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# The potential impact of COVID-19 on mental health outcomes and the implications for service solutions.

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## Research Question[s]

In the context of infectious disease outbreaks requiring community or population-level quarantine and / or social isolation, we aim to answer the following:

**RQ1**. What is the impact of such outbreaks on the prevalence of mental health conditions within the general population and across healthcare workers?

**RQ2**. What community and population-level approaches have been taken to prevent and address the increased levels of mental health conditions following such outbreaks?

## Verdict

**All conclusions should be interpreted cautiously due to contextual factors, methodological differences, mental health outcomes assessed, and the lack of effectiveness data (for RQ2).**

**For RQ1**:
- The evidence suggests that an increase in the prevalence of mental health conditions is likely during, and immediately after, the COVID-19 outbreak. However, amongst the general population, this increase subsided after quarantine measures are lifted.
- Healthcare workers are at greater risk of adverse mental health outcomes, particularly those who are frontline staff, who in "high-risk" units, or have been re-deployed to "high-risk" units from other departments.
- Several other groups also appear at risk: 1) those with chronic physical and mental health conditions, 2) children and parents, 3) those who have lost a family member, 4) those with

lower levels of education, 5) those who perceive themselves to be at risk, and 6) those who live in outbreak hotspots.

**For RQ2**:
- The general public may automatically adopt behaviours which are protective of their mental health. For example, seeking peer, family and community support.
- Efforts should be taken to avoid / reduce COVID-related stigma – for those who have contracted the virus and for healthcare workers.
- Screening should be used, initially targeted at groups thought to be at greater risk, to determine the tier of support required.
- Most recommendations point towards the use of online, or remote, services and resources (e.g. hotlines, apps, accurate and up-to-date information) to support at-risk groups and the general population.
- A specific set of recommendations are provided for the prevention and treatment of mental health conditions in healthcare workers.

# What does the evidence say?

## Summary of searches

We iteratively searched the evidence base for the purpose of this review. We initially searched for relevant articles using the COVID-related databases listed in Table 4. For all searches, we used the following search terms: "mental health", "wellbeing", and "psychological impact" (or a derivative of, e.g. psychol*). No criteria were set for the publication date. All potentially relevant articles were collated into a list, and after removing for duplicates, 60 remained. To prioritise our resources, given the rapid nature of this request, we searched this article list for systematic reviews. We identified four reviews which focused on mental health outcomes following quarantine because of an infectious disease outbreak (e.g. SARS, MERS, Ebola, H1N1). Of the four reviews identified, two were deemed useful for the purpose of answering the research questions[1][2]. Data were extracted independently by two reviewers (JN and FM). Of these reviews, Brooks, et al. [1], asked very similar questions to ours and whose search was up-to-date as of early 2020. We therefore cross-referenced the studies included in their review to identify other systematic reviews in which they may also have been referenced. Through this method, we identified a further two reviews, one of which was extracted[3]. Thus, a total of three reviews were extracted for the purpose of this work (see Table 1).

However, given that these reviews focused on previous infectious disease outbreaks, we decided to screen the remaining 56 articles for primary evidence on the mental health impacts of the COVID-19 outbreak. The studies were grouped according to the research question they would help to answer. One researcher screened and extracted data from studies related to RQ1 (JN), whilst the second researcher screened and extracted data from studies linked to RQ2 (FM). Empirical studies only were included for RQ1, whilst commentary-style articles[1] were also included for RQ2 to provide potentially useful insights about how other countries may be seeking to prevent and address mental health issues within their populations.

*Inclusion*: Studies were included based on the following: 1) published in a peer-reviewed journal, 2) written in English language, and 3) focused on mental health outcomes in response to population-level quarantine, social distancing, or isolation.

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[1] Included commentaries, letters to the editor, editorials, and correspondence articles.

*Exclusion*: Studies were excluded if they focused on the impact of individual-level quarantine (i.e. source isolation within hospital settings).

## Number of included studies/reviews (number of participants)

For the purpose of RQ1, we extracted data from three systematic reviews (which focused on previous outbreaks) and 11 primary studies (which focused on the COVID-19 outbreak) – see Tables 1 and 2. For RQ2, we extracted data from three systematic reviews, five primary studies, 25 commentary-style articles and one review report – see Table 1 and 3. Of the systematic reviews, Brooks, et al. [1] assessed the psychological impact of quarantine during infectious disease outbreaks (published 2020), Chew, et al. [2] assessed the psychological and coping responses of the general public in response to infectious disease outbreaks (published 2020), and Brooks, et al. [3] reviewed the occupational and social factors associated with mental health outcomes in healthcare staff during the SARS outbreak (published 2018).

The primary evidence base was largely concerned with the short-term impacts of the COVID-19 outbreak on various mental health outcomes – mostly relevant for RQ1. Studies largely provided estimates around the prevalence of mental health conditions within general and specific populations, and also provided information about population sub-groups deemed to be at risk of poorer mental health outcomes. Few studies assessed the impact of primary, secondary or tertiary prevention approaches to community and population wide mental health outcomes, hence why we relied on the information ascertained from commentary-style articles.

## Main findings

**RQ1: What is the impact of such outbreaks on the prevalence of mental health conditions within the general population and across healthcare workers?**

*Evidence from systematic reviews on previous outbreaks (n=3 reviews)*
**Prevalence** | Evidence from the systematic reviews (Table 1) suggest that there will likely be a negative psychological impact during, and immediately after, quarantine periods amongst the general population. The review of Chew, et al. [2] reported rates of anxiety and / or fear in 3.2-12.6% of the samples surveyed following quarantine. However, where there is evidence, these impacts have shown to subside over time. Longer-term data were limited. Given that no baseline data were provided, it is not possible to determine the change in prevalence, before and after the infectious disease outbreak. Mental health outcomes (or symptoms of) often assessed included: Post-Traumatic Stress Symptoms (PTSS), Post-Traumatic Stress Disorder (PTSD), anxiety, depression, stress, distress, anger and irritability.

**At-risk groups** | Several population subgroups are at higher risk of adverse psychological impacts. Healthcare workers appear to be at greatest risk, and in particular, those directly working in patient care, those working in "high-risk" units[2] (especially nurses), and those re-deployed to help in "high-risk" units (i.e. those who do not have formal training or experience of critical care units). Psychological impacts on healthcare workers may be more severe than general public and persist over longer durations (up to 3 years reported). Other at-risk groups include: 1) children and parents, 2) those with a history of psychiatric illness, 3) those with a chronic illness, 4) those who have lost a family member, and 5) those with lower levels of education. Additional factors which appear to influence mental health status are the duration of the quarantine period and associated financial losses incurred as a result of government "lockdowns".

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[2] Defined as environments which are exposed to a high viral load.

*Evidence from primary research on COVID-19 (n=11 studies)*

**General population** | Six studies assessed the impact of COVID on the mental health status of the general population[4-9], although each used a different measure to quantify prevalence within their sample. Liu, et al. [5] found that 7% of their sample met the criteria for PTSS (via PCL-5 scale), Zhang and Ma [8] found 7.6% of respondents to have moderate-to-severe psychological impact (via IES-R scale), whilst Wang, et al. [6] found that 53.8% of the population had moderate-to-severe psychological impact (via DASS-19 scale). Those who 1) perceived themselves to be at-risk, 2) had a lower perceived health status, or 3) lived in COVID hotspots were deemed at greater risk of poorer mental health outcomes. Students were also reported to be at risk of stress and anxiety in two studies[6 9] – hypothesised to be because of the anticipated impact on their academic progress and grades. Findings were inconsistent regarding other demographic risk factors for psychological impact (e.g. gender).

**Healthcare workers** | Five studies examined the psychological impact of the COVID-19 pandemic on healthcare workers [10-14], again, all of which used different measures (Table 2). Amongst the larger of the studies[11-13], levels of moderate anxiety ranged from 22.6%[13] to 44.6%[12], and severe anxiety from 2.9%[13] to 5.3%[12]. Lai, et al. [12] also found that 50.4% [6.2%], 34.0% [1%], and 71.5% [10.5%] had symptoms of moderate [or severe] depression, insomnia and distress respectively. Using a composite measure for mental health disturbances, Kang, et al. [11] found 34% of healthcare workers had a mild disturbances, 22% had moderate disturbances, and 6.2% had severe disturbances. Moreover, Kang, et al. [11] went on to report that 17.5% of those surveyed had accessed group-based, psychological counselling (see Table 2 for further information). Within the healthcare workforce, those who were 1) frontline staff, 2) nurses, or were 3) worried about contracting the virus, often experienced more adverse psychological impacts. Two studies also found that those who believed there to be a shortage of personal protective equipment also had poorer outcomes[10 13].

The incidence of suicide following infectious disease outbreaks was not mentioned within the primary reviewed evidence, although this may in part be due to the search terms used. Our study team knows of two studies which have researched the incidence of suicide during the SARS outbreak[15 16].

**RQ2: What community and population level approaches have been taken to prevent and address the increased levels of mental health conditions following such outbreaks?**

Studies reporting data on the effectiveness of community and population-level approaches were largely absent. The information summarised below comes predominantly from commentary-style articles (Table 3) and from the recommendations of the systematic reviews (Table 1). Figure 1 demonstrates the types of interventions that may be offered to support the general population and "at-risk" groups with their mental health (based upon recommendations of the reviewed articles, not evidence of effectiveness). Further information related to Figure 1 is available in appendix I.

**Primary prevention** | Learning from other countries, general populations appear to have somewhat spontaneously used problem solving, distraction, social support, positive reappraisal, and sought online support to help alleviate negative cognitions[2 17]. Bo, et al. [18] have also suggested that people may have a positive attitude towards using mental health services during this time[18]. Given the impact that stigma had on people who contracted previous infectious diseases (e.g. SARS, Ebola), working to avoid / reduce COVID-related stigma may help to ensure services are sought when needed[1 19 20], and may also lessen the population mental health impacts. Ensuring that there is clear communication about the outbreak might also reduce stigma, and should therefore help to reduce uncertainty and fear amongst the public [19 21]. Lastly, given that healthcare workers are a particular at-risk group, preventative measures for their mental health may include: 1) online courses, 2) group stress relieving activities, 3) the provision of rest space, 4) brief advice on moral injury, 5) proactive support, role

modelling, and gratitude from leadership, 6) regular screening of staff mental health, and 7) work to reduce the stigma around mental health amongst healthcare workers[11 22-27].

Several additional suggestions are made in Figure 1 and in appendix I on approaches to lessen the impact of COVID-19 on the general population. These suggestions include 1) the provision of online psychological support resources, 2) the promotion of peer and community support groups, and 3) mass online information and resources about mental health and coping strategies.

**Secondary and tertiary prevention** | Services should be prioritised for those at high risk[6 17 28] (refer to answers to RQ1 for potential at-risk groups). As a first step, having the ability to screen the severity of mental health signs and symptoms should enable people to access the correct tier of support – resources for screening could be directed at groups known to be at elevated risk (e.g. frontline workers, re-deployed staff, those with chronic physical and mental health conditions). When accessing services, the mode of delivery may need to be adjusted considering the ongoing social distancing restrictions and due to likely increased demand. Much of the evidence – and indeed the potential interventions included in Figure 1 – highlight the importance of tele-services, online services, app-based services and the use of hotlines (e.g. for psychological counselling or support). It may be necessary to subsidise access to data and technology to ensure lack of wealth does not preclude access to intervention [29]. Whilst the demand for services may increase during this outbreak, all interventions should be capable of tailoring to individual needs[29]. For healthcare workers in particular, Cullen, et al. [30] suggests that they receive support promptly due to their elevated risk status. Supportive services for healthcare workers may include 1) a planned psychological intervention team, 2) therapist-led sessions, 3) access to a hotline for psychological assistance, and 4) access to a peer support team who have received psychological first aid training. Finally, for all groups who may be at-risk, social contact and peer support should be promoted. As the pandemic develops, it will be vital to continue to monitor and review plans for accessing support services [31].
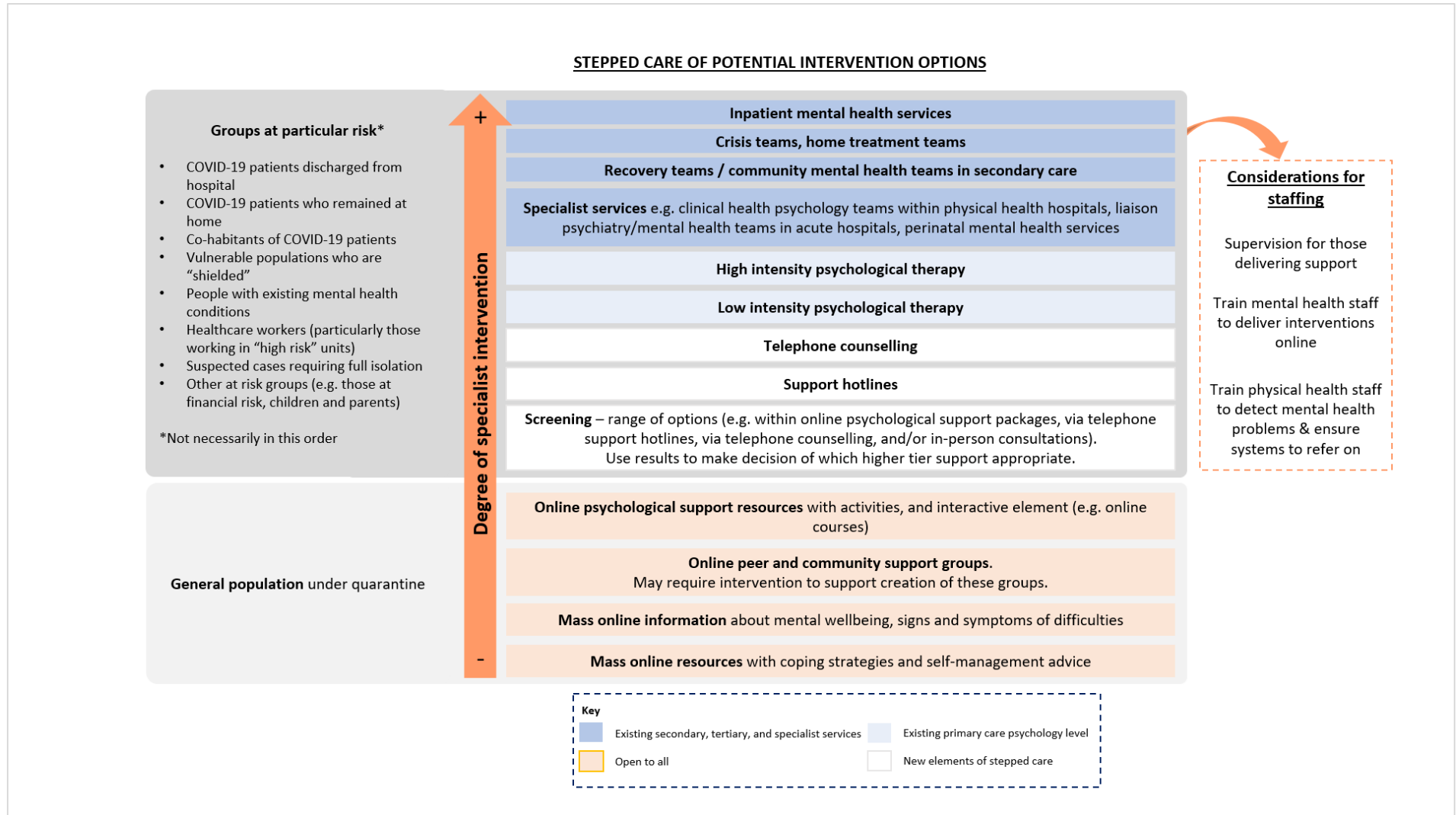
**STEPPED CARE OF POTENTIAL INTERVENTION OPTIONS**

**Groups at particular risk***

- COVID-19 patients discharged from hospital
- COVID-19 patients who remained at home
- Co-habitants of COVID-19 patients
- Vulnerable populations who are "shielded"
- People with existing mental health conditions
- Healthcare workers (particularly those working in "high risk" units)
- Suspected cases requiring full isolation
- Other at risk groups (e.g. those at financial risk, children and parents)

*Not necessarily in this order

**Degree of specialist intervention**

+

**Inpatient mental health services**

**Crisis teams, home treatment teams**

**Recovery teams / community mental health teams in secondary care**

**Specialist services** e.g. clinical health psychology teams within physical health hospitals, liaison psychiatry/mental health teams in acute hospitals, perinatal mental health services

**High intensity psychological therapy**

**Low intensity psychological therapy**

**Telephone counselling**

**Support hotlines**

**Screening** – range of options (e.g. within online psychological support packages, via telephone support hotlines, via telephone counselling, and/or in-person consultations). Use results to make decision of which higher tier support appropriate.

**General population** under quarantine

**Online psychological support resources** with activities, and interactive element (e.g. online courses)

**Online peer and community support groups.** May require intervention to support creation of these groups.

**Mass online information** about mental wellbeing, signs and symptoms of difficulties

**Mass online resources** with coping strategies and self-management advice

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**Considerations for staffing**

Supervision for those delivering support

Train mental health staff to deliver interventions online

Train physical health staff to detect mental health problems & ensure systems to refer on

**Key**

| | |
|---|---|
| ■ Existing secondary, tertiary, and specialist services | ■ Existing primary care psychology level |
| ▢ Open to all | ▢ New elements of stepped care |

**Figure 1: Potential intervention options (based upon the reviewed literature)**

## Strength of the evidence

There are several broad considerations which should be accounted for when interpreting this rapid evidence review.

1) **Contextual factors** should strongly be considered and lessons from the evolving situations in China and Italy (for example) may not apply in a UK context. The approach and response to quarantine, social distancing and isolation will differ notably between populations.

2) Most of the primary studies collected data **during the COVID outbreak** and did so using **online surveys**.

3) Many authors highlighted that their **samples were not representative** of the population (often many had a higher percentage of female respondents), and the results should be cautiously interpreted.

4) Seldom did these studies **did not assess the longer-term impacts** on mental health outcomes and did not have baseline data by which to compare against.

5) The **mental health outcomes varied** between the included studies, as did the survey measures used to quantify them. This was also the case within the systematic reviews, which synthesised studies with a high degree of heterogeneity.

6) We identified little effectiveness data to help answer RQ2, and we mostly **drew upon commentary-style articles**. As such, the recommendations from RQ2 should be cautiously interpreted given the lack of supportive evidence.

7) With regards to the systematic reviews and the evidence related to previous outbreaks, it is important to note that the **psychological impact will differ between outbreaks** due to infection rates, mortality rates, and the approaches taken to manage the spread of the diseases.


## Additional Research

Appendix II highlights several research projects that are planned around the mental health impacts of COVID-19.


**Date question received:**  6th April 2020
**Date searches conducted:**  8th and 9th April 2020
**Date answer completed:**  15th April 2020

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## Disclaimer

This report has not been peer-reviewed; it should not replace individual clinical judgement and the sources cited should be checked. The views expressed in this report represent the views of the authors and not necessarily those of the University of Bristol, the NHS, the NIHR, or the Department of Health and Social Care. The views are not a substitute for professional medical advice.

## Systematic Reviews

**Table 1: Summary of findings from systematic reviews**

| Author (year) and search date | Number of included studies and inclusion criteria | Summary of results |
|---|---|---|
| **Brooks, et al.** [1]<br><br>February 2020 | *Included studies*: 24<br><br>*Populations*:<br>• Any population subject to quarantine or isolation for at least 24 hours due to infectious disease outbreak.<br><br>*Infectious diseases*:<br>• SARS (11 studies)<br>• Ebola (5 studies)<br>• H1N1 (3 studies)<br>• MERS (2 studies)<br>• Equine influenza (1 study)<br><br>*Exclusion criteria*: Quarantine within hospital wards only. | **RQ1: Impact on MH outcomes**<br>*General public*<br>• During quarantine, 7% (126 of 1656) showed *anxiety* symptoms and 17% (275) showed feelings of *anger*, whereas 4–6 months after quarantine, these symptoms had reduced to 3% (anxiety) and 6% (anger). (South Korea, MERS, *n*=1656 people surveyed).<br><br>*Children and Parents*<br>• Mean *PTSS* scores were four times higher in children who had been quarantined vs. those not. (USA & Canada, H1N1 or SARS, *n*=398 parents surveyed).<br>• 28% (27 of 98) of parents quarantined in this study reported sufficient symptoms to warrant a diagnosis of a *trauma-related mental health disorder*, compared with 6% (17 of 299) of parents who were not quarantined. (USA & Canada, H1N1 or SARS, *n*=398 parents surveyed).<br><br>*Healthcare workers*<br>• 9 days after SARS quarantine period, having been quarantined was most predictive factor of developing *ASD* symptoms. (Taiwan, SARS, *n*=338 staff surveyed).<br>• Having been quarantined was a predictor *PTSS* three years later. (China, SARS, *n*=549 staff surveyed).<br>  ○ 9% of hospital staff reported high depressive symptoms three years following SARS quarantine. Of this group, almost 60% had been quarantined.<br>  ○ Having been quarantined was positively associated with alcohol abuse, dependency symptoms, and avoidance behaviours after 3 years of being quarantined.<br>• Healthcare workers who had been quarantined had more severe symptoms of *PTSS* than members of the general public. (Canada, SARS, 1057 people surveyed).<br>  ○ Healthcare workers also felt greater stigmatisation than the general public, exhibited more avoidance behaviours after quarantine, reported greater lost income, and were consistently more affected psychologically:<br><br>*Undergraduate students*<br>• No difference in *PTSS* or *general MH* between students who had been quarantined and those who had not. (China, H1N1, *n*=419 students surveyed).<br><br>*People with a history of psychiatric illness* |

| Author (year) and search date | Number of included studies and inclusion criteria | Summary of results |
|---|---|---|
| | | • Associated with *anxiety* and *anger*, 4-6 months post quarantine. (South Korea, MERS, 1656 residents).<br><br>Other factors to consider, which may influence MH outcomes after quarantine:<br>• Duration of the quarantine: longer durations often led to poorer MH outcomes.<br>• Financial loss: Financial loss due to quarantine was a risk factor for psychological disorders for several months following quarantine, particularly for those on lower incomes.<br>• Stigma: Was often problematic for individuals who have been quarantined where the general public have not been. May also be more a more prevalent issue for healthcare workers.<br><br>**RQ2: Approaches to prevent and address MH outcomes**<br>*Preventative*<br>• Timely financial support and reimbursement, particularly for those who are / were in low paid jobs.<br>• Adequate support from managers of health care staff, both from a preventative and treatment perspective.<br>• Provision of information during quarantine, particularly on the nature of the disease and reasoning for quarantine.<br>• Telephone support lines: A telephone support line, staffed by psychiatric nurses, set up specifically for those in quarantine could be effective in terms of providing them with a social network. (Canada, SARS, observational study).<br>• Maintenance of social support via social media. Ensuring people have access to phones, computers and WiFi.<br>• For quarantined healthcare workers, organisational support has been found protective of mental health. Ensure colleagues are supportive of quarantined workers. |
| Chew, et al. [2]<br><br>April 2020 | *Included studies*: 24<br><br>*Populations*:<br>• General population.<br><br>*Infectious diseases*:<br>• SARS (18 studies)<br>• Ebola (4 studies)<br>• H1N1 (2 studies)<br><br>*Exclusion criteria*: Non-empirical studies, non-English language, published outside of last 20 years. | **RQ1: Impact on MH outcomes**<br>*General public*<br>• Across 15 studies, rates of *anxiety* and / or fear ranges between 3.2% and 12.6% of population studied. Inclusive of SARS, H1N1, and Ebola-related studies.<br>• 60% of Taiwanese sample worried about recurrence of SARS. 3.2% were in criteria of psychologically distressed due to *depression*. (Taiwan, SARS, 1278 people surveyed).<br>• *Depressive symptoms* ranged from 3-73% across eight studies in the general population.<br>   o In Hongkong, 73.1% of Hong Kong residents staying at the epicentre of the outbreak reported more than two weeks of low mood following the outbreak. (Hong Kong, SARS, 903 people surveyed).<br>• Across five SARS studies, feelings of *anger* and *irritability* ranges from 2.3% to 56.7% of the sample.<br>• Nearly 26% of the public (who visited community health care centre) reported high-levels of *PTSS* (Singapore, SARS, 415 people surveyed).<br>• Across 12 studies, levels of stigmatisation, abandonment, and isolation ranged from 9.7%-48.7% in the general public (SARS, H1N1, and Ebola related). |

| Author (year) and search date | Number of included studies and inclusion criteria | Summary of results |
|---|---|---|
| | | • Some positive changes were reported across five studies, including post-traumatic growth, self-empowerment, increased compassion and empathy.<br><br>*Survivors*<br>• 7.3% of SARS survivors, one month after recovery, reported severe anxiety. (China, SARS, 100 SARS survivors surveyed)<br><br>*Longitudinal impacts*<br>• Negative cognitions and emotional responses (linked to depression) declined over time.<br><br>*Potential at-risk groups of psychiatric distress:*<br>• Healthcare workers<br>• Those with a chronic illness<br>• Those who have lost family members<br>• Those with lower levels of education<br>• Those with a fear of a recurrent outbreak, contracting the disease, or a family member contracting the disease.<br><br>**RQ2: Approaches to prevent and address MH outcomes**<br>Based on their conclusions, several recommendations for COVID are made:<br>• Make people aware of the potential detrimental impacts on mental health.<br>• Linked to the above, this would then facilitate earlier identification of people with prolonged, or intensive, symptoms.<br>• Need to ensure MH support services are still available for those with pre-existing MH illness.<br>• Encourage adaptive coping responses across populations, such as self-care, rest, spending time with loved ones, and recreational activities or upskilling.<br>• Empower peer and community support groups, and promote social behaviours such as use of social media and communication technologies.<br>• Ensure access to updated, verifiable information about the outbreak, especially in light of subjective reporting and the ubiquity of social media. |
| **Brooks, et al.** [3]<br><br>March 2018 | *Included studies*: 22<br><br>*Populations*:<br>• Healthcare workers<br><br>*Infectious disease*: | **RQ1: Impact on MH outcomes**<br><br>*Occupational risk / protective factors*<br>• *Risk*: Those more directly involved in patient care tended to have poorer MH outcomes – particularly nurses. Outcomes include: PTSD, stress, common MH disorders, and distress. |

| Author (year) and search date | Number of included studies and inclusion criteria | Summary of results |
|---|---|---|
| | • SARS (22 studies)<br><br>*Exclusion criteria*:<br>• Non-empirical studies, non-English language, not focused on occupational or social risk factors affecting psych wellbeing. | • *Risk*: Those with poorer training in infection control more likely to experience burnout, PTSS, and continued poorer MH. Similarly, those who may be redeployed to work with SARS patients at higher risk (i.e. conscripts). These conscripts had poorer MH outcomes than those volunteering to work in high-risk units.<br>• *Risk*: Working in "high-risk" units linked to poorer MH outcomes (PTSS, anxiety, depression, fatigue, worry of infecting others), and maladaptive responses (e.g. alcohol consumption). Often defined as environments with greater exposure to virus.<br>• *Risk*: Being quarantined most strongly associated with acute stress disorder, PTSS, and higher alcohol intake. Also linked to feelings of being stigmatised, a reluctance to work, and a deterioration of work performance.<br>• *Risk*: Job-related stressors, such as not being able to do one's job properly, a lack of control over work, & workload, were linked to poorer MH outcomes.<br>• *Risk*: Perceptions of safety, threat and risk all predictive of poorer MH outcomes. Duration of risk exposure linked to number of adverse outcomes.<br>• *Protective*: specialised training (e.g. in infection control) or previous experience in crises working.<br>• *Protective*: Feeling that safety equipment and procedures were adequate and sufficiently protective.<br><br>*Social risk / protective factors*<br>• *Risk*: Poor organisational support associated with avoidance behaviour and state anger in nurses. Particularly, lack of psychological support, frontline staff feedback not reaching administrators, and poor sense of team spirit.<br>• *Risk*: Healthcare workers feeling like friends / neighbours avoiding them (due to their work) associated with poorer outcomes on IES-R scale. Similarly too with discrimination.<br>• *Protective*: Greater levels of family support reduced MH outcomes and anxiety.<br><br>**RQ2: Approaches to prevent and address MH outcomes**<br>Based on their conclusions, several recommendations are put forward for future infectious disease outbreaks:<br>• Provide specialised training for healthcare workers on how to operate in challenging conditions such as these.<br>• Managers should ensure they are approachable and supportive, and also promote the interrelationships between colleagues.<br>• Ensure that there is adequate, and up-to-date, information shared with healthcare workers about the outbreak.<br>• Managers to ensure employees are prepared for negative experiences (e.g. isolation and discrimination).<br>• Ensure educational interventions are available to address psychological distress and to help develop individual coping strategies. Similarly, highlight some of the positive outcomes that can arise in crisis situations.<br>• Setting up web-based support to reduce feelings of social isolation. |

ASD: Acute Stress Disorder, IES-R: Impact of Event Scale Revised. MERS: Middle East Respiratory Syndrome, MH: Mental Health, PTSS: Post-Traumatic Stress Symptoms, SARS: Severe Acute Respiratory Syndrome.

## Primary studies for RQ1

**Table 2: Summary of findings from primary studies for RQ1**

| Author (year) and article type | Population groups and country | Methods | Summary of findings |
|---|---|---|---|
| **Cao, et al.** [9]<br><br>Original article | College students<br><br>China | Cross-sectional survey of 7143 undergraduate students of Changzhi medical college. 67% female. 99.5% had no relatives with COVID-19.<br><br>Surveyed socio-demographics, generalised anxiety (via GAD-7), cognitions and preventative behaviours, and available social support. | **Prevalence**<br>• 24.9% of students had mild (21.3%), moderate (2.7%) to severe (0.9%) symptoms of anxiety.<br>**At-risk**<br>• Those with a relative who has COVID-19.<br>**Protective factors**<br>• Those in urban areas, 2) with stable family income, and 3) living with parents.<br>**Stressors**<br>• Worry about economic influences, worry about academic delays, influence on daily life, and social support. |
| **Chung and Yeung** [10]<br><br>Short article | Hospital staff<br><br>Hong Kong | Online mental health self-assessment questionnaire for all hospital staff using PHQ-9 questions. Data gathered in Feb 2020.<br><br>69 staff completed assessment (of 8418 invited). 24 nurses, 23 admin staff, 8 healthcare assistants, 6 AHPs, 3 doctors, 2 management staff, and 3 defined as other. | **Prevalence**<br>• 34.8% of respondents had mild depression, 14.5% of respondents had moderate depression.<br>**Stressors**<br>• Sufficiency of PPE, and being infected with COVID-19. |
| **Kang, et al.** [11]<br><br>Original article | Hospital staff<br><br>Wuhan, China | Cross-sectional survey of 994 hospital staff. 183 doctors, and 811 nurses. 31.1% in high-risk departments. 85% female. Survey online 29th Jan to 4th Feb 2020.<br><br>Six-part questionnaire: socio-demographics, mental health assessment (PHQ-9, GAD-7, ISI, and IES-R), exposure to COVID, MH services accessed, psychological care needs, and perceived health status before COVID. | **Prevalence**<br>• 34% had mild MH disturbances (composite of PHQ-9, GAD-7, ISI, and IES-R), 22% had moderate disturbances, and 6.2% had severe disturbances.<br>• 53-73% of those with moderate to severe MH disturbances stated that their health was worse or much worse following COVID outbreak.<br>• No demographic differences between clusters.<br>**At-risk**<br>• Those who are exposed to people with COVID-19. Confirmed via SEM.<br>• Those who had severe MH disturbances were less likely to have accessed MH support information. Confirmed via SEM.<br>**Accessing MH services**<br>• 17.5% participated in group psychological counselling.<br>• Those with higher MH disturbances wanted more likely want access to psychotherapists and psychiatrists. |

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| | | | • Those with mild and moderate disturbances were likely to access self-help resources. |
| **Lai, et al. [12]**<br><br>Original article | Hospital staff<br><br>China (Wuhan, Hubei province, & outside Hubei province) | Cross sectional survey of 1257 healthcare workers (39% physicians, 61% nurses), across 34 hospitals. 1830 asked to complete survey (69% completion rate). 76% female. Survey online 29th Jan to 3rd Feb 2020.<br><br>Three-part questionnaire: socio-demographics, mental health assessment (PHQ-9, GAD-7, ISI, and IES-R), and exposure to COVID. | **Prevalence**<br>• A considerable proportion of participants had symptoms of depression (634 [50.4%]), anxiety (560 [44.6%]), insomnia (427 [34.0%]), and distress (899 [71.5%]).<br>• Severe symptoms of depression (78 [6.2%]), anxiety (66 [5.3%]), insomnia (12 [1%]), and distress (132 [10.5%])<br>**At-risk**<br>• 1) Nurses, 2) women, 3) frontline staff, 4) those in Wuhan, and 5) those working in secondary hospitals. |
| **Li, et al. [7]**<br><br>Original article | General population<br><br>China | Analysis of 17,865 active Weibo users posts via use of Online Ecological Recognition. Assessment conducted before and after to COVID-19 being declared (20th Jan 2020).<br><br>Assessed emotional indicators (anxiety, depression, and indignation) and cognitive indicators (social risk judgement and life satisfaction). | **Prevalence**<br>• Emotional indicators: anxiety, depression and indignation all worsened marginally following COVID declaration.<br>• Cognitive indicators: social risk judgement and life satisfaction all decreased marginally following COVID declaration. |
| **Li, et al. [4]**<br><br>Short article | General population and hospital workers<br><br>China | Cross-sectional survey of 214 members of the general public and 526 nurses (*n*=234 frontline nurses). Survey available 17th Feb to 21st Feb 2020.<br><br>Assessment of vicarious traumatisation (i.e. indirectly induced trauma) via the vicarious traumatisation questionnaire (includes physiological and psychological response domains). | **Prevalence**<br>• Vicarious traumatisation scores were higher amongst the general public (mean score: 75.5, 95%CI: 62.0-88.3) and non-frontline nurses (mean score: 75.5, 95%CI: 63.0-92.0) in contrast to frontline workers (mean score: 64.0, 95%CI: 52.0-75.0). |
| **Liu, et al. [5]**<br><br>Original article | General population<br><br>Hubei Province, China | Cross-sectional survey of 285 residents (of 300 invited). Completed between 30th Jan and 8th Feb 2020.<br><br>Measures included socio-demographics, contact frequency with COVID-19 patients, sleep quality (PSQI), quarantine status and exercise. Measurement of PTSS assessed by the PTSD checklist (PCL-5). | **Prevalence**<br>• 7% of participants met the criteria for PTSS.<br>**At-risk**<br>• The following groups scored higher on PTSS: 1) women, 2) those living [or had lived in] Wuhan, 3) populations more susceptible to infection, and 4) those with poorer sleep quality. |

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| **Lu, et al.** [13]<br><br>Original article | Hospital staff<br><br>China | Total population survey of 2042 medical staff and 257 administrative staff (all from one hospital). Medical staff 77.9% female, administrative staff 75.5% female. Survey online 25th Feb to 26th Feb 2020.<br><br>Survey assessed socio-demographics, and fear, anxiety, depression (via HAMA and HAMD). | **Prevalence**<br><ul><li>70.6% of medical staff had moderate to severe levels of fear (in contrast to 58.4% of admin staff). 22.6% had mild to moderate anxiety (17.1% in admin staff), and 2.9% had severe anxiety (2.9% in admin staff). No meaningful differences between medical and administrative staff regarding depression (11.8% vs. 8.2%).</li></ul>**At-risk**<br><ul><li>1) Working in the isolation ward or other high-risk areas, 2) worry of infection, 3) shortage of PPE, 4) perception that epidemic would not be controlled, 5) unsatisfactory results, and 6) feelings of isolation.</li></ul> |
| **Tan, et al.** [14]<br><br>Short article | Hospital staff<br><br>Singapore | Cross-sectional survey of 470 healthcare workers (500 invited) in Singapore. 28.7% physicians, 34.3% nurses, and 37% non-medical staff. 68.3% female. Data collected between 19th Feb and 13th March 2020.<br><br>Survey assessed socio-demographics, depression, anxiety, and stress (DASS-21), and the Impact of Events Scales (IES-R). | **Prevalence**<br><ul><li>14.5% screened positively for anxiety, 8.9% for depression, 6.6% for stress, and 7.7% for clinical concern of PTSD.</li></ul>**At-risk**<br><ul><li>Non-medical staff had a higher prevalence of anxiety (20.7% vs. 10.8%) and mean IES-R scores – both accounted for potential confounders.</li></ul> |
| **Wang, et al.** [6]<br><br>Original article | General population<br><br>China | Cross-sectional survey of 1210 people from 194 cities in China. Survey online 31st Jan to 2nd Feb 2020. 67.4% female. Most respondents spent 20-24hours per day at home (84.7%). 1% had been in contact with someone who had suspected COVID-19.<br><br>Survey assessed socio-demographics, physical symptoms of COVID-19, precautionary measures against COVID-19, and additional information about COVID-19, Impact of Events (IES-R), and mental health status (DASS-19). | **Prevalence**<br><ul><li>53.8% of the population reported moderate to severe psychological impact (across all domains): symptoms of depression (16.5%), anxiety (28.8%), or stress (8.1%).</li><li>75.2% were worried or very worried about their family member's contracting COVID-19.</li></ul>**At-risk**<br><ul><li>Deemed at-risk via the IES-R scale: females, students, a history of chronic illness, poorer perceived health status, low perceived likelihood of contracting COVID-19.</li><li>Deemed at-risk via DASS *depression* sub-scale: males, lower levels of education, a history of chronic illness, poorer perceived health status, high perceived likelihood of contracting COVID-19.</li><li>Deemed at-risk via DASS *anxiety* sub-scale: males, students, a history of chronic illness, poorer perceived health status, high perceived likelihood of contracting COVID-19.</li><li>Deemed at-risk via DASS *stress* sub-scale: males, students, a history of chronic illness, poorer perceived health status, high perceived likelihood of contracting COVID-19, high concern for family members contracting COVID-19.</li></ul>**Protective factors**<br><ul><li>Regular hand washing, not sharing utensils, & wearing of masks.</li></ul> |

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| **Zhang and Ma** [8]<br><br>Original article | General population<br><br>Jinzhou, Liaoning Province, China | Cross-sectional survey of 263 people (of 400 invited). Survey online 28th Jan to 5th Feb 2020. 59% female.<br><br>Survey assessed socio-demographics, Impact of Events (IES-R), indicators of mental health impacts, social and family support, and mental health-related lifestyle changes. | **Prevalence**<br>• 7.6% of people had moderate-to-severe psychological impact (IES-R >26).<br>• 52.1% of people felt horrified and apprehensive due to COVID-19. Almost 48% of people felt helpless against the pandemic.<br>**At-risk**<br>• Study found no socio-demographic factors to predict higher IES-R scores.<br>• Those aged 41-50 had more favourable scores across all questions. |

AHP: Allied Health Professionals, DASS-21: Depression and Anxiety Stress Scales, GAD-7: Generalised Anxiety Disorder scale, HAMA: Hamilton Anxiety Scale, HAMD: Hamilton Depression Scale, IES-R: Impact of Event Scale Revised, ISI: Insomnia Severity Scale, MH: Mental Health, OR: Odds Ratio, PPE: Personal Protective Equipment, PSQI: Pittsburgh Sleep Quality Index, PTSD: Post-traumatic Stress Disorder, PTSS: Post-traumatic Stress Symptoms, SEM: Structural Equation Modelling, 95% CI: 95% Confidence Interval.

# Articles for RQ 2

**Table 3: Summary of findings from articles for RQ2**

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
|---|---|---|---|---|
| **General population and patients** | | | | |
| **Bao, et al. [32]**<br><br>Correspondence | General population and hospital staff<br><br>China | General systems ideas | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Refers to guideline for local authorities to promote psychological intervention for hospital staff and patients.<br>• Handbook for how to address mental health issues.<br>• Psychologists and psychiatrists use the internet and social media to share strategies for dealing with psychological stress.<br>• Specialised hotlines to provide psychological counselling services for people in need. |
| **Bo, et al. [18]**<br><br>Original article | COVID-19 patients<br><br>China | PTSD | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Survey found that people with COVID-19 related PTSD had a positive attitude towards mental health services.<br>• Comments that online self-guided psycho-educational resources may be less effective for people who are perhaps older, with reading difficulties, restricted access to the internet, or in physical discomfort. |
| **Brooke and Jackson [33]**<br><br>Commentary | Older adults<br><br>UK / USA | Focuses on loneliness | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Offer support to address isolation.<br>• Use volunteers.<br>• Use existing networks such as Neighbourhood Watch to help create and support online support groups e.g. using WhatsApp.<br>• Online therapies may reduce loneliness also. Telephone support. |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
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| | | | | • Sharing of information between groups (e.g. community groups, community nurses etc) to create comprehensive support networks to ensure each person has some support.<br>• Recommends a co-ordinated approach using a range of charities, health care providers and other organisations. |
| **Canady** [34]<br><br>Commentary | General population<br><br>USA | People with existing engagement with mental health services | Use telephone and internet | **No findings reported**<br><br>**No preventative considerations**<br><br>**No health systems guidance considerations** |
| **Cullen, et al.** [30]<br><br>Commentary | General population and hospital staff<br><br>USA | Overall ideas about strategy | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Avoid redeploying mental health experts – risks people's physical and mental health, removes mental health care from those requiring it already.<br>• Target intervention at those high risk of psychological morbidity [does not offer guidance on how to establish this].<br>• Increase awareness of and diagnosis of mental disorders.<br>• Improve access to psychological interventions – particularly online and App.<br>• Focus on hospital staff first. |
| **Dong and Bouey** [35]<br><br>Letter to the editor | General population<br><br>China | Service issues | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Suggests "Task-shifting or -sharing (i.e. shifting service delivery of specific tasks from professionals to persons with fewer qualifications or creating a new cadre of providers with specific training) might help, especially in low-resource areas". |
| **Duan and Zhu** [31]<br><br>Commentary | General population<br><br>China | Overview | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Describes the need of a coordinated effort to offer remote psychological support, working together regionally and across professions.<br>• Notes that as pandemic situation develops and individual's recover physically and mentally, services will need to adapt: constant monitoring and review will be required. |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
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| **Ho, et al.** [36]<br><br>Commentary | General population and special populations including hospital staff<br><br>Singapore | Guidance on what intervention should be offered | Use online and telephone.<br><br>Provide psychoeducation and interventions to support mental wellness.<br><br>Initiate psychological intervention – examples given are CBT and mindfulness [no specific evidence cited for these].<br><br>Intervention ingredients suggested: Behavioural therapies and relaxation also potentially useful, address unhelp coping styles. | **No findings reported**<br><br>**Preventative considerations**<br>• For *hospital staff*: Support staff – peer support, leaders to support also. Identify burnout to provide timely intervention.<br><br>**Health system guidance**<br>• Identify high risk groups (e.g. females reported higher distress and appear greater risk). [See the prevalence section of the review].<br>• Screen people for distress (e.g. using Impact of Event Scale-Revised)<br>• Work in partnership between physical health and mental health focused services.<br>• Train physical health staff to detect mental health distress. |
| **Jung and Jun** [20]<br><br>Editorial | General population<br><br>South Korea | General | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Isolation and potential stigma of the disease are problematic, both require public system response (rather than individual intervention). Enhance social support systems and eliminate stigma. |
| **Li, et al.** [37]<br><br>Review report | General population<br><br>China | Mental health systems | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>Lists a number of guidelines and instructions that were set up for mental health services in China in response to COVID-19. Authors summarise these as:<br>• Understand mental health status across different populations.<br>• Identify those at high risk of suicide / aggression.<br>• Appropriate psychological intervention.<br>• Suggests a stepped model:<br>  1. Those most vulnerable to problems e.g. hospitalised patients, hospital staff<br>  2. Isolated patients / fever clinic patients |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
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| | | | | 3. Those with close contacts in 1 & 2<br>4. Those affected by the control measures<br>• Suggests online services, with assigned crisis response teams providing education on mental health for patients and front-line medical staff. |
| **Liu, et al.** [38]<br><br>Correspondence | General population and hospital staff<br><br>China | Online service delivery | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Suggests provision of online services, some targeted to specific groups (e.g. hospital staff or students, others general).<br>• Provide online or paper versions of educational materials about mental health, the likely impact of COVID-19, and the potential coping strategies.<br>• Online self-help / self-directed interventions, including for insomnia, and other difficulties; often with CBT focus.<br>• Deliver counselling online. |
| **Park and Park** [21]<br><br>Editorial | General population<br><br>South Korea | General population | Leaflets providing information about how to manage mental stress | **No findings reported**<br><br>**Preventative considerations**<br>• Leaflets are potentially preventative.<br><br>**Health system guidance**<br>• Multidisciplinary mental health teams (psychiatrists, psychiatric nurses, clinical psychologists, and other mental health professionals).<br>• Clear communication with regular and accurate updates about the COVID-19 outbreak.<br>• Establishment of secure services to provide psychological counselling (e.g. electronic devices and applications). |
| **Qiu, et al.** [28]<br><br>Editorial | General population<br><br>China | Overview | None | **No findings reported**<br><br>**Preventative considerations**<br>• Timely intervention, based on screening, may prevent worsening mental health.<br><br>**Health system guidance**<br>• Attend to vulnerable groups (e.g. elderly, women, migrant workers).<br>• Nationwide, strategic planning of mental health response required – including psychological first aid, potentially delivered via telemedicine.<br>• Screen, refer and offer targeted intervention for psychological intervention. |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
|---|---|---|---|---|
| Torous, et al. [29]<br><br>Commentary | General population<br><br>USA | Implementation issues | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Refers to evidence base that telemedicine for psychiatry can be effective.<br>• Advises the importance of considering how to support engagement from clients. States evidence for behaviour change and mental health apps is often limited. Suggests using apps to supplement other ways to offer care, and that resources should be tailored to individuals needs. Supports idea remote delivery of lifestyle interventions to play important part in self-management (e.g. exercise, sleep).<br>• Raises importance of training staff to use tele-health techniques, and potentially clients also. References a training package "Digital Opportunities for Outcomes in Recovery Services (DOORS)" (in pre-print, not yet available)<br>• Highlights inequalities and need for subsidised access to data, technology etc. |
| Usher, et al. [39]<br><br>Commentary | General population<br><br>Australia | Overview | None | **No findings reported**<br><br>**Preventative considerations**<br>• Social support may be protective.<br>• Mentions evidence that post-SARS, avoidance of social interaction and higher potentially problematic handwashing were seen. These are potential signs of risk of mental health problem developing.<br><br>**Health system guidance**<br>• Draws on previous research to highlight at-risk groups potentially include lower socio-economic status, females, and pre-existing mental health conditions. |
| Wang, et al. [6]<br><br>Original article | General population<br><br>China | Measure psychological impact. | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• In discussion, highlights need to identify high risk groups –( e.g. females, students, lower education level) [n.b. these are from Chinese data].<br>• Online or smartphone-based psychoeducation and intervention, and provide online platforms for a support network.<br>• Suggests health professionals should be screening for / aware of presentations of common mental health problems to signpost. |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
|---|---|---|---|---|
| | | | | • Deliver therapy online – if does not require presence of mental health professional, this increases capacity. |
| **Wind, et al.** [40]<br><br>Commentary | General population<br><br>Netherlands and Sweden | Online intervention | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Reflects that barriers to offering online interventions are often within mental health care workers' own concerns, rather than patient or system problems. |
| **Xiang, et al.** [19]<br><br>Commentary | General population and hospital staff<br><br>China | How to set up mental health services | Relates findings from 2003 SARS that need mental health care for patients, families, hospital staff and public. | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Use multidisciplinary mental health teams to deliver mental health support to patients and healthcare workers.<br>• Clear communication about the outbreak to hospital staff and patients to reduce uncertainty and fear.<br>• Psychological counselling electronically for whoever needs it.<br>• Screen patients and hospital staff for depression, anxiety, suicidality – using mental health workers to screen. Then offer "timely psychiatric treatment".<br>• Beware that stigma around mental health may limit engagement with services. |
| **Yoon, et al.** [41]<br><br>Original article (case study) | General population (MERS)<br><br>South Korea | Service set up | Describes mental health service for people who had been placed in quarantine and a service provided to families of patients who had died or recovered patients. If screened needing some support – psychoeducation, "psychological support", information; or transferred for treatment. | **Findings**<br>• Continuing care was needed by 29% of those with emotional problems following quarantine / family members.<br><br>**Preventative considerations**<br>• Monitoring of mental health for all people who had been in quarantine (n.b. MERS numbers impacted smaller, but $n$=6157 in one province used in case study).<br><br>**Health system guidance**<br>• Schematic of the system is reproduced in appendix IV. Essentially case detection with screening and a hotline, hotline, active case-management and brief intervention offered, with referral on for more indepth treatment if indicated. |
| **Zhou, et al.** [17]<br><br>Commentary | General population and hospital staff<br><br>China | Focuses on telemedicine | Provides evidence to support effectiveness of tele-medicine (telephone | **No findings reported**<br><br>**Preventative considerations**<br>• Provision of support may maintain psychological wellbeing [however no details what/how]. |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
|---|---|---|---|---|
| | | | and online) in mental health | • Report that population in isolate proactivity seeking online support for mental health [this may be preventative if seeking support early and it is available].<br>• Communicating [with masses] via email and text could share information about symptoms of common conditions, offer cognitive /relaxation [or behavioural activation] skills to manage minor symptoms, and encourage engagement with online self-help.<br><br>**Health system guidance**<br>• Offer range of services – counselling, supervision, training, psychoeducation using hotlines, email, video-conferences, chat facilities and other online tools.<br>• Lists example services (e.g. Black Dog Institute, Mood gym etc.) [see appendix III].<br>• Here prioritised mental health services for those at higher risk of exposure – hospital staff, patients with diagnosis and their families/ people living with them. |
| **Hospital staff only** | | | | |
| Chen, et al. [22]<br><br>Correspondence | Hospital staff<br><br>China | Delivery plans and challenges | See systems response as what planned and offered were changed. | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Planned psychological intervention team, online courses, hotline team for guidance and supervision, group stress relieving activities.<br>• Barriers: hospital staff reluctant to participate, stated had no problems (despite showing signs); staff reported did not need a psychologist but needed rest without interruption and PPE. They wanted training to manage patients' anxiety, panic and distress.<br>• New system response: rest space, practical support with food, videoed staff safety routines to reassure family, trained them in identification of psychological distress in patients, rules to use and manage PPE, relaxation and leisure activities, psychologist at rest area to listen, rest area for staff. |
| Greenberg, et al. [23]<br><br>Commentary | Hospital staff<br><br>UK | Systems for hospital staff | None | **No findings reported**<br><br>**Preventative considerations**<br>• Explains concept of moral injury, which can lead to development of mental health problem. Suggests can be mitigated by support before, during and after incident.<br>• Give staff frank information about the challenges lying ahead.<br>• Help staff make sense of the decisions they made.<br>• Leaders reach out to staff who are avoiding contact – as symptom of PTSD.<br>• Brief on moral injury and other causes of "mental ill health".<br><br>**Health system guidance** |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
|---|---|---|---|---|
| | | | | • Aftercare: Active monitoring for those who may develop diagnosable condition |
| Jun, et al. [24]<br><br>Editorial | Hospital staff<br><br>USA | Staff mental health support | Suggests the following therapeutic interventions have an evidence base [no details re: delivery etc]: Acceptance, active coping, cognitive-behavioural skills building, stress reduction, mindfulness and breathing interventions, gratitude, and coaching. | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Short and long-term approach needed to service provision for staff.<br>• Reduce stigma of mental health problems.<br>• Increase awareness of mental health problems and screen staff. |
| Kang, et al. [25]<br><br>Letter to the editor | Hospital staff (predominately)<br><br>China | Overall mental health system response | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Psychological intervention team of senior experts formulates the intervention materials, technical guidance, implementation guidance and supervision. Others provide intervention for both hospital staff and patients.<br>• A hotline of trained volunteers offer psychological assistance with telephone guidance. [no further details given]. |
| Kang, et al. [11]<br><br>Original article | Hospital staff<br><br>China | Rates of distress and service usage | Usage rates of different supports: 36.3% psychological materials (such as books on mental health), 50.4% psychological resources available through media (such as online push messages on mental health self-help coping methods), and 17.5% counselling or psychotherapy. | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• In discussion, notes range of interventions are accessed. Non-professionals and digital technologies can provide a range of mental health interventions, in addition to therapist led sessions. |
| Sani, et al. [26]<br><br>Letter to the editor | Hospital staff<br><br>Italy | Use of Mental Health specialists | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance** |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
|---|---|---|---|---|
| | | | | • Suggesting that mental health professionals should have a more active role in task for activities for planning co-ordinated support for staff. |
| **Wu, et al. [27]**<br><br>Commentary | Hospital staff<br><br>USA | Supporting staff, systems management | Staff support<br><br>Leadership and crisis management structures. | **No findings reported**<br><br>**Preventative considerations**<br>• Lack of support with the stress, burnout may evolve into PTSD – therefor can infer important to make staff feel supported.<br><br>*Interventions*:<br>• Leaders normalise feelings, encourage emotional expression, advocate self-care, identify support resources.<br>• Create peer support team for psychological first aid (e.g. use employee assistance, chaplain), triage out to higher level support. E.g. confidential peer support program called RISE (Resilience in Stressful Events). This responds 24/7 with in person MHFA and emotional support. Now proactively working with staff at high-acuity units and giving phone support.<br>• Attend to less visible staff (e.g. lab', transport, pharmacy).<br>• Infection control and management staff also can share information with peer support networks re: who may need support and support these staff also.<br><br>**Health system guidance**<br>• Leadership focused on resilience: crisis management that is proactive "Effective crisis management provides a clear, optimistic vision and realistic plan; takes decisive action; and facilitates open, honest, and frequent communication."<br>• Leaders should make extra efforts to thank workers and express gratitude for the extra burden being imposed on them.<br>• Communications should provide information and empowerment. Information provision can reduce anxiety. Suggest including most up-to-date information on COVID-19, what is being done to protect hospital staff, and what they should do if exposed. Attempt to anticipate staff questions and answer in advance. Leadership should anticipate questions Empower by being clear what people can do for themselves also. |
| **Xiao, et al. [42]**<br><br>Original article | Hospital staff<br><br>China | Focuses on sleep and social support | Study of links between sleep, social support and anxiety and depression suggest important to intervene to increase/maintain sleep and give social support. | **No findings reported**<br><br>**No preventative considerations**<br><br>**No health systems guidance considerations** |
| **Children only** | | | | |

| Author (year) and article type | Population groups and country | Specific diagnosis or focus | Intervention offered | Summary of findings |
|---|---|---|---|---|
| **Li and Cui** [43]<br><br>Letter to the editor | Children<br><br>China | Basic advice r.e. crisis management for children | Suggests for children: parents supported to remain calm and to maintain routine, limit information to children, support emotion regulation. | **No findings reported**<br><br>**No preventative considerations**<br><br>**No health systems guidance considerations** |
| **Liu, et al.** [44]<br><br>Commentary | Children under quarantine<br><br>China | Focuses on management of children in quarantine (here, away from parents) | None | **No findings reported**<br><br>**No preventative considerations**<br><br>**Health system guidance**<br>• Train paediatric hospital staff to detect mental health warning signs in children and use screening tools.<br>• Collaborate between physical health and psychiatric teams. |
| **Wang, et al.** [45]<br><br>Correspondence | Children under quarantine<br><br>China | Specifically *children* in quarantine | None | **No findings reported**<br><br>**Preventative considerations**<br>• Education r.e. mental health and encouragement of healthy behaviours – both from schools and public resources for parents to use.<br>• Support parents to have good quality interactions with their children.<br><br>**Health system guidance**<br>• Provision of online mental health support.<br>• Social workers to support families and social safety net to safeguard and offer practical support. |

CBT: Cognitive Behavioural Therapy, IES-R: Impact of Event Scale Revised, MHFA: Mental Health First Aid, MERS: Middle East Respiratory Syndrome, NHS: National Health Service, PHE: Public Health England, PPE: Personal Protective Equipment, PTSD: Post-traumatic Stress Disorder, SARS: Severe Acute Respiratory Syndrome

# Search details

## Initial project screen

**Table 4: Databases used for the initial screening**

| Source | Link | Number of hits | Relevant Evidence Identified | |
|---|---|---|---|---|
| | | | **RQ1** | **RQ2** |
| CEBM, University of Oxford | https://www.cebm.net/covid-19/ | 0 | - | - |
| Cochrane Methodology Review Group | Infection control and prevention: https://www.cochranelibrary.com/collections/doi/SC000040/full | 0 | - | - |
| | Evidence relative to critical care: https://www.cochranelibrary.com/collections/doi/SC000039/full | 0 | - | - |
| Department of Health and Social Care Reviews Facility | http://eppi.ioe.ac.uk/COVID19_MAP/covid_map_v3.html | 5 (1 not included) | Huang, et al. [46] Li, et al. [4] Wang, et al. [6] | Liu, et al. [38] |
| UCSF COVID19 papers | https://ucsf.app.box.com/s/2laxq0v00zg2ope9jppsqtnv1mtxd52z | 0 | - | - |
| PHE Knowledge and Library Services | https://phelibrary.koha-ptfs.co.uk/coronavirusinformation/ | 13 | Berhe, et al. [47] Limcaoco, et al. [48] Sani, et al. [26] Tan, et al. [14] Torales, et al. [49] Zandifar and Badrfam [50] | Chen, et al. [22] Kang, et al. [11] Liu, et al. [38] Park and Park [21] Wang, et al. [45] Wu, et al. [27] Yang, et al. [51] |
| WHO Global Research COVID19 database | https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov | 77 (34 not included) | Bo, et al. [18] Canady [52] Cao, et al. [9] Chung and Yeung [10] Huang, et al. [46] Jun, et al. [24] | Bao, et al. [32] Brooks, et al. [1] Canady [58] Canady [34] Chew, et al. [2] Cullen, et al. [30] |

| | | | | |
|---|---|---|---|---|
| [35] | | | Kang, et al. [11]<br>Lai, et al. [12]<br>Li, et al. [7]<br>Liang, et al. [53]<br>Lima, et al. [54]<br>Liu, et al. [55]<br>Lu, et al. [13]<br>Sani, et al. [26]<br>Shigemura, et al. [56]<br>Torales, et al. [49]<br>Usher, et al. [39]<br>Venkatesh and Edirappuli [57]<br>Wang, et al. [6]<br>Zandifar and Badrfam [50]<br>Zhang and Ma [8] | Dong and Bouey [35]<br>Fiorillo and Gorwood [59]<br>Greenberg, et al. [23]<br>Ho, et al. [36]<br>Jung and Jun [20]<br>Kang, et al. [25]<br>Knopf [60]<br>Li and Cui [43]<br>Li, et al. [37]<br>Liu, et al. [44]<br>Starace and Ferrara [61]<br>Torous, et al. [29]<br>Xiang, et al. [19]<br>Xiang, et al. [62]<br>Zhou, et al. [17] |
| CDC COVID19 guidance | https://www.cdc.gov/coronavirus/2019-ncov/hcp/index.html | 0 | - | - |
| Harvard Global Health Institute | https://globalhealth.harvard.edu/mentalhealth-resources-covid19 | 10 (1 not included) | Asmundson and Taylor [63]<br>Lai, et al. [12]<br>Yao, et al. [64] | Brooks, et al. [1]<br>Duan and Zhu [31]<br>Torous, et al. [29]<br>Vahia, et al. [65]<br>Wind, et al. [40]<br>Xiang, et al. [19] |

# Appendices

## Appendix I: Recommendations for primary and secondary prevention interventions

Initiatives suggested in the reviewed papers are collated below.

1. Awareness raising about mental health, particularly signs and symptoms of difficulties in both the general public and amongst physical healthcare workers (for themselves and for them to be able to detect difficulties in patients) [2 17 30]. Educational material should be provided online and via paper versions on the likely impact of COVID-19 on mental health, and coping strategies [17 21 38].

2. Mental health professions to share strategies for managing psychological stress online and on social media, as has already been done on a macro-scale by the Public Health England and NHS mental wellbeing resources [32]. It may be useful to use remotely delivered advice and interventions to support self-management, e.g. exercise, sleep [29]. Psychoeducation is also suggested, without indication of suggested content [6 36].

3. Screening / early identification of people needing psychological input is recommended [2 28 36 41]. This may be done by physical health staff trained to detect difficulties [6 36]. Screening is particularly suggested for those discharged from hospital after COVID-19 admission [19 66]. Screening should also target those with at higher risk of psychological distress, based on the COVID-19 research, for example suggests targeting females [36].

4. Offer psychological follow-up to those discharged from hospital after COVID-19 admission [66].

5. Use peer and community support groups as ways to enhance social support [2 6 20]. Social support may be protective of psychological distress [39]. For older people in particular, volunteers, existing networks (e.g. Neighbourhood Watch), online support groups and apps (WhatsApp), telephone contact, and community nurses a can promote social support, with information shared between these different sources [33].

6. Encourage adaptive coping responses and self-care [2], which may be covered in psychoeducation. Furthermore, online self-help and self-directed interventions are suggested, including those for insomnia [38].

7. Provide specialised hotlines to provide psychological counselling [32] or support [17]. It is unclear whether hotlines should act as information lines, one-off counselling provision, crisis lines, or an avenue for providing ongoing support. Increased access to psychological care [2 30]. Reviewed evidence for use of online and tele-health methods in mental health supports its effectiveness [17 29]. Online psychological counselling, that is secure [6 19 21 30 34 36 38]. Online and self-guided interventions may be less suitable for older people, people with reading difficulties, restricted access to the internet, or physical health problems [18]. Often mental health professionals have concerns about using online interventions, which reflect major barriers sometimes over and above patient or system concerns [40]. Psychological first aid packages may be useful [28]. Telephone counselling should be offered [34 36]. App' based interventions can also be considered [30], however be aware that these may have a limited evidence-base [29]. All interventions should be capable of tailoring to an individual's needs [29]. Promote these using local authorities [32]. Staff may need training to use these resources [29], or task-shifting can be used, whereby people without specific mental health training / volunteers can be trained to offer intervention [35]. This will also require supervision.

8. Target intervention to at-risk groups [30 38].

9. Multidisciplinary mental health teams to deliver care to COVID-19 patients (and healthcare workers) [19] [21]. Therefore these staff should not be redeployed to physical health roles if possible [30].

10. Work in partnership between physical health and mental health focused services [36].

## Appendix II: Prospective studies of interest

**1. University College London has launched a study into the psychological and social experiences of Covid-19.**

*Overview*:  The study is open to all adults in the UK. Participation involves answering a 15-minute online survey now and then answering a shorter 10-minute follow-up survey once a week whilst social isolation measures are in place. Survey available here: www.covid19study.org.

*Purpose*: The results from this are vital if we are to understand the effects of social isolation on individuals. They will help us to track trajectories of mental health and loneliness in the UK over the coming weeks, identify which groups are most at risk, and understand the effects of any potentially protective activities people could be engaging in. The UCL team will be providing public data releases each week, which can be signed up to here.

**2. Cochrane Rapid Reviews**

The following reviews are all currently planned or underway:

1. What are the harms for vulnerable populations of public health measures to prevent the spread of COVID-19? (link)
2. How best to support staff resilience and wellbeing during the COVID outbreak (link)
3. The Impact of Covid-19 pandemic on youth and adult mental health: a systematic review (link)
4. The psychological impact of 2019 novel coronavirus pneumonia (COVID-19) and mental healthcare strategies: a systematic review and meta-analysis of current evidence (link)
5. The psychological impact of an epidemic/pandemic on the mental health of healthcare professionals and interventions to reduce this impact: a rapid review (link)

**3. Mental Health Impact of COVID-19 Pandemic on National Institute for Mental Health (US) Research Participants and Volunteers**

*Overview*: This protocol leverages existing NIMH studies and participants to accomplish time-sensitive research on the mental health impact of environmental stressors imposed by the COVID-19 pandemic. The study will describe the relationship between stressors related to COVID-19 and self-rated measures of mental health symptoms and distress among a range of participants (*n*=5000) including various patient populations and healthy volunteers. Further information available here: https://clinicaltrials.gov/ct2/show/NCT04339790

## Appendix III: Tele-mental health services listed in Zhou, et al. [17]

### Table 1. Examples of Community Online Mental Health Services Available in Australia

| TELEMENTAL HEALTH SERVICES | TARGET MENTAL HEALTH PROBLEMS | TELEHEALTH MODALITIES |
|---|---|---|
| Betterhelp https://www.betterhelp.com/ | Depression, stress, anxiety, anger, grief, etc. | Text messaging, chat, telephone, videoconferencing, etc. |
| Black Dog Institute https://www.blackdoginstitute.org.au/ | Depression, bipolar disorder, anxiety, suicide and self-harm, post-traumatic stress disorder, etc. | Websites, mobile apps |
| Moodgym https://moodgym.com.au/ | Depression and anxiety | Online self-help platform |
| E-couch https://ecouch.anu.edu.au/welcome | Emotional problems | Online self-help platform |
| Beyond Blue https://www.beyondblue.org.au/ | Anxiety, depression, and suicide | Online forum |
| Headspace https://headspace.org.au/ | Anxiety, depression, eating disorders, trauma, etc. | Online group chat, e-mail, telephone |
| RUOK https://www.ruok.org.au/ | Suicide | Psychoeducation about how to ask each other about ups and downs |

Appendix IV: Schematic of mental health system used in Korea in response to MERS (Yoon, et al. [41])



**Fig. 1** Psychological intervention system for MERS victims