies
- geographical location was mostly not reported in abstracts so unable to determine relevancy to a UK or Welsh population, in reviews that did provide details, it appeared that many reviews were of a global nature thus including studies in populations with different health care systems and social and economic conditions
- search dates of the reviews were mostly a year old; it was noted that with the evolving nature of the pandemic there would be different experiences at different times
- types of healthcare worker were mostly not specified with some reviews including both healthcare workers and general populations
- lack of evidence from the social care sector

Due to the seemingly **considerable evidence base and the above uncertainties**, it was decided that PHASE II of the rapid evidence review process would be initiated with the production of a rapid overview of systematic reviews. It was agreed that the focus would be on **HSCWs working during the COVID-19 pandemic in countries with similar healthcare systems to Wales.** Of the 53 systematic reviews initially identified, 44 were selected for full text screening against the following criteria:

- limited to the COVID-19 pandemic
- inclusion of a quality assessment of primary studies
- reporting of prevalence of mental health disorders or risk factors for mental health disorder
- at least 50% of primary studies study individuals in countries within Europe, North America, Australia and New Zealand
- in studies of mixed populations, presentation of mental health outcomes reported separately for HSCWs

Unfortunately, **none of the systematic reviews met the above inclusion criteria. Most reviews failed to meet the criteria concerning geographical location of the HSCW population.**

To ensure relevance it was agreed that a Rapid Review of UK primary studies would be conducted. The research questions was, “What is the impact on the mental health of health and social care workers (HSCWs) working in the UK during the COVID-19 pandemic?” This report summarises that evidence.

## 2. RESULTS

### 2.1 Overview of the Evidence Base

#### The nature of the evidence

A summary of the included evidence is provided in Table 1. The **20 included studies** were all **cross-sectional surveys**, relying heavily on **self-reporting of outcomes**. The surveys were either issued before the end of the first wave (end of June 2020, n=10), or extending into July or August 2020 (n=7). In the latter group one study issued the same survey again in November 2020-January 2021 (McFadden et al. 2021b), providing the only data that originate from the second wave of the pandemic. In two studies the issue date was not reported.

**In half of the studies (n=10) the surveys were issued UK-wide.** In the remainder the surveys were issued in London (n=2), Leicestershire (n=2), West Midlands (n=1), Derby (n=1), the Northwest of England (n=1), mixed UK locations (n=1), Scotland (n=1), or the region was not reported (n=1).

**Methods to issue the surveys were varied**, but studies often used a marketed survey platform. Other methods included issue within a health organisation via email, human resource and communication teams, via a professional body, or via Twitter. The number of respondents per study ranged from 72 to 6040 (median 387, interquartile range 179-1635).

**Most studies included mixed samples of mixed healthcare workers/professionals (n=7)**, social care workers (n=1) or health and social care workers (n=3). A number of other studies included specific groups of doctors and nurses: GPs (n=1), secondary care doctors (n=1), ethnic minority doctors and nurses (n=1), obstetrics and gynaecology doctors (n=1), medical students and newly qualified doctors (n=2). Two studies included dentists and one of staff within intensive care units (ICU).

**In over half (n=12) of studies most respondents were female.** Otherwise, there was a near equal gender split (n=3) or these data were not reported (n=5). Within most of the studies reporting sample ethnicity (n=8), **most respondents were of white ethnicity (n = 6).** Of note, **one study included 100% ethnic minority group participants (Moorthy et al. 2020) and another included 70% (Trivedi et al. 2021).**

**Various measures of mental health outcomes were used within the included studies. Most studies (n=13) used one or more validated self-reported measures.** These either reported mean or median values or stated the proportion of participants that scored above a threshold to indicate a substantial level of disorder. There were cases where different thresholds were used in different studies for the same measure. The remainder (n=7) of studies used bespoke, unvalidated measures. **None of the studies used clinical diagnoses from healthcare professionals,** thus mental illness/disorder is not reported on within this review.

- **Anxiety**

**Eleven studies reported on anxiety** (Choudhury et al. 2020, Ferry et al. 2021, Gilleen et al. 2021, Greenberg et al. 2021, Greene et al. 2021, Lavender et al. 2021, Pappa et al. 2021, Ranka & Ranka et al. 2021, Shah et al. 2020, Siddiqui et al. 2021, Wanigasooriya et al. 2020). Of the **five studies** that reported on moderate to severe anxiety using the **Generalized Anxiety Disorder 7-item anxiety scale (GAD-7), score of 10 or more (Spitzer et al. 2006), prevalence in healthcare workers ranged from 16% to 38%, with four studies reporting prevalence >30%.** The highest prevalence of anxiety using GAD-7 was from a study of ICU staff (Greenberg et al. 2021). One study used a **UK clinically significant score of 8 or more on the GAD-7 (thus a lower threshold than other studies) and reported a prevalence of 47% in health and social care workers (Greene et al. 2021).** Two studies used the Patient Health Questionnaire-4 (PHQ-4) to measure anxiety; one reporting a prevalence of 34% amongst healthcare workers (score of 3 or above; Wanigasooriya et al. 2020) and the other reporting **71% amongst dentists** (unclear cut-off; Ranka & Ranka 2021). Using the Generalized Anxiety Disorder 2-item anxiety scale (GAD-2), a prevalence of **25% likely generalized anxiety disorder (score of 3 or more) was reported for a group of doctors working in obstetrics and gynaecology** (Shah et al. 2020). Siddiqui et al. (2021) used an unvalidated measure and reported an increase in anxiety in healthcare professionals from pre-pandemic (retrospectively measured). Lavender et al. (2021) found **6% of doctors' assistants (medical students) reporting anxiety using an unvalidated measure.**

- **Depression**

**Twelve studies reported on depression** (Choudhury et al. 2020, Copolotti et al. 2020, Ferry et al. 2021, Gilleen et al. 2021, Greenberg et al. 2021, Greene et al. 2021, Hussein et al. 2021, Pappa et al. 2021, Ranka et al. 2021, Shah et al. 2020, Wanigasooriya et al. 2020) and mood (Coyle et al. 2020). **Using the Patient Health Questionnaire-9 (PHQ-9), prevalence of moderate to severe depression ranged from 15% to 47% in six studies. Prevalence was >40% in three of these studies.** Within one of these studies, **thoughts of suicide and self-harm were also measured and 13% of the sample of ICU staff reported these** (Greenberg et al. 2021). Two studies use the Patient Health Questionnaire-4 (PHQ-4); one reported a prevalence of **31% in healthcare workers** (score of 3 or above; Wanigasooriya et al.

2021) and the other **60% depression-related symptoms in dentists** (unclear cut off; Ranka & Ranka 2021). Shah and colleagues (2020) reported **16% of their sample of obstetrics and gynaecology doctors had likely major depressive disorder as determined by the Patient Health Questionnaire-2 (PHQ-2), score of 3 or more**. One study reported **increased feelings of depression using an unvalidated measure in 60% of their sample of social care workers** (Hussein et al. 2021). Coyle and colleagues (2020) measured mood on a 0 – 100 scale and report a mean of 52 amongst medical students and newly qualified doctors. Cipolotti and colleagues (2020) reported that **64% experienced feeling low, sad or depressed (single item/unvalidated measure) and this affected everyday functioning for 34% of healthcare workers**.

- **Post-Traumatic Stress Disorder (PTSD)**

**Four studies reported on PTSD** (Gilleen et al. 2021, Greene et al. 2021, Greenberg et al. 2021, Wanigasooriya et al. 2020). Using the **Impact of Event Scale-Revised (IES-R) two studies report prevalence of between 15% and 25% in healthcare workers however they used different cut-off scores ( $\geq 26$  and  $\geq 33$  respectively)**, suggesting even wider differences in prevalence (Gilleen et al. 2021, Wanigasooriya et al. 2020). Within a sample of **ICU staff a prevalence of 40% probable PTSD was reported using the PTSD Checklist-6, PCL-6**, (Greenberg et al. 2021). Another study used the **International Trauma Questionnaire (ITQ) and reported prevalence of 22.5% in their study of health and social care workers** (Greene et al. 2021).

- **Stress**

**Five studies reported on stress** (Choudhury et al. 2020, Copolotti et al. 2020, Gilleen et al. 2021, Ranka & Ranka 2021, Trivedi et al. 2021), which was mostly measured using the **Perceived Stress Scale (PSS)**. Using a cut-off of the top quartile, Gilleen and colleagues (2021) found that **28% of healthcare workers had severe stress**. A number of factors were associated with stress including a **previous mental health condition** (Gilleen et al. 2021). Another study which used a shorter version of the PSS (the PSS-4) reported a median score 7 and higher scores for those with **pre-existing anxiety and depression** (Choudhury et al. 2020). One study used the PSS but only reported at the individual item level for the sample of GPs (Trivedi et al. 2021). By examining frequencies of responses, they reported that a **greater proportion of GPs reported more stress on each item compared with retrospectively reported pre-pandemic scores** (Trivedi et al. 2020). Lavender and colleagues (2021) used an unvalidated tool to measure stress, which was reported by 3% (n=1) in a small sample of doctors' assistants (n=32). Ranka and Ranka (2021) used the Numeric Rating Scale for Pain (Hawker et al. 2011) to measure stress and reported 92% of dentists experiencing stress and 45% being severely stressed. Cipolotti and colleagues (2020) asked whether healthcare workers were experiencing a lot of stress using a single item (unvalidated) and reported that 78% did and it was having an impact on everyday functioning for 34%.

- **Burnout**

**Four studies examined burnout** (Choudhury et al. 2020, Ferry et al. 2021, McFadden et al. 2021a, Pappa et al. 2021). Using the **Copenhagen Burnout Inventory (CBI)**, Ferry and colleagues (2021) reported **79% of healthcare workers**



**to have moderate to severe burnout.** Reporting on separate subscales of the CBI, McFadden and colleagues (2021a) report **75% moderate to severe personal burnout, 66% moderate to severe work-related burnout and 19% client-related moderate to severe burnout.** Using the MBI to examine three dimensions of burnout, Pappa and colleagues (2021) found **52% to have moderate or high emotional exhaustion, 20% to have moderate or high depersonalization and 28% to have low accomplishment.** Choudhury and colleagues (2020) report that 12% felt they were burning out and **only 19% felt they would not burn out** if the pandemic carried on into the second half of 2020.

- **Other specific mental health outcomes**

Individual studies reported on other specific mental health outcomes. **Seven percent (7%) of ICU staff reported problem drinking using the Alcohol Use Disorders Identification Test-C, AUDIT-C, measure** (Greenberg et al. 2021).

In a sample of healthcare workers in West London, **52% reported insomnia** (AIS measure) and **5% reported low resilience** (RS-14 measure; Pappa et al. 2021). Using a single unvalidated item, Cipolotti and colleagues (2020) reported **72% of healthcare workers had insomnia** (“I cannot sleep”), which impacted everyday functioning for 32%.

**Work-related quality of life (WRQOL measure) showed a significant decrease between the two phases** of McFadden and colleagues’ (2021a, 2021b) study, with 26% reporting low work-related quality of life in the initial phase and 47% in the second phase.

- **General mental health**

**Ten studies reported on general mental health** (Collin et al. 2021, Ferry et al. 2021, Greenberg et al. 2021, Greene et al. 2021, McFadden et al. 2021a, 2021b, Ranka & Ranka 2021, Choudhury et al. 2020, Cubitt et al. 2021, Lavender et al. 2021). There was **substantial heterogeneity in the choice of validated and non-validated instruments that were used across the ten studies:** a total of 15 different validated instruments was used, either in whole or in part or in combination. These are described below.

- **Mental (health) disorder**

Identifying any mental disorder (severe anxiety or depression, or PTSD, or problem drinking), Greenberg and colleagues (2021) reported **45% of ICU staff categorised as having a mental disorder.**

- **Distress**

Using the **General Population-Clinical Outcomes in Routine Evaluation (GP-CORE)** scale, **58% of dentists were reported to have clinical psychological distress** (Collin et al. 2021). Using a composite of psychological measures (PTSD, depression or anxiety), Greene and colleagues (2021) reported **68% of health and social care workers in their sample to have clinically significant distress.**

Only 1% of healthcare workers were found to have distress using the IES-R (Ferry et al. 2021). In contrast,

**92% of dentists reported psychological symptoms in another study** (Ranka & Ranka 2021), however it is not clear how this measure was used (it could have been anyone who did not say “never” to the PHQ-4 questions).

- **Wellbeing**

Three studies reported on wellbeing (Greenberg et al. 2021 and McFadden et al. 2021a, 2021b). Greenberg et al. (2021) reported that **59% of ICU staff were found to have good wellbeing using the Warwick Edinburgh Mental Wellbeing Scale** (WEMWBS). Comparing to population averages, McFadden and colleagues (2021a) reported mean Short-WEMWBS wellbeing scores of health and social care workers to be lower than average and also to show a significant decrease between the two phases of their studies (McFadden et al. 2021a, 2021b).

Three studies reported individual item unvalidated measures of general mental health with varying results (Choudhury et al. 2020, Cubitt et al. 2021, Lavender et al. 2021). Forty percent (40%) of healthcare workers reported feeling fairly well or well mentally prepared for work in the pandemic (Choudhury et al. 2020). **Forty-seven percent (47%) of secondary care doctors reported a decline in mental health** (Cubitt et al. 2021). Ninety-one percent (91%) of doctors’ assistants reported no difficulties in mental health and wellbeing.

- **Mental health support**

Mental health support was reported on by two studies each using non-validated measures (Siddiqui et al. 2021, Trivedi et al. 2020). Forty-two percent of healthcare professionals felt that mental health support was adequate, whereas 32% felt it was not (Siddiqui et al. 2020). In a sample of General Practitioners (GPs), 60% felt workplace mental health support was good or excellent (Trivedi et al. 2020).

- **Miscellaneous outcomes**

Gilleen et al. (2021) reported that **61% of healthcare workers had experienced a stressful or traumatic COVID-related event**. Another study reported that **60% of hospital staff struggled to concentrate and 53% had low self-confidence**, with this impacting on daily functioning for 28% and 19% respectively (Cipolotti et al. 2020). Choudhury et al. (2020) reported that **80% of healthcare workers were afraid of catching COVID**. Amongst **social care workers, 81% reported increased feelings of tension** (Hussein et al. 2021). Moorthy reported that the pandemic had a **“bad” impact** (unclear if this includes physical as well as mental health) on 11% of their sample of ethnic minority doctors and nurses.

## **Association between adverse mental health outcomes and other variables**

Many of the included studies reporting prevalence of mental health outcomes then proceeded to explore whether any other variables collected (demographic, work-related, pandemic-related, mental health history, others) were associated with adverse mental health outcomes. These findings are reported here, though it should be noted that studies that found no associations are not reported in this review (these findings were not routinely

extracted), thus this is a general overview only of associations identified and should be interpreted with caution.

Some variables appeared to be fairly frequently associated with adverse mental health outcomes across nine of the included studies. These include **female gender** (Pappa et al. 2021, Shah et al. 2020, Wanigasooriya et al. 2020, McFadden et al. 2021, Choudhury et al. 2020, Cipolotti et al. 2020, Ferry et al. 2021, Gilleen et al. 2021), **existing mental health condition** (Pappa et al. 2021, Shah et al. 2020, Wanigasooriya et al. 2020, Choudhury et al. 2020, Cipolotti et al. 2020, Ferry et al. 2021, Gilleen et al. 2021) and **concerns/risk of COVID-19 exposure/PPE** (Siddiqui 2021, Wanigasooriya et al. 2020, Greene et al. 2021, Ferry et al. 2021, Gilleen et al. 2021). **Two studies found ethnic minority healthcare workers to be at increased risk of adverse mental health outcome** (McFadden et al. 2021, Gilleen et al. 2021).

However, there was **substantial heterogeneity in the studies cited above in terms of sample size, health/social worker group included, outcome measures used, and whether multivariate methods were applied.**

Of the 20 included studies, two studies (Gilleen et al. 2021, Wanigasooriya et al. 2020) stand out in terms of the following characteristics:

- Large sample size (>2600)
- Focus on health care workers in general rather than only a specific group of health care workers
- Use of multivariate analyses to adjust the effects of one variable for the combined effects of all other variables modelled
- Used validated measures for depression, anxiety and PTSD

The findings of these two studies are compared in Table 2, below. The two studies present a complex picture with many variables found to be significantly associated with anxiety, depression, PTSD and stress. However, it can be seen that as above, **female gender, existing mental health condition and concerns about transmission/PPE** are frequently found to be associated with an adverse mental health outcome (Table 2).

## 2.2 Summary of the Evidence Base

Table 1 – Summary of included studies

| Citation                              | Study Details   | Participants   | Outcomes   | Results   | Notes  |
|---------------------------------------|---|--|--|---|--|
| <a href="#">Choudhury et al. 2020</a> | <p><b>Study Design:</b></p> <p>Cross-sectional survey</p> <p><b>Region:</b></p> <p>tertiary cardiac centre in North West of England</p> <p><b>Data collection dates:</b> first week of April 2020</p> | <p><b>Sample size:</b> 109 responses from 63 participants</p> <p><b>Participants:</b></p> <p>Doctors: 17</p> <p>Nurses/AHPs: 23</p> <p>Admin staff: 23</p> | <p><b>Outcomes:</b></p> <p><b>Validated scales:</b></p> <p>Patient Health Questionnaire (PHQ-9) depression assessment scale</p> <p>Perceived Stress Scale-4 (PSS-4)</p> <p>Generalised Anxiety Disorder-7 (GAD-7) scale.</p> <p><b>Non-validated methods:</b></p> <p>Burnout and preparedness assessed using bespoke questions</p> | <p><b>Baseline characteristics:</b></p> <ul style="list-style-type: none"> <li>67% female</li> <li>Median age 41</li> <li>Median NHS experience 14 years [IQR 5-20 years].</li> </ul> <p><b>Baseline rate of pre-existing depression/anxiety:</b></p> <ul style="list-style-type: none"> <li>Doctors: 13%</li> <li>Nurses/AHPs: 9%</li> <li>Admin staff: 29%</li> <li>Total: 16%</li> </ul> <p><b>Validated scale results:</b></p> <p><b>Depression:</b> median PHQ-9 score 5 [IQR 2.5 to 8] i.e. mild depression.</p> <p>Distribution of PHQ-9 score:</p> <ul style="list-style-type: none"> <li>Mild (PHQ-9: 5 to 9): 38%</li> <li>Moderate (PHQ-9: 10 to 14): 6%</li> <li>Moderately severe (PHQ-9: 15 to 19): 3%</li> <li>Severe (PHQ-9 <math>\geq</math>20): 6%</li> </ul> <p>PHQ-9 score did not differ according to pre-existing depression, staff group, gender, age, NHS experience or patient facing/non-patient facing.</p> <p><b>Stress:</b> Median stress (PSS-4) score 7 [IQR 5 to 8].</p> <p>PSS-4 score was higher in respondents with pre-existing depression and anxiety (8 [IQR 6 to 10]) compared with those without (7 [IQR 5 to 8], <math>p = 0.042</math>).</p> <p>PSS-4 score did not differ by prespecified groups stated above.</p> <p><b>Anxiety:</b> Median (GAD-7) score 5 [IQR 4 to 12].</p> <p>Distribution of anxiety:</p> <ul style="list-style-type: none"> <li>Mild (GAD-7 score 5 to 9): 27%</li> <li>Moderate (GAD-7 score 10 to 14): 12%</li> <li>Severe (GAD-7 <math>\geq</math> 15): 22%</li> </ul> | <p>Study provides a snapshot of outcomes very early in the pandemic and the sample is restricted to a single specialty. Study does not report ethnicity. Study unfunded. Conflicts of interest: none.</p> <p>Small sample size.</p> <p><b>Interpretation of scales:</b></p> <p>PHQ-9 (depression): 0 to 4 = none-minimal; 5 to 9 = mild; 10 to 14 = moderate; 15 to 19 = moderately severe; 20 to 27 = severe.</p> <p>GAD-7 (anxiety): 0 to 4 = minimal; 5 to 9 = mild; 10 to 14 = moderate; more than or equal to 15 = severe anxiety.</p> <p>PSS-4 (stress): higher score indicates a higher level of stress. British population stress level in prior study cited as PSS-4 = 6.1.</p> |

|  |  |  |   |  |   |
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|  |  |  |   | <p>GAD-7 score was higher in women (6.5 [IQR 4 to 17]) than men (4 [IQR 1 to 7], <math>p = 0.006</math>). There was no significant difference in anxiety score based on occupation, direct exposure to patients, age, or length of NHS experience or presence/absence of pre-existing depression/anxiety.</p> <p><b>Bespoke survey responses</b></p> <p>40% of respondents felt fairly well or well prepared mentally for work in the pandemic.</p> <p>81% of respondents were afraid of catching COVID-19.</p> <p>19% were confident they would not experience burnout if the pandemic exceeded until the second half of 2020.</p>  |   |
| <p><a href="#">Cipolotti et al. 2021</a></p> | <p><b>Study Design:</b></p> <p>Cross-sectional survey</p> <p><b>Region:</b></p> <p>National hospital for neurology and neurosurgery, University College London Hospitals Trust, UK</p> <p><b>Data collection dates:</b></p> <p>24/04/2020 – 29/04/2020</p> | <p><b>Sample size:</b> 158</p> <p><b>Participants:</b> doctors, nurses, AHPs, non-clinical staff</p> | <p><b>Outcomes:</b> Likert scale measurement of:</p> <p>Psychological distress</p> <p>Specific concerns</p> <p>Interventions deemed useful.</p> | <p><b>Baseline characteristics:</b></p> <ul style="list-style-type: none"> <li>Nurses: 28%</li> <li>Doctors: 22%</li> <li>AHPs: 22%</li> <li>Admin staff: 18%</li> <li>Other hospital staff: 9%</li> </ul> <p>Median age: 40 years</p> <p>Female: 58%</p> <p><b>Prevalence (%) of distress reported in response to:</b></p> <ul style="list-style-type: none"> <li>I am experiencing much distress: 78%</li> <li>I cannot sleep: 72%</li> <li>I feel low/sad/depressed: 64%</li> <li>I struggle to concentrate: 60%</li> <li>My self-confidence is low: 53%</li> </ul> <p><b>Prevalence (%) of distress impacting every day functioning reported in response to:</b></p> <ul style="list-style-type: none"> <li>I am experiencing stress: 34%</li> <li>I cannot sleep: 32%</li> <li>I feel low/sad/depressed: 28%</li> <li>I struggle to concentrate: 28%</li> <li>My self-confidence is low: 19%</li> </ul> | <p>Study provides snapshot results only for the early period of the pandemic.</p> <p>Likert scale measurement.</p> <p>Study does not report ethnicity.</p> <p>Study appears to mix quantitative and qualitative methods.</p> <p>Small sample size.</p> <p>Study supported by the National Institute for Health Research University College London Hospitals Biomedical Research Centre.</p> |

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|   |  |  |   | <p>Distress scores were significantly higher in females (<math>p &lt; 0.05</math>) and those with previous mental health history (<math>p &lt; 0.05</math>). Distress score did not differ by age, age group, profession, years in role, or contact with COVID-19 patients.</p> <p>Nurses were more concerned about risk of infection than other groups.</p> <p>Nurses and doctors were concerned about work challenges.</p> <p>Staff exposed to COVID-19 infected patients were concerned about risk of infection and work challenges.</p>  |  |
| <p><a href="#">Collin et al. 2021</a></p> | <p><b>Study Design:</b></p> <p>Cross-sectional survey</p> <p><b>Region:</b> UK wide</p> <p><b>Data collection dates:</b><br/>22/05/2020 – 28/05/2020</p> | <p><b>Sample size:</b> 5170</p> <p><b>Participants:</b><br/>Dentists</p> | <p><b>Outcomes:</b> Psychological distress measured by the 14-item GP-CORE scale, intended for the general population.</p> <p>Qualitative responses</p> | <p><b>Baseline characteristics:</b></p> <ul style="list-style-type: none"> <li>Female: 49%</li> <li>Practicing as a dentist: 94%</li> <li>General dental practice: 90%</li> <li>Practice owner: 47%</li> <li>Associate: 51%</li> <li>Locum/other: 2%</li> </ul> <p><b>Psychological distress</b></p> <p>58% of respondents exceeded the clinical threshold for psychological distress.</p> <p>Compared to a prior survey from 2017, the 58% rate represented a reduction since the rate of clinical psychological distress in 2017 was 68%.</p> <p>General dental practitioners reported higher levels of psychological distress than dentists working in hospitals or other settings (<math>p &lt; 0.001</math>).</p> <p>Community dentists had higher stress scores than hospital dentists (<math>p = 0.001</math>).</p> <p><b>Psychological distress level, year 2017 versus May 2020 by specialty:</b></p> <ul style="list-style-type: none"> <li>General dental practice: 1.93 vs 1.74, <math>p &lt; 0.01</math></li> <li>Community dentistry: 1.89 vs 1.68, <math>p &lt; 0.01</math></li> <li>Teaching/research: 1.50 vs 1.29, <math>p = \text{NS}</math></li> <li>Hospital: 1.69 vs 1.29, <math>p &lt; 0.01</math></li> <li>Other: 1.51 vs 1.56, <math>p = \text{NS}</math></li> </ul> <p><b>Psychological distress level, year 2017 versus May 2020 by proportion of NHS commitment:</b></p> <ul style="list-style-type: none"> <li>100% NHS: 2.04 vs 1.8, <math>p &lt; 0.01</math></li> <li>75-99% NHS: 1.99 vs 1.73, <math>p &lt; 0.01</math></li> <li>50-74% NHS: 1.94 vs 1.75, <math>p &lt; 0.01</math></li> <li>25-49% NHS: 1.79, 1.87, <math>p = \text{NS}</math></li> </ul> | <p>Study benefits from large sample size representing 12% of all UK dentists.</p> <p>90% of respondents are general dental practitioners which is likely an over-representation.</p> <p>Paper does not provide full details for the GP-CORE scale and does not report the threshold score to indicate clinical psychological distress.</p> <p>Study funded by the British Dental Association Trust. No statement made regarding conflicts of interest.</p> |

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|                                    |   |  |  | <ul style="list-style-type: none"> <li>1-24% NHS: 1.79 vs 1.71, p=NS</li> <li>0% NHS: 1.79 vs 1.72, p=NS</li> </ul> <p>90% of practice owners reported suffering financially compared to 48% of associates (no p value reported).</p> <p>79% of practice owners reported that their mental health had suffered compared to 38% of associates (no p value reported).</p>  |  |
| <a href="#">Coyle et al. 2020</a>  | <p><b>Study Design:</b></p> <p>Cross-sectional survey</p> <p><b>Region:</b> UK wide</p> <p><b>Data collection dates:</b> not stated</p> | <p><b>Sample size:</b> 2075</p> <p><b>Participants:</b> Medical students and newly qualified doctors (interim foundation year 1)</p> | <p><b>Outcomes:</b> Mood, recorded on a unitless scale of 0-100; zero being the worst imaginable mood and 100 being the best imaginable mood.</p>    | <p><b>Baseline characteristics:</b></p> <ul style="list-style-type: none"> <li>Age range: 18-59 years</li> <li>Medical students: 92%</li> <li>Newly qualified doctors: 1%</li> </ul> <p><b>Results:</b></p> <p>Mean mood score: 51.8, SD 21.1</p> <p><b>Rate of utilization of exercise to maintain mental well-being:</b></p> <ul style="list-style-type: none"> <li>Whole sample: 80.1%</li> <li>Newly qualified doctors: 72.3%</li> <li>Medical students: 83.7%</li> </ul> <p>Mean mood score was higher in participants reporting exercise (52.3, SD 20.7) compared to participants who did not exercise (49.8, SD 21.2), p=0.048.</p> <p><b>Mean mood scores by professional and exercise status:</b></p> <ul style="list-style-type: none"> <li>Student not exercising: 49.7, SD 21.2</li> <li>Student exercising: 52.0, SD 21.0</li> <li>Doctor not exercising: 50.9, SD 19.1</li> <li>Doctor exercising: 56.2, SD 22.7</li> <li>p=0.037</li> </ul> <p>Post hoc analysis indicated that the difference lay between students who did not exercise compared to doctors who exercised.</p> | <p>Study benefits from large sample size.</p> <p>Date of survey not stated, though likely to be Spring or Summer 2020.</p> <p>Proportions of students/doctors do not sum to 100%.</p> <p>The focus is on exercise and the study found association between exercise and mood score, though the cross-sectional design does not demonstrate causation.</p> |
| <a href="#">Cubitt et al. 2021</a> | <p><b>Study Design:</b> cross-sectional survey</p> <p><b>Region:</b> an un-named</p>  | <p><b>Sample size:</b> 242</p> <p><b>Participants:</b> secondary care doctors</p>  | <p><b>Outcomes:</b> changes in mental and physical health.</p> <p>Qualitative outcomes focused broadly on items in the Maslach Burnout Inventory</p> | <p><b>Response rate</b></p> <p>242/449 = 54%</p> <p><b>Baseline characteristics:</b></p> <p><b>Grade of doctors:</b></p> <ul style="list-style-type: none"> <li>123 were consultants (50.1%)</li> <li>119 other grades (49.9%), including:</li> </ul>  | <p>Survey was anonymous.</p> <p>A strategy to deploy the survey was supported by the human resources, estates and communications departments, better working lives group and junior doctor forum.</p>  |

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|  | <p>local Acute NHS Foundation Trust</p> <p><b>Data collection dates:</b><br/>4/06/2020-19/06-2020</p> |   |   | <ul style="list-style-type: none"> <li>• associate specialists (3.3%)</li> <li>• trust grade and locally employed doctors (5%)</li> <li>• specialty registrars (6.6%)</li> <li>• core trainees in years 1–3 (16.6%)</li> <li>• foundation year 2 doctors (13.7%)</li> <li>• foundation year 1 doctors (7%)</li> <li>• interim foundation doctors (3.7%)</li> <li>• general practice trainees (2.1%)</li> </ul> <p><b>Specialties:</b></p> <ul style="list-style-type: none"> <li>• medicine (32.6%)</li> <li>• surgery (17.8%)</li> <li>• anaesthetics/ITU (14.9%)</li> <li>• radiology (7.4%)</li> <li>• acute assessment unit (7%)</li> <li>• obstetrics and gynaecology (5.8%)</li> <li>• emergency department (5%)</li> <li>• paediatrics (5%)</li> <li>• laboratory services (3.7%)</li> <li>• general practice (0.8%)</li> </ul> <p><b>Physical and mental health:</b></p> <p>Proportion reporting a decline in physical health: 34.3%</p> <p>Proportion reporting a decline in mental health: 47.1%</p> <p><b>Proportion* of doctors reporting worry or anxiety due to:</b></p> <ul style="list-style-type: none"> <li>• Not supporting social distancing: 36%</li> <li>• Personal situation: 32%</li> <li>• Staffing levels: 27%</li> <li>• Staff testing availability: 24%</li> <li>• Other: 19%</li> <li>• Patient testing availability: 15%</li> <li>• PPE availability: 11%</li> <li>• Medication availability: 5%</li> <li>• Other equipment availability: 3%</li> <li>• No, I have no concerns: 22%</li> </ul> | <p>The survey was conducted in June 2021, when the first wave was tailing off.</p> <p>Demographic details not reported: age, gender, ethnicity absent.</p> <p>High response rate and diversity of specialties may reduce scope for selection bias.</p> <p>Qualitative outcomes not reported here.</p> <p>* values read from Figure 4 in published paper.</p> <p>Funding: none.</p> <p>Competing interests: two authors worked for the NHS Trust.</p> |
| <p><a href="#">Ferry et al. 2021</a></p> | <p><b>Study Design:</b><br/>cross-</p>  | <p><b>Sample size:</b> 539</p> <p><b>Participants:</b><br/>healthcare workers</p> | <p><b>Outcomes:</b></p> <p><b>Primary:</b> incidence of moderate/severe burnout defined as score of <math>\geq 50</math> on</p> | <p><b>Baseline characteristics:</b></p> <p>Female: 90%</p> <p>Age: evenly distributed</p>  | <p>The survey method was dissemination by Twitter, linking relevant individuals and organizations. This appears to have distributed</p>  |



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| <p>sectional survey</p> <p><b>Region:</b><br/>unlimited (Twitter) but most responses were from Scotland</p> <p><b>Data collection dates:</b><br/>17/06/2020-24/06/2020</p> |  |  | <p>the Copenhagen Burnout Inventory CBI)</p> <p><b>Secondary:</b> incidence of moderate/severe depression/anxiety/distress defined as a score <math>\geq 10</math> on the Public Health Questionnaire-9 (PHQ-9) and General Anxiety Disorder-7 (GAD-7) and Impact of Event (IES-R) scales.</p> <p><b>Secondary:</b> subjective measures of increased stress</p> | <p>Previous mental health diagnosis: 33%</p> <p>Live and work in Scotland: 97%</p> <p><b>Occupation:</b></p> <ul style="list-style-type: none"> <li>• AHP: 6%</li> <li>• Clinical Support Worker: 10%</li> <li>• Doctor: 11%</li> <li>• Nurse: 53%</li> <li>• Pharmacist: 20%</li> <li>• Other: 20%</li> </ul> <p><b>Moderate-severe burnout:</b></p> <p>Prevalence of burnout: 79%</p> <p>In multivariate analysis adjusting for other variables the following variables were found to be predictors for burnout:</p> <p>Female gender: OR Male: Female 0.3 (95% CI 0.2-0.5), <math>p=0.003</math></p> <p>Previous depression: OR previous: none 3.6 (95% CI 2.2-5.9), <math>p=0.012</math></p> <p>Redeployment: OR redeployed: not 2.2 (95% CI 1.5-3.3), <math>p=0.042</math></p> <p>Exposure level to COVID-19 (scale 1-4): OR per unit increase: 1.6 (95% CI 1.4-1.8), <math>p&lt;0.001</math></p> <p>Supportive workplace team environment (scale 1-4): OR per unit increase 0.6 95% CI 0.5-0.7), <math>p&lt;0.001</math></p> <p><b>Moderate-severe depression (PHQ-9)</b></p> <p>Prevalence: 47%</p> <p>Adjusted, multivariate analysis identified the following predictors for depression:</p> <p>Previous anxiety: OR anxiety: none 2.6 (95% CI 1.9-3.4), <math>p=0.001</math></p> <p>Previous depression: OR depression: none 3.6 (95% CI 2.6-4.9), <math>p&lt;0.001</math></p> <p>Exposure level to COVID-19 (scale 1-4): OR per unit increase: 1.3 (95% CI 1.1-1.4), <math>p=0.023</math></p> <p>Workplace support available: OR support: none 0.6 (95% CI 0.5-0.8), <math>p=0.001</math></p> | <p>the survey mostly within Scotland.</p> <p>Time point is end of first wave of COVID-19.</p> <p>Nurses account for over half of responses.</p> <p>Ethnicity not reported.</p> <p>Data rich study with sound statistical methods</p> <p>Reported prevalence of distress is markedly lower than that of burnout, anxiety and depression.</p> |
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|  |  |   |   | <p>Supportive workplace team environment (scale 1-5): OR per unit increase 0.7 (95% CI 0.7-0.8), p=0.001</p> <p>Feeling safe in PPE (scale 1-5): OR per unit increase 0.7 (95% CI 0.7-0.8), p=0.008</p> <p><b>Moderate/severe anxiety (GAD-7)</b></p> <p>Prevalence: 35%</p> <p>Adjusted, multivariate analysis identified the following predictors for anxiety:</p> <p>Age 51-60 (versus older/younger groups): OR 0.5 (95% CI 0.4-0.9), p=0.029</p> <p>Previous anxiety: OR previous: none 3.6 (95% CI 2.7-4.7), p&lt;0.001</p> <p>Supportive workplace team environment (scale 1-5): OR per unit increase 0.7 (95% CI 0.7-0.8), p=0.001</p> <p><b>Event related distress (IES-R)</b></p> <p>Prevalence: 5%</p> |   |
| <p><a href="#">Gilleen et al. 2021</a></p> | <p><b>Study Design:</b></p> <p>Cross-sectional survey with a retrospective survey of the pre-pandemic era</p> <p><b>Region:</b> UK wide</p> <p><b>Data collection dates:</b> 22/04/2020-10/05/2020</p> | <p><b>Sample size:</b> 2773</p> <p><b>Participants:</b> mixed health care workers</p> | <p><b>Outcomes:</b></p> <p>Patient Health Questionnaire-9 (PHQ-9) scale for depression (score <math>\geq 10</math> defines moderate/severe depression)</p> <p>General Anxiety Disorder-7 (GAD-7) scale for anxiety (score <math>\geq 10</math> defines moderate/severe anxiety)</p> <p>Impact of Event (IES-R) for PTSD (score <math>\geq 26</math> defines PTSD)</p> <p>Perceived Stress Scale for stress (score <math>\geq 24</math> defines severe stress)</p> | <p><b>Baseline characteristics:</b></p> <p>Female: 85%</p> <p>White ethnicity: 87%</p> <p>Black, Asian Minority ethnicity (BAME): 12%</p> <p>Work setting:</p> <ul style="list-style-type: none"> <li>• NHS hospital: 51%</li> <li>• NHS primary care: 5%</li> <li>• NHS other community: 21%</li> <li>• NHS mental health: 14%</li> <li>• NHS ambulance: 0.2%</li> <li>• Private hospital: 0.5%</li> <li>• Care home: 1.6%</li> <li>• Nursing home: 0.76%</li> <li>• Other/not reported: 6%</li> </ul> <p>Role:</p> <ul style="list-style-type: none"> <li>• Nurse: 31%</li> <li>• Doctor: 14%</li> </ul>  | <p>Of 3379 responses, responses by on-healthcare workers and those with &lt;70% of responses included were excluded, leaving 2773 responses.</p> <p>Data-rich paper with robust and exhaustive analyses. However, this presents a very complex picture to summarise concisely.</p> <p>Potential for recall bias for pre-COVID-19 outcomes.</p> <p>Odds ratios from the multivariate analysis and 95% confidence intervals for odds ratios are not extracted from the paper for the sake of brevity.</p> |

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|  |  |  | <p>Worry and well-being measured on Likert scales, including a retrospective survey of pre-COVID-19 era.</p> | <ul style="list-style-type: none"> <li>• AHP: 28%</li> <li>• Management: 9%</li> <li>• Other/not reported: 19%</li> </ul> <p><b>Prevalence:</b></p> <p>Moderate/moderate-severe/severe depression: 28%</p> <p>Moderate/severe anxiety: 33.1%</p> <p>Top quartile for stress: 28%</p> <p>Experience of a stressful/traumatic COVID-19-related event: 61%</p> <p>High PTSD symptoms: 15%</p> <p><b>Multivariate analysis:</b></p> <p><b>Anxiety</b></p> <p>High anxiety was significantly associated with:</p> <ul style="list-style-type: none"> <li>• being female</li> <li>• all non-doctor roles (versus doctor)</li> <li>• working outside London</li> <li>• being front line</li> <li>• having a mental health diagnosis</li> <li>• Friends or family dying from COVID-19</li> <li>• patients asking if they are going to die</li> <li>• performing resuscitation</li> <li>• insufficient training</li> <li>• extra workload,</li> <li>• insufficient information</li> <li>• thinking not enough is currently</li> <li>• being done to reduce risk</li> </ul> <p><b>PTSD symptoms</b></p> <p>PTSD was significantly associated with:</p> <ul style="list-style-type: none"> <li>• All non-doctor (versus doctor) roles</li> <li>• being a manager</li> <li>• being front-line workers</li> <li>• being from an ethnic minority</li> <li>• existing mental health conditions</li> <li>• experience of all traumatic and stressful events except aftercare of the deceased</li> </ul> |  |
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|  |  |  |  | <ul style="list-style-type: none"> <li>• pressure to reuse PPE</li> <li>• insufficient information</li> <li>• perception that not enough was done to reduce risk</li> <li>• greater workload</li> </ul> <p><b>Depression</b></p> <p>Depression was significantly associated with:</p> <ul style="list-style-type: none"> <li>• being female</li> <li>• all non-doctor roles (versus doctor)</li> <li>• working outside London</li> <li>• having a mental health diagnosis</li> <li>• experiencing friends or family dying</li> <li>• patients asking them if they are going to die</li> <li>• performing aftercare for the deceased</li> <li>• Extra workload</li> <li>• pressure to work without PPE</li> <li>• insufficient information</li> <li>• perception that not enough had been done to reduce risk</li> </ul> <p><b>Stress</b></p> <p>High stress levels were significantly associated with:</p> <ul style="list-style-type: none"> <li>• Being female</li> <li>• younger (55–64 years versus &lt;25) age</li> <li>• all non-doctor roles (versus doctor)</li> <li>• working on the front line</li> <li>• having a mental health diagnosis</li> <li>• insufficient information,</li> <li>• pressure to work without PPE</li> <li>• &gt;20% of team members off sick</li> <li>• perception that not enough had been done to reduce risk</li> </ul> <p>Factors associated with fewer psychiatric symptoms (anxiety, stress, depression):</p> <ul style="list-style-type: none"> <li>• Being able to share stress at work</li> <li>• Resilience</li> </ul> <p>However, there was no association with PTSD.</p> <p><b>Changes from pre-COVID-19 era</b></p> <p>Across the cohort, every mental health symptom, concern and work-related issue were rated as significantly worse during COVID-19 compared with pre-COVID-19 –</p> |  |
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|  |   |  |  | <p>most to a highly significant level. Health workers worried about their family health showed the greatest (negative) change.</p> <p><b>Ethnic minority status</b></p> <p>Ethnic minority status was significantly associated with greater risk of PTSD (OR 1.52) but not anxiety, stress or depression.</p>   |   |
| <p><a href="#">Greenberg et al. 2021</a></p> | <p><b>Study Design:</b> cross-sectional</p> <p><b>Region:</b> 9 NHS trusts</p> <p><b>Data collection dates:</b> June to July 2020</p> | <p><b>Sample size:</b> 709</p> <p><b>Participants:</b> ICU staff</p>       | <p><b>Outcomes:</b> 7-item GAD scale; PHQ-9 for depression, thoughts of suicide &amp; self-harm; PCL-6 for PTSD; AUDIT-C for alcohol use, WEMWBS for mental wellbeing.</p> | <p><b>Baseline characteristics:</b> doctors – 291 (41%); nurses – 344 (49%); other clinical role – 74 (10%)</p> <p><b>WEMWBS:</b> 418 (59%) reported good well-being.</p> <p><b>Probable PTSD:</b> 280 (40%)</p> <p><b>Problem drinking:</b> 51 (7%)</p> <p><b>Depression:</b> 45 (6%) severe; 262 (37%) moderate.</p> <p><b>Anxiety:</b> 80 (11%) severe; 189 (27%) moderate</p> <p><b>thoughts of suicide &amp; self-harm:</b> 92 (13%)</p> <p><b>Any mental disorder:</b> 322 (45.4%)</p> <p>Doctors reported better mental health than nurses across a range of measures.</p>   | <p>Cross-sectional study with several limitations: potential for sampling bias, lack of demographic details, confounding not explored, self-reported outcome measures.</p>  |
| <p><a href="#">Greene et al. 2021</a></p>    | <p><b>Study Design:</b> cross-sectional</p> <p><b>Region:</b> UK wide</p> <p><b>Data collection dates:</b> 27 May to 23 July 2020</p> | <p><b>Sample size:</b> 1194</p> <p><b>Participants:</b> mixed H&amp;SC</p> | <p><b>Outcomes:</b> 7-item GAD scale; ITQ for PTSD; PHQ-9 for depression</p>   | <p><b>Baseline characteristics:</b> mean age – 41.5years (range 18.5-86.5, SD 11.8); 1103 (92.4%) female; 1084 (90.8%) white ethnicity; 903 (75.6%) worked directly with COVID-19 patients; 17.7% reported having had confirmed COVID-19; 504 (42.2%) nurses; 638 (53.4%) based in hospital.</p> <p><b>PTSD:</b> 246 (22.5%), redeployment and having had COVID-19 were associated with higher odds for PTSD.</p> <p><b>Depression:</b> 477 (46.9%)</p> <p><b>Anxiety:</b> 470 (47.3%)</p> <p><b>Overall,</b> 572 (57.9%) participants met criteria for clinically significant levels of distress.</p> <p><b>Higher household income</b> was associated with reduced odds for a mental disorder, as was <b>being able to tell manager</b> if they were not coping.</p> <p><b>Access to PPE</b> was associated with reduced odds for depression and anxiety.</p> | <p>Cross-sectional study, limitations to note potential for sampling bias, self-reported outcome measures, majority of participants were female and of white ethnicity.</p> |

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| <p><a href="#">Hussein et al. 2020</a></p>  | <p><b>Study Design:</b> cross-sectional</p> <p><b>Region:</b> UK wide</p> <p><b>Data collection dates:</b> 3 July to 10 August 2020, though 2 further extensive longitudinal surveys are planned for 2021.</p> | <p><b>Sample size:</b> 296</p> <p><b>Participants:</b> social care workers</p>  | <p><b>Outcomes:</b> wellbeing (tools not specified)</p>  | <p><b>Baseline characteristics:</b> 272 (92%) female; 251 (85%) described as White British; 59 (20%) aged 55-64 years, 110 (37%) aged 45-54 years, 71 (24%) aged 35-44 years, 44 (15%) aged 25-34 years; &gt;10 years work experience 148 (50%); private sector 165 (56%); guaranteed hours 213 (72%).</p> <p><b>Increased feelings of depression:</b> 177 (60%)</p> <p><b>Increase feelings of tension:</b> 240 (81%).</p> <p>Both outcomes greater in those aged 25-34 years vs. 45-54 years.</p> | <p>Cross-sectional study, limitations to note: potential for sampling bias, self-reported outcome measures using non-validated questions, majority of participants were female and of white ethnicity.</p>                       |
| <p><a href="#">Lavender et al. 2021</a></p>   | <p><b>Study Design:</b> cross-sectional</p> <p><b>Region:</b> Derby &amp; Burton NHS Trust</p> <p><b>Data collection dates:</b> 22 May and 24 June 2020</p>  | <p><b>Sample size:</b> 32/40</p> <p><b>Participants:</b> doctors' assistants (senior medical students employed in clinical roles for 5 weeks at the launch of the survey)</p> | <p><b>Outcomes:</b> mental health and well-being (tools not specified)</p>   | <p><b>Baseline characteristics:</b> none reported.</p> <p><b>Mental health and wellbeing:</b> 29 (91%) experienced no difficulties.</p> <p><b>Anxiety:</b> 2 (6%)</p> <p><b>Stress:</b> 1 (3%)</p>  | <p>Cross-sectional study, limitations to note: potential for sampling bias, small sample size; lack of demographic details; self-reported outcome measures using non-validated questions.</p>                                    |
| <p><a href="#">McFadden et al. 2021b</a>, <a href="#">McFadden et al. 2021a</a> – Phase 1 and 2</p> | <p><b>Study Design:</b> cross sectional</p> <p><b>Region:</b> UK wide</p> <p><b>Data collection dates:</b></p>   | <p><b>Sample size:</b></p> <p>Phase 1 = 2541</p> <p>Phase 2 = 3499</p> <p><b>Participants:</b> mixed health and social care workers</p>                                       | <p><b>Outcomes:</b> wellbeing using Short Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS); quality of life using Work-Related Quality of Life (WRQOL) scale; coping using Brief COPE scale and Clark et</p> | <p><b>Phase 1</b></p> <p><b>Baseline characteristics:</b> 2211 (87.1%) female; 1293 (51.0%) aged 30-49 years; 2389 (94.2%) white ethnicity; 1337 (53.2%) married; 1379 (54.4%) in Northern Ireland; 1952 (77.0%) social or care workers.</p> <p><b>Mental Wellbeing:</b> mean score of 21.35. Those with the following demographics reported lower scores: being single or divorced/separated, working as AHP or social worker, previous reporting of any number of sick days.</p>                  | <p>Although 2 phases conducted, the methodology is the same in both, however the sample is likely to differ.</p> <p>Cross-sectional study, limitations to note: potential for sampling bias; self-reported outcome measures;</p> |

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|  | <p>phase 1 - 7<br/>May to 3 July<br/>2020</p> <p>phase 2 -<br/>November<br/>2020 to<br/>January 2021</p> |  | <p>al. (2014) scale. Burnout using the CBI.</p>                     | <p><b>Worked-Related Quality of life:</b> 792 (31.2%) had low QoL, 668 (26.3%) had average QoL, 1081 (42.5%) had high QoL. Those with the following demographics reported lower scores: black ethnicity, single or cohabiting, working in Scotland or Northern Ireland, a disability, redeployed, previous reporting of 11+ sick days.</p> <p><b>Phase 2</b></p> <p><b>Baseline characteristics:</b> 3107 (88.8%) female; 2561 (73.2%) aged 30-59 years; 3223 (92.1%) white ethnicity; 1652 (47.2%) married; 1189 (34.0%) in Northern Ireland, 1095 (31.3%); 2425 (69.3%) social or care workers.</p> <p><b>Mental Wellbeing:</b> mean score of 20.10 (3 pts below population mean). Those with following demographics reported lower scores: females, younger age, Asian ethnicity, a disability, if felt that their service was overwhelmed, if not a line manager.</p> <p><b>Worked-Related Quality of life:</b> 1634 (46.7%) had low QoL, 910 (26%) had average QoL, 955 (27.3%) had high QoL. Those with the following demographics reported lower scores: nurses, Asian ethnicity, females, younger age groups, a disability, if felt that their service was overwhelmed.</p> <p><b>Work Related Burnout:</b> 745 (21.3%) reported high levels, 1575 (45.0%) reported moderate levels.</p> <p><b>Personal burnout:</b> 46.4% moderate, 28.3% high/severe.</p> <p><b>Client-related burnout:</b> 17.1% moderate, 2% high/severe.</p> <p><b>Differences between phases:</b></p> <p><b>Mental Wellbeing:</b> significant decrease in phase 2 (<math>p &lt; 0.001</math>), adjusted for country of work, occupational group, sex, age, ethnicity, and disability status. Likely attributed to anxiety or depression.</p> <p><b>Worked-Related Quality of life:</b> significant decrease in phase 2 (<math>p &lt; 0.001</math>), adjusted for country of work, occupational group, sex, age, ethnicity, and disability status.</p> | <p>most participants were female.</p>  |
| <p><a href="#">Moorthy &amp; Sankar 2020</a></p> | <p><b>Study Design:</b> cross sectional survey (online).</p> <p><b>Region:</b> Leicestershire.</p>       | <p><b>Sample size:</b> 200.</p> <p><b>Participants:</b> Black, Asian and Minority Ethnic group doctors (70%) and nurses (30%).</p> | <p><b>Outcomes:</b> Mental health well-being, support from NHS.</p> | <p><b>Baseline characteristics:</b> Equal split of genders. 78% born outside UK; majority born in India (64%). 47% aged 40-50 (average; range 30-70). 85.5% worked full time. Most worked at University Hospitals of Leicester NHS trust. 58% from secondary care settings, 30% from primary care. 80.5% already routinely in a front-line role, 5% deployed to front line.</p> <p><b>Mental health wellbeing:</b> 72% some form of impact. 55% mild form, 11% bad impact (of which 2% took time off work due to mental health impacts). 28% no change in mental health.</p>  | <p>Sample, population and setting unclear. Confounders not explored. Outcome measures self-reported and not validated; the question about mental health refers to mental <i>and physical</i> health within the figure.</p> |

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|   | <p><b>Data collection dates:</b> 2 to 17 May 2020.</p>  |   |  | <p><b>Support:</b> 81% satisfied with overall support received.</p>  | <p>Sample mainly Asian.</p> <p>Lack of clarity hinders understanding/ interpretation. Figures do not match up.</p>   |
| <p><a href="#">Pappa et al. 2021</a></p>      | <p><b>Study Design:</b> cross-sectional survey (online).</p> <p><b>Region:</b> West London.</p> <p><b>Data collection dates:</b> beginning of June to end of July 2020.</p> | <p><b>Sample size:</b> 387.</p> <p><b>Participants:</b> mixed healthcare workers (16% doctors, 16.4% nurses, 18.5% psychologists, 7.5% healthcare assistants, 14.6% administrative/management, 27% other) working within a mental health trust.</p> | <p><b>Outcomes:</b> wellbeing (depression, PHQ-9; anxiety, GAD-7), sleep (AIS), lifestyle changes, burnout (MBI; EE, DP, PA), resilience (RS-14), fear (NFRS).</p> | <p><b>Baseline characteristics:</b> 71% female, 48% live with a partner, just under a third aged 51-65 and about two thirds white.</p> <p><b>Prevalence:</b> <b>insomnia</b> 51.6%; <b>depression</b> mild=25.8%, moderate=11.3%, severe=10.6%; <b>anxiety</b> mild=25.8%, moderate=10.2%, severe=5.7%; <b>resilience</b> low=5.3%, moderate 24.7%, high=70%. <b>Burnout:</b> <b>EE</b> low=47.4%, moderate=17%, high=35.3%; <b>DP</b> low=80.5%, moderate=7.8%, high=11.7%; <b>PA</b> low=28.3%, moderate=27.2%, high=44.5%;</p> <p><b>Group differences:</b> Females had higher anxiety and emotional exhaustion scores than males (<math>p&lt;.05</math>). Those who had a pre-existing mental health diagnosis had higher depression, anxiety, insomnia and emotional exhaustion scores and lower resilience scores (<math>p&lt;.05</math>).</p> <p>A number of other factors (personal and work-related effects of/concerns about COVID-19), were found to be <b>associated</b> (<math>p&lt;.05</math>) with presence of depressive symptoms, anxiety, burnout (EE, DP &amp; PA) and resilience. Insomnia was only associated with depressive symptoms. Direction of associations somewhat unclear.</p> | <p>Analyses unclear; not possible to tell if confounding variables were appropriately accounted for. Outcome measures self-reported.</p> <p>Cannot establish causality. Self-selection bias &amp; small sample size limit generalisability.</p> <p>Some values in the text and table are inconsistent.</p>     |
| <p><a href="#">Ranka &amp; Ranka 2021</a></p> | <p><b>Study Design:</b> cross sectional survey (online).</p> <p><b>Region:</b> UK</p> <p><b>Data collection dates:</b> two months after</p>                                 | <p><b>Sample size:</b> 123</p> <p><b>Participants:</b> dentists.</p>  | <p><b>Outcomes:</b> anxiety and depression (PHQ-4), and stress (NRS).</p>  | <p><b>Baseline characteristics:</b> 45% were working. Of these, 18% working in public sector, 27% working in independent sector, 55% in both sectors.</p> <p><b>Prevalence:</b> 92% reported psychological symptoms. 71% <b>anxiety</b> related symptoms (74% nervous/anxious, 60% worried). 60% <b>depression</b>-related symptoms (60% lost interest/pleasure in doing things, 60% feeling low or depressed). 92% reported <b>stress</b>; 24% mild, 23% moderate, 45% severe.</p> <p><b>Association</b> between not working and depressive symptoms and between working in the independent sector and depressive symptoms. Association between anxiety and work sector unclear (different results per analyses). No association between work status or sector and stress.</p>  | <p>Sample demographics not given. Unclear when the survey was administered. Confounders not explored. Limited detail of self-reported outcome measures and use. Unclear whether appropriate statistical tests used.</p> <p>Cannot establish causality; not enough data to identify which types of dentists</p> |



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|                                      | the pandemic peak in UK.  |  |   |   | experienced the most problems.<br><br>Social media dentistry groups and personal communications used to recruit. Not enough detail in the results section to ensure correct interpretation (possible inconsistency of results).  |
| <a href="#">Shah et al. 2020</a>     | <p><b>Study Design:</b> cross-sectional survey.</p> <p><b>Region:</b> UK</p> <p><b>Data collection dates:</b> not given</p> | <p><b>Sample size:</b> 207.</p> <p><b>Participants:</b> obstetric and gynaecology doctors.</p>   | <p><b>Outcomes:</b> major depressive disorder (MDD; PHQ-2) and generalized anxiety disorder (GAD; GAD-2).</p> | <p><b>Baseline characteristics:</b> 19% male, 81% female. 45% 20-34 years, 45% 35-49 years. 25% consultants, 48% registrars, 24% senior house officers. 47% white, 32% Asian, 11% black, 3% mixed.</p> <p><b>Prevalence: likely MDD 16%, likely GAD 25%.</b> These were significantly higher than pre-pandemic UK population estimates. Anxiety was more prevalent in females. No significant difference between roles or between those with history of treated medical health conditions.</p> <p>Extent to which rapidly evolving environment had impact on their mental health was <b>associated</b> with likely MDD. Extent they were concerned about contracting COVID-19 from the workplace (impacted mental health) was associated with likely GAD.</p> | <p>Geographical data for the sample not given. Data collection dates not provided. Outcome measures self-reported.</p> <p>Small sample. Possible selection and response bias. Causality cannot be established. Population estimates of GAD and MDD were pre-pandemic.</p> <p>Article received 21/6/20, revised and then accepted 29/7/20. Missing words/figures within the paper. Use of the measure of extent factors had impact on mental health not very clear.</p> |
| <a href="#">Siddiqui et al. 2021</a> | <p><b>Study Design:</b> cross-sectional survey (online).</p> <p><b>Region:</b> UK</p>                                       | <p><b>Sample size:</b> 558.</p> <p><b>Participants:</b> Healthcare professionals (51% doctors, 14% allied healthcare professionals, 13% nurses, 4% pharmacists, 1% students, 19% other</p> | <p><b>Outcomes:</b> anxiety (current and previous), support.</p>  | <p><b>Baseline characteristics:</b> 77% female. Majority between 25 and 65 (&gt;94%). 40% worked in primary care, 26% in hospitals, 26% in the community. Majority (72%) worked in London.</p> <p>Significant increase in <b>anxiety</b> from pre-pandemic, with the largest increase amongst doctors and nurses (especially nurses in hospitals). Increases in anxiety were seen more prominently in primary and secondary care than community or other settings.</p> <p>Main <b>reasons identified for anxiety</b> were 1) exposing patients/family, 2) exposure to COVID-19, 3) lack of PPE, 4) lack of testing. Results were also presented by</p>  | <p>Possible recall bias for pre-pandemic anxiety scores. Outcome measures self-reported and not validated. Confounders not explored.</p> <p>Small number of nurses. Grade of doctor and type of allied health professional not captured. Generalisability limited due to lack of</p>   |

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|  | <p><b>Data collection dates:</b> 30 Mar to 5 May 2020.</p>  | <p>(incl midwives, psychologists, support workers, optometrists, dentists).</p>  |  | <p>sector. Reasons other than those in the questionnaire were identified from free text.</p> <p>42% felt there was adequate <b>support</b> for their mental health (32% thought not and 28% did not know). Results are presented by sector and job role.</p>  | <p>geographic spread. Exposure to COVID-19 not measured.</p>  |
| <p><a href="#">Trivedi et al. 2021</a></p>       | <p><b>Study Design:</b> cross-sectional survey (online).</p> <p><b>Region:</b> Leicestershire.</p> <p><b>Data collection dates:</b> 24 July to 7 August 2020.</p> | <p><b>Sample size:</b> 111.</p> <p><b>Participants:</b> GPs.</p>                 | <p><b>Outcomes:</b> perceived stress (PSS; current and previous), support.</p>       | <p><b>Baseline characteristics:</b> 51% male and 47% female. Majority aged 35-54 (59%). Majority Black, Asian, minority ethnic group (70%). 57% GP partner, 21% salaried GP, 15% locum GP. Majority had over 10 years' experience (66%).</p> <p><b>Perceived stress:</b> In comparison to pre-pandemic, more GPs felt more stressed on each item. E.g. more often/always felt upset with something that happened unexpectedly, unable to control important things in life, nervous or stressed, angered because of things outside of their control; fewer GPs felt things were going their way.</p> <p><b>Support:</b> Most (79%) felt their overall workplace support was good or excellent. Most (60%) felt their workplace support for mental wellbeing was good or excellent.</p>   | <p>Possible recall bias for pre-pandemic stress. Outcome measures self-reported. Composite PSS scores not presented.</p> <p>Limited geographical area &amp; in lockdown. Unrepresentative sample. Ambiguous questions.</p>                            |
| <p><a href="#">Wanigasooriya et al. 2020</a></p> | <p><b>Study Design:</b> cross-sectional survey (online).</p> <p><b>Region:</b> West Midlands.</p> <p><b>Data collection dates:</b> 5 June to 31 July 2020.</p>    | <p><b>Sample size:</b> 2638.</p> <p><b>Participants:</b> healthcare workers.</p> | <p><b>Outcomes:</b> anxiety, depressive symptoms (PHQ-4), PTSD symptoms (IES-R).</p> | <p><b>Baseline characteristics:</b> 80% female, median age 42 years (IQR 31-51), 17% from Black, Asian and minority ethnic groups. 29% nurses, 17% doctors, 53% other roles. 95% worked in acute general hospitals. 27% based from in-patient wards, 15% from ITUs, 5% from emergency departments. Majority (54%) patient facing roles. 33% redeployed during the pandemic. 37% had a history of a mental health condition, the majority (78%) of whom had treatment for this.</p> <p><b>Prevalence:</b> 34.4% <b>anxiety</b>, 31.2% <b>depression</b>, 24.5% <b>PTSD</b>.</p> <p><b>Anxiety associated</b> (<math>p &lt; .05</math>) with being <math>\leq 40</math>, female, history of mental health conditions, hospital admission for COVID-19. Protective factors: doctor or nurse, adequate PPE, well-being support at work, no morally uncomfortable changes.</p> | <p>Outcome measures self-reported. Only 54% had patient facing roles.</p> <p>Timing of PTSD measure may have captured acute stress reaction. Causality cannot be established.</p> <p>Inconsistency in gender reporting in supplementary material.</p> |

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|  |  |  |  | <p><b>Depression associated</b> (p&lt;.05) with history of mental health conditions, smoking, acute general hospital worker. Protective factors: alcohol use, adequate PPE, well-being support at work, no morally uncomfortable changes.</p> <p><b>PTSD symptoms associated</b> (p&lt;.05) with being female, history of mental health conditions and physical illness, smoking, working in in-patient ward/ITU/emergency department, increased working hours, redeployment, COVID-19 hospital admission (self, friend or family). Protective factors: doctor or nurse, alcohol use, adequate PPE, well-being support at work, no morally uncomfortable changes.</p> |  |
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### Ongoing study

One ongoing study was identified, which began in October 2020. It includes domiciliary care workers and secondary outcome measures to be collected include contacts for mental health and diagnoses.

| Citation  | Study Details   | Participants  | Methods   |
|---|---|---|---|
| <p><a href="#">Lugg-Widger et al. 2021</a><br/>– OSCAR (Outcomes for Social Carers: An Analysis using Routine data) study</p> | <p><b>Study Design:</b> mixed methods comprising cohort study and qualitative interviews.</p> <p><b>Region:</b> Wales</p> <p><b>Study timeline:</b> commenced 28 Oct 2020 and will run for 18 months.</p> | <p><b>Participants:</b> domiciliary care workers (DCWs)</p> | <p><b>Aim:</b> To quantify rates of confirmed COVID-19 infection and key health outcomes to inform service planning and public health policy.</p> <p>Data for all DCWs accessed via the Secure Anonymised Information Linkage (SAIL) Databank.</p> <p><b>Primary outcomes:</b> rate of confirmed COVID-19 in registered DCWs.</p> <p><b>Secondary outcomes to include:</b> contacts for mental health and diagnoses, psychotropic medication and admissions, fit notes.</p> |

**Table 2. Variables found in multivariate analyses to be significantly associated with adverse mental health outcomes in health care workers (two selected studies)**

| Study              | Anxiety (GAD-7)  | Depression (PHQ-9)   | PTSD (IES-R)   | Stress (PSS)   |
|--------------------|--|--|--|--|
| Gilleen 2021       | <p><b>Risk factors:</b></p> <ul style="list-style-type: none"> <li>Female</li> <li>All non-doctor roles (versus doctor)</li> <li>Working outside London</li> <li>Being front line</li> <li>Having a mental health diagnosis</li> <li>Friends or family dying from COVID-19</li> <li>Patients asking if they are going to die</li> <li>Performing resuscitation</li> <li>Insufficient training</li> <li>Extra workload,</li> <li>Insufficient information</li> <li>Thinking not enough is currently being done to reduce risk</li> </ul> <p><b>Protective factors:</b></p> <ul style="list-style-type: none"> <li>Being able to share stress at work</li> <li>Resilience</li> </ul> | <p><b>Risk factors:</b></p> <ul style="list-style-type: none"> <li>Female</li> <li>All non-doctor roles (versus doctor)</li> <li>Working outside London</li> <li>Having a mental health diagnosis</li> <li>Experiencing friends or family dying</li> <li>Patients asking them if they are going to die</li> <li>Performing aftercare for the deceased</li> <li>Extra workload</li> <li>Pressure to work without PPE</li> <li>Insufficient information</li> <li>Perception that not enough had been done to reduce risk</li> </ul> <p><b>Protective factors:</b></p> <ul style="list-style-type: none"> <li>Being able to share stress at work</li> <li>Resilience</li> </ul> | <p><b>Risk factors:</b></p> <ul style="list-style-type: none"> <li>All non-doctor (versus doctor) roles</li> <li>Being a manager</li> <li>Being front-line workers</li> <li>Being from an ethnic minority</li> <li>Existing mental health conditions</li> <li>Experience of all traumatic and stressful events except Aftercare of the deceased</li> <li>Pressure to reuse PPE</li> <li>Insufficient information</li> <li>Perception that not enough was done to reduce risk</li> <li>Greater workload</li> </ul> <p><b>Protective factors:</b> none.</p>                                | <p><b>Risk factors:</b></p> <ul style="list-style-type: none"> <li>Risk factors:</li> <li>Being female</li> <li>Younger (55–64 years versus &lt;25) age</li> <li>All non-doctor roles (versus doctor)</li> <li>Working on the front line</li> <li>Having a mental health diagnosis</li> <li>Insufficient information,</li> <li>Pressure to work without PPE</li> <li>&gt;20% of team members off sick</li> <li>Perception that not enough had been done to reduce risk</li> </ul> <p><b>Protective factors:</b></p> <ul style="list-style-type: none"> <li>Being able to share stress at work</li> <li>Resilience</li> </ul> |
| Study              | Anxiety (PHQ-4)  | Depression (PHQ-4)   | PTSD (IES-R)   |  |
| Wanigasooriya 2020 | <p><b>Risk factors:</b></p> <ul style="list-style-type: none"> <li>Female</li> <li>History of mental health conditions</li> <li>Hospital admission for COVID-19</li> </ul> <p><b>Protective factors:</b></p> <ul style="list-style-type: none"> <li>Doctor or nurse</li> <li>Adequate PPE</li> <li>Well-being support at work</li> <li>No morally uncomfortable changes.</li> </ul>  | <p><b>Risk factors:</b></p> <ul style="list-style-type: none"> <li>History of mental health conditions</li> <li>Smoking</li> <li>Acute general hospital worker.</li> </ul> <p><b>Protective factors:</b></p> <ul style="list-style-type: none"> <li>Alcohol use</li> <li>Adequate PPE</li> <li>Well-being support at work</li> <li>No morally uncomfortable changes.</li> </ul>  | <p><b>Risk factors:</b></p> <ul style="list-style-type: none"> <li>Female</li> <li>History of mental health conditions and physical illness</li> <li>Smoking</li> <li>Working in in-patient ward/ITU/emergency department,</li> <li>Increased working hours</li> <li>Redeployment</li> <li>COVID-19 hospital admission (self, friend or family)</li> </ul> <p><b>Protective factors:</b></p> <ul style="list-style-type: none"> <li>Doctor or nurse</li> <li>Alcohol use</li> <li>Adequate PPE</li> <li>Well-being support at work</li> <li>No morally uncomfortable changes.</li> </ul> | Not applicable   |

## 2.3 Bottom line results

- The evidence is limited to 20 cross sectional studies conducted mostly during or following the first wave of COVID-19; there is a lack of longitudinal data. The included studies provide a snapshot of mental health outcomes taken at the time of the surveys but are susceptible to sampling bias and recall bias. Cross-sectional studies lack the capability of demonstrating causative effects.
- A wide range of prevalence rates of anxiety, depression and PTSD were reported for health and social care workers in the UK during the COVID-19 pandemic, though predominantly in the first wave.
- Most evidence pertains to anxiety and depression with the majority of rates estimated to be between 15% and 47%, suggesting considerable prevalence of these problems. These estimates are based on individuals self-reporting their mental health status (not clinical diagnosis) but often using validated scales.
- Some of the included studies explore associations between demographic and pandemic-related variables and adverse mental health outcomes. There is a high level of complexity with a large number of variables found to be associated with different adverse mental health outcomes, making summary reporting difficult. However, being female, having a pre-existing or prior mental health disorder and having worries about COVID-19 transmission/PPE are frequently reported to be associated with adverse mental health outcomes during the COVID-19 pandemic.
- Only a small volume of data was reported on the mental health of health and social care workers (HSCWs) in ethnic minority groups: two studies sampling NHS trust staff and GPs in Leicestershire had a majority or total sample of ethnic minority respondents. Findings in these studies were not dissimilar to studies with predominantly white respondents.
- There were a limited number of studies which involved social care workers. A single study of specifically social care workers reported high rates of increased depression (60%) and increased tension (81%).

## 3. DISCUSSION

### 3.1 Summary

A wide range of prevalence rates was reported for mental health outcomes in the 20 included UK-based studies (1% to 92%). Anxiety, depression, and PTSD prevalence rates mostly ranged between 15% to 47% in HSCWs using self-reported validated measures. Anxiety and depression were examined by the greatest number of studies (11 and 12 respectively). PTSD, burnout, and stress were examined by fewer studies and a variety of measures was used for each or measures were used in different ways, making the summarising the findings difficult. Other mental health outcomes were considered by only one study, such as problem drinking and insomnia.

Some studies explored factors associated with mental health outcomes. Being female, having a history of or existing mental health problem and concerns about COVID-19 related factors were identified quite frequently, though numerous other associations were also demonstrated. Study quality varied; all studies used self-report measures, some of which

were validated scales and others were bespoke questions. Most studies reported data up until the end of the first wave of the COVID-19 pandemic. All studies were cross sectional; thus, causality cannot be established. One study included two phases, so comparisons were drawn, however the samples did not necessarily include the same participants.

### 3.2 Implications for policy and practice

The evidence from **20 cross-sectional studies** conducted predominantly in the **first wave of the COVID-19 pandemic** suggests that there was **a substantial adverse impact on the mental health of health and social care workers at that time**, which would **likely warrant interventions** to improve mental health amongst health and social care workers. Though it should be noted that whilst clinical thresholds were used within some of the studies to indicate a substantial level of mental health disorder, diagnostic interviews by healthcare professionals were not reported by any of the included studies. Some studies reported that supportive working environments were beneficial.

However, there likely exists no similar body of evidence for the period of the second wave or beyond. A single study (McFadden et al. 2021b) collected data until January 2021 (second wave) and found that at that time, adverse mental health outcomes persisted. Otherwise, **it is not known whether the deterioration in mental health observed during the first wave was sustained or worsened subsequently, nor whether health and social care workers became more resilient**. Other potential impacts such as that of long-COVID affecting HSCWs are also unknown currently.

From December 2020 onwards a national COVID-19 vaccine strategy was implemented, which prioritised health and social care workers. It is not known whether the vaccine Programme had a positive impact on mental health of health and social care workers. Initiation of the vaccine Programme coincided with the worsening second wave of the COVID-19 pandemic, where many hospital patient/care home resident deaths were observed. As of July 2021, there is an increase in cases due to the Delta variant, and it is unknown whether this rise in cases together with the anticipated easing of social and working restrictions in society as a whole, will further impact the NHS and social care. The level of impact of the COVID-19 pandemic on these services will likely have a long tail; many NHS services that were halted during sequential lockdowns will likely be trying to re-start, bringing further changes and potential for stressors on NHS staff.

Therefore, further research is needed on the longitudinal and longer-term mental health impact as well as the severity of the mental health impacts. This could be done by **active and routine monitoring of the mental health of HSCWs**. Routinely collected data, such as in SAIL, could also be examined for mental; health conditions / diagnoses, use of services and treatments (cognitive, pharmaceutical etc.) among HSCWs.

### 3.3 Limitations of the available evidence

All the studies were cross sectional by design which although this enables research to be initiated quickly and report results rapidly, there are limitations. While the studies can demonstrate associations between adverse mental health outcomes and other variables during the pandemic, they **cannot establish causality**. McFadden et al. (2021a, 2001b) compared outcomes between the 2 phases of their survey, but the phases did not necessarily contain the same participants. Cross sectional studies rely upon the willingness of individuals to respond to surveys and there exists the possibility of selection bias in all of

the studies, where respondents may differ from non-responders in important characteristics. It is not possible to conclude to what extent this has occurred.

(For information on limits of survey data see:

<https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366%2820%2930237-6/fulltext>)

The evidence presented in this review mostly relates to the **first wave of the COVID-19** pandemic, extending generally no later than the summer of 2020 i.e. the trough between first and second waves of disease. Other than one study that provided data collected during the second wave there was a lack of substantial data for this period. Our literature search, conducted in May 2021, will not have identified any evidence that may exist on the emerging third wave of COVID-19.

The included studies had **substantial heterogeneity of methods**, particularly concerning how the degree of mental health problems was measured. Also, there was a **lack of clarity on the definition of outcomes**; in particular, the study by Ranka and Ranka (2021) was unclear about what cut offs were used to define anxiety, depression and stress (with the cut-offs being a potential reason for the higher prevalence rates identified in their sample of dentists compared with other studies). Two studies (Gilleen et al. 2021, Wanigasooriya et al. 2020) used the IES-R to measure PTSD, although each used different cut off scores, whereas Ferry et al. (2021) used the IES-R to report on distress, indicating different usage of the scale.

Estimates of prevalence of mental health problems reported in this review are limited to **self-reported measures**. There is also variation in the selection of validated measures used to assess mental health, with several studies using only unvalidated, single item, measures of mental health outcomes.

Three studies may include possible recall bias (Gilleen et al. 2021, Siddiqui et al. 2021, Trivedi et al. 2020) because participants were asked to report how they felt before the onset of the pandemic. This is potentially complex because HSCWs may have reported high anxiety before the pandemic e.g. during winter crises, and some HSCWs may have become desensitised to a state of crisis as the COVID-19 pandemic has evolved.

There is variability among the included studies in terms of the exploration for variables that may be risk factors (or protective factors) for adverse mental health outcomes. Studies used either univariate or multivariate methods, where the latter aims to isolate the effect of a single variable while holding other variables constant. Two studies (Wanigasooriya et al. 2020, Gilleen et al. 2021) were selected which used exhaustive, multivariate methods to try and summarise the strength of association between demographic and pandemic-related variables and the prevalence of mental health problems. However, it is very difficult to see a clear pattern in which demographic and pandemic variables may predict adverse mental health outcomes in HSCWs. Although, across the generality of the included studies it appears to be the case that **female gender, history of/pre-existing mental health disorder and worries about transmission of COVID-19/PPE** appear to be associated with adverse mental health outcomes.

Only a minority of studies was identified (Moorthy et al. 2020, Trivedi et al. 2020) that examined mental health outcomes in HSCWs in **Black, Asian and Minority** ethnic (BAME) groups. Population level data suggest that people with Black or Asian ethnicity represent 10.6% of the general population of England but represent **17.2% of the NHS workforce** in England (NHS Digital, 2021). It is reported widely in the literature and media that people in

BAME groups are highly susceptible to physical harm from COVID-19 (Aldridge et al. 2020, Otu et al. 2020, Trivedi et al. 2020). Two included studies with predominantly participants of white ethnicity, found BAME status to be associated with poorer mental health outcomes (Gilleen et al. 2021, McFadden et al. 2021). However, a large number of variables were also found to be associated with adverse mental health outcomes and these two studies are subject to the heterogeneity discussed above. Two studies that studied majority (Trivedi et al. 2020) or exclusively (Moorthy et al. 2020) BAME samples found that BAME respondents reported results that were not dissimilar to the results of the other included studies. Our small volume of included evidence on ethnic minority HSCWs is **not sufficient to conclude** whether the increased physical risk has translated to increased risk of adverse mental health outcomes compared to white HSCWs.

There were also a limited number of studies which involved social care workers (Greene et al. 2021, Hussein et al. 2021, McFadden et al. 2021).

The quality of reporting within some papers was poor. This resulted in a lack of clarity about what had been done as well as a lack of confidence in the results when inconsistent findings were reported.

### *Moral Injury*

Moral injury can occur when someone engages in (an act of commission), fails to prevent (an act of omission), or witnesses acts that conflict with their values or beliefs. Experiences that may lead to moral injury in healthcare workers include: decisions about whether it is possible to continue life-saving or life-prolonging treatment, or prioritizing treatment of one patient over another. As noted above, if pressures for such decision-making are sustained this may lead to de-sensitisation, and significant impacts.

Moral injury is not a mental health condition, but it can be associated with mental health conditions, notably PTSD, but also depression, stress, poor social adjustment, and low resilience. It has not been a focus of this Rapid Review and we note and acknowledge a briefing paper on moral injury from the Knowledge and Analytic Services (July 2021).

## **3.4 Strengths and limitations of this Rapid Review**

### **3.4.1 Strengths**

To our knowledge this is the first rapid review of the impact of the COVID-19 pandemic on the mental health of HSCWs working in the United Kingdom. Only studies with UK populations were included, thus the findings are more relevant to the Welsh population than many currently published reviews, which include a majority of studies of HSCWs working in non-UK countries, particularly in Asia. However, it should be noted that just under half of the studies included in this review were of a UK-wide workforce and the others were from England or Scotland (or UK region not reported). Also, for at least one study the sample was not entirely UK based; Ferry and colleagues (2021) reported <1% working outside of the UK.

A range of types of HSCWs was included within the samples, including registrants with professional bodies and also non registrants. Samples included staff from social, primary, secondary and tertiary care services.



From the studies included in this review, alongside the prevalence rates for mental health outcomes, it was also possible to report associations between mental health outcomes and pandemic related factors (e.g., female gender, history of/pre-existing mental health disorder and worries about transmission of COVID-19/PPE).

### 3.4.2 Limitations

In order to complete the review in a timely manner COVID-19 specific resources were used including LitCOVID, which is the most comprehensive resource on novel coronavirus. However, it is difficult to say whether further studies would have been identified if traditional bibliographic databases were used to carry out the literature search.

Although qualitative studies were excluded from this review as the focus was on understanding the size of the mental health burden in HCSWs rather than individual experiences, a volume of studies with qualitative outcomes was observed. Qualitative evidence may shed additional light on the experience of HCSWs during the COVID-19 pandemic.

This review was conducted rapidly to inform policy and decision makers, and therefore methods were adjusted as an understanding of the evidence base developed. Initially a rapid review of published systematic reviews was intended but there were insufficient reviews reporting on countries considered to have similar health care systems and social and economic conditions as that of Wales i.e. Europe, North America, Australia and New Zealand. Therefore, the approach was changed to focus on primary studies evaluating the impact of the COVID-19 pandemic on the mental health of health and social care workers (HSCWs) working in UK settings.

In conducting this review rapidly, it should be noted that data extraction and critical appraisal of each study were undertaken by different reviewers and not independently checked for accuracy and consistency.

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## 5. RAPID REVIEW METHODS

### 5.1 Eligibility criteria

Primary studies were selected for inclusion based on the included participants, exposure status and evaluated outcomes. Studies had to be of an observational design (cohort, cross-sectional, or health surveys) reporting prevalence data and published in the English language. Due to the topic and resources searched no date limited needed to be applied.

**Participants:** health and social care workers

**Exposure:** COVID-19 pandemic

**Outcomes:** mental health (mental health; stress; depression; anxiety, PTSD, burnout; wellbeing) NOT moral injury

**Study design:** primary research of any study design.

### 5.2 Literature search strategy

A search was carried out in LitCOVID on 27th May 2021 and updated on 14th June 2021, to identify primary studies of HSCWs based in the UK using the following search string: "Mental health" AND (Wales OR England OR Scotland OR Ireland OR UK) AND (impact OR prevalence) AND (dentist or pharmacist or paramedic or nurse or doctor or worker OR professional or carer). This search retrieved 68 references. Additional studies identified by Wales COVID-19 Evidence Centre members were screened for relevance.

In addition, prior to preparing this review, a Rapid Evidence Summary, as part of the PHASE I rapid evidence review process was initiated (May 2021). A search was carried out in COVID-19 specific repositories (see resource list in Table 3), to identify secondary research using the terms 'systematic review' and/or 'meta-analysis. In total, 53 systematic reviews were identified as relevant based on screening the title and abstracts. After screening the full text, 103 primary studies that were potentially relevant to a UK HSCW population were retained for full text screening.

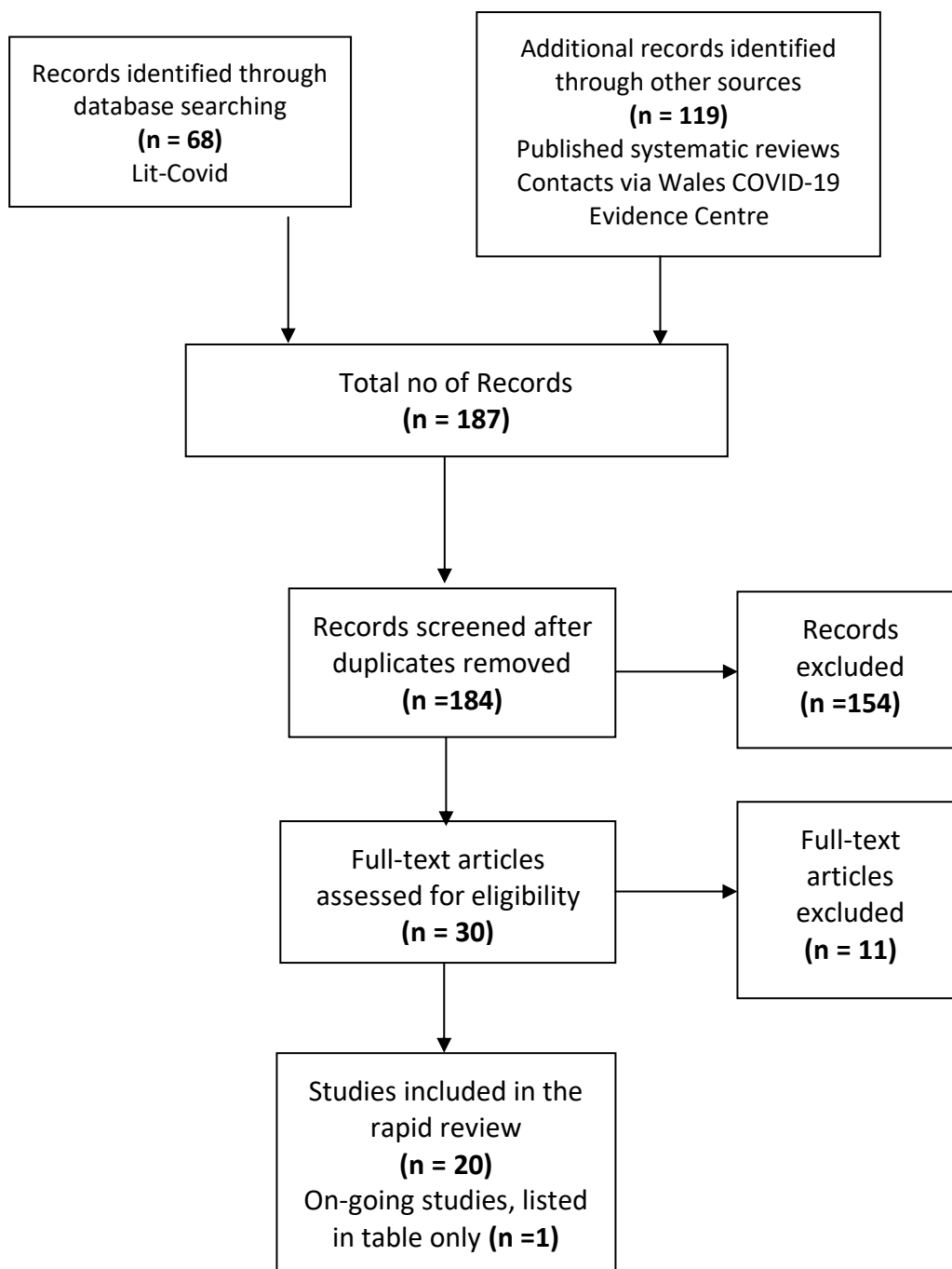
### 5.3 Resources List (Table 3)

| Date       | Resources   |
|------------|---|
| 17/05/2021 | Cochrane COVID Review Bank<br><a href="https://covidreviews.cochrane.org/search/site">https://covidreviews.cochrane.org/search/site</a>                                   |
| 17/05/2021 | Collabovid<br><a href="https://www.collabovid.org/">https://www.collabovid.org/</a>   |
| 17/05/2021 | L*OVE – COVID-19<br><a href="https://app.iloveevidence.com/loves/5e6fdb9669c00e4ac072701d?utm=ai">https://app.iloveevidence.com/loves/5e6fdb9669c00e4ac072701d?utm=ai</a> |
| 17/05/2021 | VA-ESP<br><a href="https://www.covid19reviews.org/index.cfm">https://www.covid19reviews.org/index.cfm</a>   |

### 5.4 Study selection process

Results from the literature searches were imported into EndNote X9, where duplicates were removed. Title and abstracts were screened for inclusion followed by full text screening. Both screening stages were undertaken by a single reviewer against predefined inclusion criteria using a screening tool created in Excel. In cases of uncertainty for full text screening a second reviewer was consulted.

## 5.5 Study selection flow chart



## 5.6 Data extraction

A standardised data extraction table was created and performed by a single reviewer.

The following information was extracted for all studies when reported:

- study citation (author, year of publication)
- study details (study design, geographical region, data collection dates)
- study participants (sample size, type of participant: i.e. doctor, nurse, mixed HSCW etc.)
- study outcomes
- study results (Baseline characteristics etc.)

A notes column was also included to report key study information that was not captured in by any of the above and to record any limitations of the study.

### **5.7 Quality appraisal**

Quality appraisal was carried out by a single reviewer, using the Joanna Briggs Institute Critical Appraisal Tool, Checklist for Analytical Cross-Sectional Studies (Moola et al. 2017). Discrepancies arising during full text review were discussed and agreement reached by reviewers.

### **5.8 Synthesis**

The findings of this review are presented narratively. Data from the included studies are summarized and presented in tables.

## **6. ADDITIONAL INFORMATION**

### **6.1 Information available on request**

Reasons for publications excluded after full text screening, quality appraisal forms of included studies.

### **6.2 Conflicts of interest**

The authors declare they have no conflicts of interest to report.

### **6.3 Acknowledgements**

The authors would like to thank Prof Ann John, Dr Chris Roberts, and Dr Brendan Collins for their contributions during stakeholder meetings to guide the focus of the review and interpret findings. Also, members of the Wales COVID-19 Evidence Centre specifically Professor Adrian Edwards, for providing the list of potentially relevant papers retrieved by Tesni Galvin, whilst carrying out the rapid review on “moral injury” effects on keyworkers of the pandemic. In addition, thanks to Dr Alison Cooper for passing on the primary studies relating to social care workers in the pandemic supplied by Dr Lisa Trigg.

### **6.4 Abbreviations**

|  |
|--|
| AIS=Athens Insomnia Scale; AUDIT=C - Alcohol Use Disorders Identification Test— Consumption; CBI=Copenhagen Burnout Inventory; DP=depersonalisation; EE=emotional exhaustion; ; H&SC=Health and Social Care; GAD=Generalised anxiety disorder; GAD-2=Generalised Anxiety Disorder-2; GAD-7=Generalised Anxiety Disorder-7; IES-R=impact of events scale-revised; IQR=interquartile range; ; ITQ=International Trauma Questionnaire; ITU=intensive treatment unit; MBI=Maslach Burnout Inventory; MDD=major depressive disorder; NFRS=Numerical fear rating scale; NRS=Numeric Rating Scale; PA=personal accomplishment; PCL-6=Post-Traumatic Stress Disorder checklist (civilian version); PHQ-2=Patient health questionnaire-2; PHQ-4=patient health questionnaire-4; PHQ-9=Patient Health Questionnaire-9; PPE=personal protective equipment; PSS=Perceived Stress Scale; PTSD=post-traumatic stress disorder; RS-14=Resilience Scale-14; WEMWBS=Warwick Edinburgh Mental Wellbeing Scale. |
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## 7. ABOUT THE WALES COVID-19 EVIDENCE CENTRE (WC19EC)

The WC19EC integrates with worldwide efforts to synthesise and mobilise knowledge from research.

We operate with a core team as part of [Health and Care Research Wales](#), are hosted in the [Wales Centre for Primary and Emergency Care Research \(PRIME\)](#), and are led by [Professor Adrian Edwards of Cardiff University](#).

The core team of the centre works closely with collaborating partners in [Health Technology Wales](#), [Wales Centre for Evidence-Based Care](#), [Specialist Unit for Review Evidence centre](#), [SAIL Databank](#), [Bangor Institute for Medical & Health Research/ Health and Care Economics Cymru](#), and the [Public Health Wales Observatory](#).

Together we aim to provide around 50 reviews per year, answering the priority questions for policy and practice in Wales as we meet the demands of the pandemic and its impacts.

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