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HS&DR Evidence Synthesis Centre Topic Report

Organisation-wide interventions to promote the health and well-being of healthcare staff during periods of increased demand: a systematic review

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HS&DR Evidence Synthesis Centre Topic Report

This report

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Contents

List of tables

List of figures

List of abbreviations

B & A	Before and after
CI	Confidence interval
COVID-19	Coronavirus disease 2019
EMBASE	Excerpta Medica Database
H1N1	Influenza A virus subtype H1N1
HCWs	Healthcare workers
HMIC	Healthcare Management Information Consortium
HS&DR	Health services and delivery research
MERS	Middle Eastern Respiratory Syndrome
NHS	National Health Service
NETSCC	NIHR Evaluation, Trials and Studies Coordinating Centre
NIHR	National Institute for Health Research
OR	Odds ratio
PPE	Personal protective equipment
PROSPERO	Prospective Register of Systematic Reviews
SARS	Severe acute respiratory syndrome
SARS COV-1	Severe acute respiratory syndrome coronavirus 1
UK	United Kingdom
US	United States of America

Abstract

Background:

Attention to staff health and well-being is a critical aspect of crisis management within healthcare systems, in order that services can be maintained during periods of increased demand. While there is evidence regarding the effectiveness of individual-level interventions, actions at a whole organisation level are less well understood.

Objectives:

The systematic review aimed to evaluate the evidence regarding actions taken by healthcare organisations, to address the health and well-being of staff during periods of increased demand on services.

Methods:

We searched five bibliographic databases in November 2020, and updated the search in January 2021. Inclusion and exclusion criteria were as follows:

- Staff employed in healthcare organisations.
- Studies relating to organisational or system-wide changes which aim to enhance staff health or well-being during periods of increased demand on services (excluding short term disasters or emergencies).
- Any health and well-being outcome for staff including views and perceptions.
- Healthcare services in any high or middle income country.
- Any study published since 2002 reporting descriptive or empirical data.

Quality (risk of bias) assessment was undertaken for studies reporting empirical data, using tools appropriate for each study design. We performed a narrative synthesis of the included studies.

Results:

From a database of 1663 citations we included 42 studies, which were predominantly of descriptive or cross-sectional (survey) designs. Key areas of focus for organisational action are: policy and strategy; practical needs of staff; the working environment; access to mental health support; peer support; communication within the organisation; organisational culture; and training needs and staffing.

Practical needs to address include child care, nutrition, resting areas, transport, protection of workers and their families. The organisational culture should support a staff well-being approach, with recognition of efforts and positive feedback, mechanisms to ensure staff feedback is heard and acted upon, and leadership which inspires trust that staff well-being is a concern. Attention should also be paid to developing peer support systems within teams.

Future work:

There is a need for higher quality evaluative designs, studies outside hospital settings and exploration of staff health and well-being during times of increased seasonal demand.

Limitations:

Given the current Covid-19 pandemic that there are many new studies in progress or due to be published. However, we updated the searches which had been run in November 2020, in January 2021, and the increasing use of pre-print services enabled us to capture much recent literature.

Conclusions:

While there may often be a focus on interventions which target individual staff mental health and well-being, the limited evidence suggests that organisation-wide interventions can have a positive effect on stress, burnout, and post-traumatic stress. It is noteworthy that many of the findings and associated recommendations from past outbreaks of infectious disease such as SARS in 2002, are echoed by the current literature relating to the COVID-19 pandemic. This suggests that organisational responses to maintain the health and well-being of staff during times of increased demand continue to require attention.

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Plain English summary

Staff health and wellbeing is particularly important during times of high pressure on healthcare services. Not only to make sure that staff are well, but also to ensure that patient care can be maintained. We know that help for individual workers (such as counselling) can be of benefit, but we know less about the effect of changes which organisations can make. We searched in research databases for relevant studies from high and middle income countries published since 2002.

We found 42 research papers and categorised the actions they described. All related to times of epidemic infectious disease, we did not find any studies on winter demand. There was little high quality research which described the effectiveness of actions taken. Instead, studies described initiatives that had been tried, or used surveys or focus groups to ask staff what they thought.

Our review suggested that organisation-wide strategies can have a positive effect on staff, so the focus should not be limited to interventions for individual staff. Key areas for action described in the research are: addressing staff basic needs; having a leadership and culture which values staff well-being; listening and acting on feedback; maximising support between colleagues; providing easy access to mental health support; having good communication systems; and providing training in pandemic preparation and use of protective equipment. Many of the findings from older studies were also mentioned in research carried out during the COVID-19 pandemic. This suggests that past learning could be used better to plan organisational actions.

Scientific summary

Background

Attention to staff health and well-being is important at all times, but especially during periods of increased demand. Crises such as the COVID-19 pandemic can lead to acute psychological distress, burnout, and post-traumatic stress for staff, with effects not only felt by staff directly providing patient care. Studies of staff health and well-being during virus outbreaks have supported the need for clear leadership, communication and empowering information, and an organisational approach based on a comprehensive plan for staff wellness. While there is evidence that individual-level interventions (such as cognitive behavioural therapy) can be effective in improving the health and well-being of staff, some authors have emphasised the need for a whole organisation approach.

This systematic review, rather than examining interventions for individual workers, or professionals or other staff groupings used a whole healthcare system lens to examine how staff health and well-being may be best enabled at an organisational level. We undertook a synthesis of this literature in order to enable organisations taking action to support staff during times of particular pressure or crisis on services to draw on best available evidence. This is needed if staff health and well-being are to be optimised and thereby enable best patient care.

Aims and objectives

The review aimed to answer the following research questions:

What is the evidence of effectiveness of system-level interventions to support staff physical and mental well-being during times of particular pressure or crisis in health services?

What factors may enable or act as barriers to implementation of these interventions?

What is the evidence regarding effectiveness for different sub-groups of staff e.g. professionals versus lower paid staff, different local areas, and national versus local programmes?

Are there particular features of effective interventions during different types of crisis, for example are there particular system level approaches required during a COVID-19-type pandemic which differs from other stress points?

Methods

We searched Medline, EMBASE, HMIC (Health Management Information Consortium) and Science and Social Sciences Citation Indexes in November 2020, and again in January 2021.

Inclusion criteria were as follows:

Population: All staff employed within services providing healthcare in high and middle income countries.

Intervention: Organisational or system-wide interventions to enhance the health and/or well-being of healthcare staff. This includes actions taken by commissioners of services, organisation leaders, and managers of services. The intervention could take place in hospital and/or primary care settings.

Context: Extended periods of higher than usual demand for healthcare services including during epidemics and periods of increased seasonal demand. This includes epidemics and periods of increased seasonal demand but exclude short term responses for example to mass casualty incidents or disasters.

Outcomes: Any measure of effectiveness including measures of physical or mental health, or views and perceptions of healthcare staff.

Study design: Studies providing descriptive or empirical data relating to organisational interventions.

Other criteria: Studies published since 2002 (the start date of the SARS-CoV-1 outbreak).

Retrieved citations were downloaded to a reference management database (EndNote version 7). All citations were screened at title and abstract level by three members of the review team against the inclusion criteria, with any queries resolved by consensus during regular team meetings.

Public involvement

We drew on the expertise of the Evidence Synthesis Centre public advisory group to provide a patient and public perspective to the evidence we found, and optimal ways of communicating the key messages for a public audience.

Results

From a database of 1663 citations we included 42 studies. We identified studies relevant to times of epidemic and pandemic, but were unable to identify any literature relating to the well-being of staff during periods of increased seasonal (winter) demand.

We identified nine key areas of focus for consideration and organisational action: policy and strategy; practical needs of staff; the working environment; access to mental health support; peer support; communication within the organisation; organisational culture; training needs and staffing. Within these areas of focus we categorised components of interventions reported in the literature. The literature indicated the value of actions at a whole organisational level to address staff health and well-being during times of increased demand on services. Practical needs of staff to address include child care, adequate nutrition, resting areas, transport to work, protection of workers, and protection of workers' families. The review highlights the need for an organisational culture which supports a staff well-being approach, with recognition of efforts and positive feedback, mechanisms to ensure staff feedback is heard and acted upon, and leadership which inspires trust that staff well-being is a concern. Attention should also be paid to developing peer support systems within teams.

The evidence available for review was predominantly primary studies which provided descriptive reports of initiatives (13 studies) rather than evaluative data, or narrative reviews (seven studies) which provided an overview of literature rather than systematic evaluation. We identified only one primary study which took measurements both before and after introduction of an intervention in order to evaluate its effectiveness. The other studies which provided empirical data used survey methods (eight studies) or qualitative methods (seven studies) to explore staff perceptions and experiences. It is important to recognise therefore that the recommendations made are limited by the quality of the evidence available.

While the review found a paucity of literature which evaluated the effectiveness of organisational-level interventions, a small number of studies reported associations between organisational interventions and staff mental well-being as outlined below:

- There was very limited evidence (one narrative review) of an association between organisational interventions and increased resilience and avoidance of burnout.
- There was very limited evidence (one before and after study) of an association between a wellness programme (which included training, working hours reduction, a mental health team, personal protective equipment and nutritional supplements) and reduced anxiety and depression.

- There was very limited evidence (one survey) that a well-being centre may lead to greater well-being but no difference in job stressfulness, job satisfaction, presenteeism or turnover intentions in those who access it.

- There was very limited evidence (one survey) of an association between training and reduced burnout and stress.

In addition, some studies drew associations between characteristics of organisations and staff mental well-being as below:

- There was limited evidence (one systematic review) of an association between support from supervisors and colleagues and reduced post-traumatic stress and psychiatric symptoms.

- There was limited evidence (one systematic review) of an association between perceived adequacy of psychological support from an employer and lower psychiatric morbidity.

- There was very limited evidence (one survey) of an association between a culture of support for staff, and bolstered resilience and reduced burnout and stress.

- There was limited evidence (one systematic review) of an association between perceived adequacy of training and support and reduced post-traumatic stress, burnout, and psychological disorder.

We identified little evidence regarding differential effects of organisational interventions on groups of staff. One review suggested that physicians were less affected than nurses by personal factors which were associated with poorer outcomes (coping abilities, resilience, psychiatric history). This study also commented that nurses have more intense physical exposure to infected patients than physicians, which may suggest that actions require adapting to different professional groups. Some studies reported that nurses were the predominant group to access interventions which had been introduced, and contrasted this with the small numbers of physicians. This also may suggest that groups of staff have different needs or access requirements. Other authors emphasised the need to ensure that all staff (not just those working directly with patients) should be considered when planning organisational actions. While many studies described their populations in general terms such as “healthcare staff” or “healthcare workers”, there seemed to be a dominance of employees in hospital settings, with no studies which specified that they included workers in community (primary care/non-hospital) settings.

Conclusions

The literature outlined nine key areas of focus for consideration and organisation-wide action during periods of increased demand on services, namely: policy and strategy; practical needs of staff; the working environment; access to mental health support; peer support; communication within the organisation; organisational culture; training needs and staffing. Within these areas of focus we categorised components of interventions reported in the literature. While there may often be a focus on interventions which target individual staff mental health and well-being (such as online wellness materials or counselling), the evidence suggests that organisation-wide interventions such as ensuring a culture of staff well-being, encouraging peer support systems, and implementing actions to address basic staff needs can have a positive effect on stress, burnout, and post-traumatic stress. It is noteworthy that many of the findings and author conclusions from past epidemics and pandemics are echoed by the current literature relating to the COVID-19 pandemic. This suggests that organisational responses to maintain the health and well-being of staff during times of increased demand continue to require attention.

The following implications should be considered with regard to the limited quality of the available evidence.

Implications for healthcare

1. Actions at a whole organisation level are required to address staff health and well-being, in addition to those targeting individual workers' mental health.

2. Actions are needed to address the practical needs of staff including child care, adequate nutrition, resting areas, transport to work, protection of workers, and protection of workers' families.

3. The organisational culture should support a staff well-being approach, with recognition of efforts and positive feedback, mechanisms to ensure staff feedback is heard and acted upon, and leadership which inspires trust that staff well-being is a concern.

4. Communication systems within organisations should provide clear and timely information to staff.

5. Attention should be paid to developing peer support systems within teams. Some evidence suggested that optimising mutual support systems within teams could be more valuable for many staff than providing individual-targeted interventions.

6. Ease of access to mental health support should be considered, to ensure that staff requiring this input are able and have time to access.

7. Monitoring and support of staff who are isolating or shielding is important as they are at risk of mental health difficulties.

8. There should be consideration of needs of staff in pre-planning for times of increased demand, during periods of increased demand, and continued support post- periods of increased demand.

9. Staff training needs include psychological preparedness such as resilience, in-person PPE training, and other training in preparation for pandemics.

Implications for research

1. There is a need for higher quality evaluative designs (particularly comparing baseline to follow up) to provide further evidence regarding the effectiveness of organisational interventions.
2. There is a need for exploration of organisational interventions to address staff health and well-being outside hospital settings. Currently there is little research on implementation of organisational interventions, and potential generalisability between hospitals and other settings.
3. There is currently a lack of evidence regarding actions to address staff health and well-being during times of seasonal increased demand on services. Needs during these periods may differ from times of infectious disease outbreaks.
4. We identified a dearth of evidence regarding optimal implementation processes for organisation-wide interventions.
5. We found only one study which considered the working environment and effects on staff, with changes to the working environment (such as workplace layout) potentially an avenue worthy of further exploration.
6. It may be helpful to investigate the applicability of research on crisis management from non-healthcare settings, and also to further draw on the wider organisational literature in future studies.

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Background

The UK National Health Service (NHS) has the largest workforce in Europe, and the fifth largest in the world, with an estimated 1.3 million employees.[1] The delivery of safe, high-quality care requires staff to be in post, and be physically and mentally well, yet there are high levels of sickness absence and presenteeism amongst NHS staff.[2] Times of crisis and increased demand for healthcare services, such as the COVID-19 pandemic and winter increases in accident and emergency attendance, tax the financial resources available and structural capabilities of healthcare services to provide adequate care.[3] Attention to staff health and well-being is a critical aspect of crisis management in order that services can be maintained during periods of increased demand.[3]

The delivery of safe, high-quality care requires staff to be in post, and be physically and mentally well, yet there are high levels of sickness absence and presenteeism amongst NHS staff.[2] High levels of stress are a particular problem, with the NHS staff survey in 2019 finding that 40% of staff reported work-related stress within the previous 12 months.[4] High levels of stress are known to damage staff health, causing a range of issues including cardiovascular disease, diabetes, addictions, cancers, sleep disorders and depression, and fifty per cent more NHS staff report debilitating levels of work stress compared to the general working population.[2]

A working environment of high demands and low control, and a culture of bullying, harassment and discrimination have been blamed for high stress levels seen in NHS employees.[2] Black and Minority Ethnic (BME) staff, in particular, report some of the poorest workplace experiences.[5] In one survey 70% of managers in the NHS say that there are barriers to them providing mental health support.[6] Poor mental health in the NHS has been estimated to cost between £1,749 and £2,174 per employee per year.[7]

In response to concerns regarding poor NHS staff health and well-being, the Interim NHS People Plan refers to the need to improve the experience of working in the NHS.[8] Variation in peoples' experience of employment across different parts of the NHS system has been noted as a key area for action.[9] There are plans for a "core offer" encompassing the themes of belonging, developing and empowering, with staff helping to shape local values; staff involvement in quality improvement; and formal systems to show staff they are valued and appreciated.[9]

Evidence from systematic reviews on interventions to improve staff health and well-being indicate that cognitive-behavioural therapies, mental and physical relaxation, and changing work schedules can reduce stress amongst healthcare workers.[10, 11] A 2017 review suggested that healthy workplace interventions can improve the health and well-being of professional healthcare staff.[12]

Crises such as the COVID-19 pandemic can lead to acute psychological distress, burnout, and post-traumatic stress for staff caring for patients due to fear of contagion, social isolation; and anger, frustration, and helplessness when there is a shortage of equipment.[13] The effects are not only felt by staff directly providing patient care, but also non-professional staff and those working in less visible parts of the services.[13] During the COVID-19 pandemic NHS employers issued guidance for NHS workforce leaders on staffing issues (https://www.nhsemployers.org/covid19) which included supporting staff mental health via clear communication, visible leadership, enhanced line management support, safety provisions, and peer support systems. A free seven day a week well-being support helpline/text service for NHS staff was set up, operated by the Samaritans which provided confidential listening and specialist advice from trained professionals. Online peer-to-peer, team and personal resilience support was encouraged through a digital mental health platform and a range of health and well-being apps.

Studies of staff health and well-being during virus outbreaks have supported the need for clear leadership, communication and empowering information, and an organisational approach based on a comprehensive plan for staff wellness.[3, 13] Components that have been suggested include a wellness task force comprising managerial and staff-side representatives, and initiatives such as “wellness rounds” and a “wellness hub”.[3] It has been suggested that staff performance can be enhanced and substantial cost savings (in terms of reduced sickness) achieved, by prioritising and enhancing staff health and well-being.[14]

While there is evidence that individual-level interventions (such as cognitive behavioural therapy) can be effective in improving the health and well-being of staff as part of an ongoing programme, responses during crisis periods are likely to require different elements or actions. Individual studies for example indicate the role of a whole organisational approach.[15]

This systematic review, rather than examining interventions for individual workers, or professionals or other staff groupings, used a whole healthcare system lens to examine how staff health and well-being may be best enabled at an organisational level. The recent response to COVID-19 has demonstrated that relocation of staff to different services is likely to be required during a crisis, together with redirection of available resources to different parts

of the system (such as from hospital to community care, or preventive screening to critical care). We therefore undertook a synthesis of this literature that would enable organisations taking action to support staff during times of particular pressure or crisis on services to draw on best available evidence. This is needed if staff health and well-being are to be optimised and thereby enable best patient care

Methods

The review comprised a mixed method systematic review, examining evidence regarding effectiveness, perceived effectiveness, and implementation of organisational approaches to support staff health and well-being during periods of increased demand for health services (such as pandemics including COVID-19 and SARS, and periods of higher than usual winter demand).

Review questions

What is the evidence of effectiveness of system-level interventions to support staff physical and mental well-being during times of particular pressure or crisis in health services?

What factors may enable or act as barriers to implementation of these interventions?

What is the evidence regarding effectiveness for different sub-groups of staff e.g. professionals versus lower paid staff, different local areas, and national versus local programmes?

Are there particular features of effective interventions during different types of crisis, for example are there particular system level approaches required during a COVID-19-type pandemic which differs from other stress points?

Identification of evidence

The information specialist on the team designed a search strategy, including search terms and electronic databases to be searched. The searches in electronic databases were run in November 2020, and updated in January 2021. In addition to database searching we screened the included studies (including the reviews) for other citations of potential relevance.

Data sources

We searched Medline, EMBASE, HMIC (Health Management Information Consortium) and Social Sciences Citation Indexes in November 2020. See Appendix 1 for an example search strategy. After our initial search and sift of retrieved citations we identified a gap in terms of studies relating to times of seasonal demand, so we carried out a further search using terms specifically relating to this topic. See Appendix 1 for the additional targeted search strategy. We carried out an updated search in January 2021 to identify any newly published sources.

In addition we accessed relevant UK websites to search for grey literature (see Appendix 2). The grey literature was assessed against our inclusion criteria in the same way as other sources, with any meeting our parameters being included.

Inclusion criteria

Population: All staff employed within services providing healthcare in high and middle income countries.

Intervention: Organisational or system-wide interventions to enhance the health and/or well-being of healthcare staff. This includes actions taken by commissioners of services, organisational leaders, and managers of services. The intervention could take place in hospital and/or primary care settings.

Context: Extended periods of higher than usual demand for healthcare services including during epidemics and periods of increased seasonal demand. This includes epidemics and periods of increased seasonal demand but exclude short term responses for example to mass casualty incidents or disasters.

Outcomes: Any measure of effectiveness including measures of physical or mental health, or views and perceptions of healthcare staff.

Study design: Studies providing descriptive or empirical data relating to organisational interventions.

Other criteria: Studies published since 2002 (the start date of the SARS-CoV-1 outbreak). Grey literature from the UK or cited in included sources.

Exclusion criteria

- Studies that described or evaluated interventions aimed at individual workers (for example individual counselling, in-person or online materials or training which could be accessed by staff, or referral to specialist services).
- Studies which reported the effects of increased demand on healthcare workers.
- Studies which described the effectiveness of personal protective equipment.
- Conceptual papers and projections of possible future developments.
- Studies conducted in low income country health systems.
- Theses, conference abstracts, articles in professional magazines, books and book chapters.

Selection of studies

Retrieved citations were downloaded to a reference management database (EndNote version 7). All citations were screened at title and abstract level by two members of the review team against the inclusion criteria, with any queries resolved by consensus during regular team meetings. Potentially relevant citations were tagged and re-screened by the lead reviewer. Those meeting our eligibility criteria were obtained for full paper examination. Following full paper scrutiny, sources which met the review parameters were included in the review.

Method of extraction and synthesis

We developed a data extraction form based on the expertise of the team and previous similar reviews. We piloted it on a sample of five studies prior to progressing to full use across studies. Data extraction was performed by one of the three reviewers on the team, with all checked for accuracy and consistency by a second member of the team. Given the characteristics of the literature we used methods of narrative synthesis to identify key recurring elements of interventions and explore outcomes outlined in the included studies.

Quality appraisal

We used tools appropriate for the design of each study where it was possible to appraise. For the reviews we used the Amstar tool,[16] for the qualitative studies we used a tool from the Critical Skills Appraisal Programme,[17] and for cross-sectional and longitudinal studies we uses the Joanna Briggs appraisal checklist.[18] Due to the descriptive design of many included studies we were unable to carry out an appraisal of these sources.

Public involvement

We had input from the strategic public advisory group for the evidence synthesis centre in the early and latter stages of the review. We discussed the focus and review questions and need for involvement of public advisors. The view was that as the focus of the work was healthcare staff that these were the main target audience however, it was emphasised that patients were aware of the demands on healthcare staff and recognised their levels of stress, so would have

an interest in the findings of the review in an accessible form. The group also contributed to drafting of the Plain English Summary. Members of the public were aware of individual-level interventions which had been described in the media (such as virtual support) and agreed that practical support (such as meals and childcare) were key priorities for staff well-being.

Review findings

From a database of 1663 citations we included 42 studies. See Figure 1 for a diagram illustrating the process of study selection and inclusion. See Appendix 3 for a list of studies excluded at full paper screening.

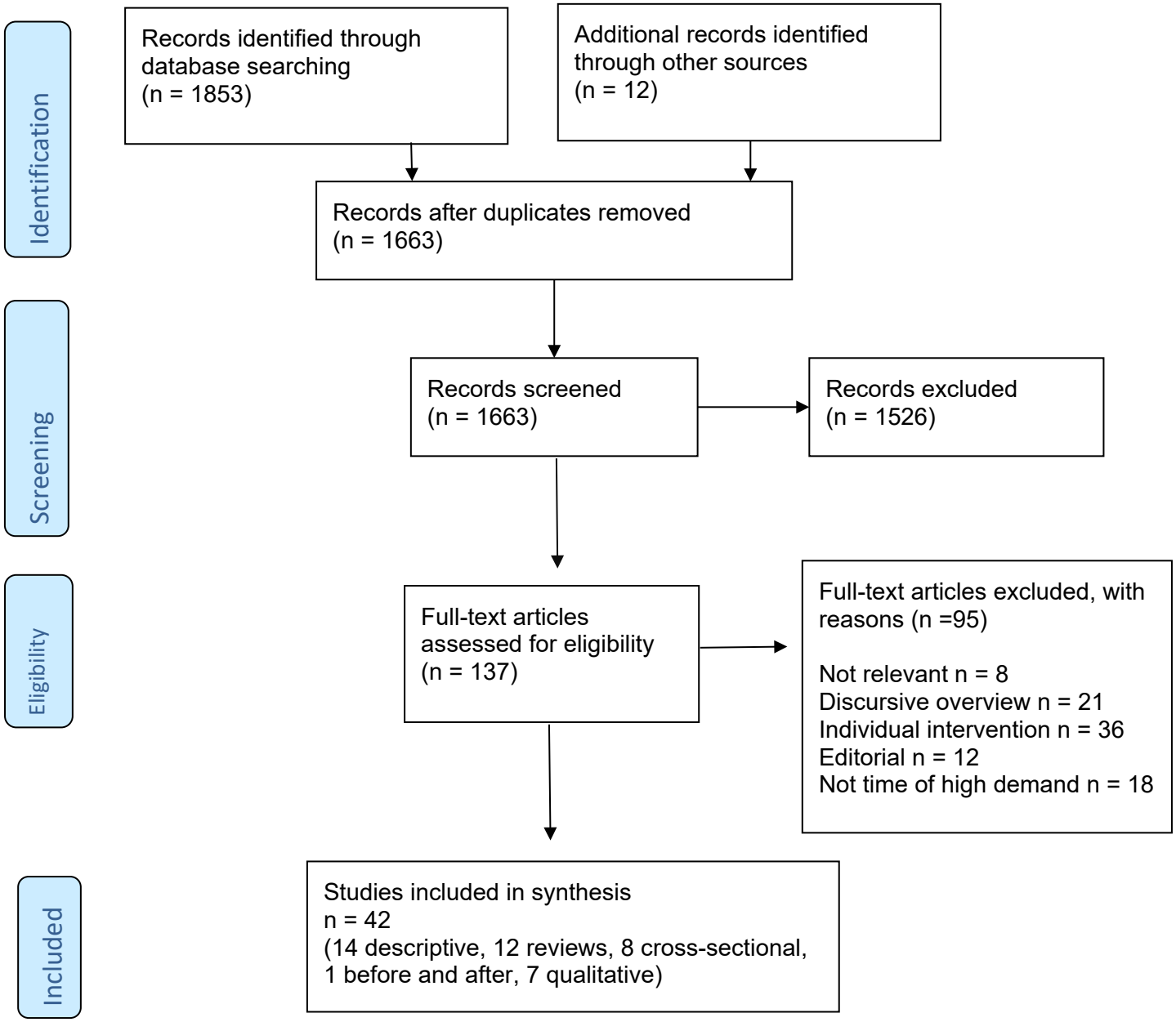

Figure 1. The process of study selection

Characteristics of the included studies

The review included studies from 15 different countries, with the largest number from the United States of America, followed by the United Kingdom (see Table 1). Europe was well represented, with perhaps surprisingly few from countries where there have been past SARS and MERS pandemics. This may have been the result of our English language inclusion criteria.

Table 1. Country of origin of the included studies

Country of origin	**Included sources**
USA (11)	Arnetz 2020[20] Azizodden 2020[58] Cowden 2010[23] Gonzalez 2020[53] Hines 2014[25] Krystal 2021[49] Rangachari 2020[47] Ripp 2020[51] Ruskin 2021[56] Shearer 2020[44] Wei 2020[52]
UK (6)	Bennett 2020[41] Blake 2020[21] Donnelly 2020[54] Draper 2010[42]/Ives 2009[50] Vindrola-Padros 2020[45]
Canada (4)	Borgeault 2020[59] Maunder 2006[26]/2008[60] Ontario Ministry 2006[48]
Australia	Halcomb 2020[24]
Italy	Carmassi 2020[22]
France	Lefevre 2021[55]
Poland	Krol 2020[57]
Turkey	Tengilimoglu 2020[27]
Taiwan	Chen 2006[40]

Korea	Kang 2018[43]
Hong Kong	Wong et al. 2012[46]
Saudi Arabia	Alanezi 2021[19]
Reviews - not applicable (12)	Barello 2020[28] Chew 2020[29] De Brier 2020[30] Demartini 2020[31] Gómez-Durán 2020[32] Heath 2020[33] Magill 2020[34] Muller 2020[35] Pandemic Influenza Preparedness Team 2011[38] Pollock 2020[36] Preti 2020[37] Walton 2020[39]

Table 2 provides a brief summary of each of the studies, see Appendix 4 Table 4 for the full extraction table. As can be seen half of the included sources related to the COVID-19 pandemic. Other pandemics studied were SARS, influenza, and H1N1 (swine flu), with some reviews considering pandemics and epidemics in general. We were unable to identify any studies relating to the health and well-being of healthcare staff during times of increased seasonal (winter) demand, despite carrying out a supplementary search using terms specifically relating to this.

We scrutinised the included reviews to ascertain the degree of overlap between secondary and primary studies, and thereby the potential for "double counting" of sources. The main duplication was in regard to the Maunder et al. survey study[26] of mental health during the SARS pandemic, which was included in over half of the other reviews. Apart from this study, there was little overlap. While the sources included in these reviews were eligible for our study, many of the included reviews had a slightly different focus from system-based interventions, so not all (and sometimes few) of their primary studies were relevant to our review.

Table 2. Summary of included studies

First author and date	Study design	Study population	Context	Main focus
Alanezi 2021[19]	Survey	Practitioners	COVID-19	Explore attitudes towards managers
Arnetz 2020[20]	Survey	Nurses	COVID-19	Explore perceptions of stress
Azizodden 2020[58]	Descriptive	Emergency department professionals	COVID-19	Evaluation of a debriefing initiative
Barello 2020[28]	Review	Healthcare workers	Influenza pandemic	Identify stress and psychological responses
Bennett 2020[41]	Qualitative	Frontline staff	COVID-19	Explore experiences of working
Blake 2020[21]	Survey	Hospital employees	COVID-19	Evaluation of a well-being centre
Borgeault 2020[59]	Descriptive	Not described	Pandemics	Describe workforce requirements
Carmassi 2020[22]	Descriptive	Workers caring for Covid-19 patients	COVID-19	Evaluation of a post-traumatic stress programme
Chen 2006[40]	Before and after survey	Nurses caring for patients with SARS	SARS	Evaluation of a well-being programme
Chew 2020[29]	Review	Healthcare workers	Infectious disease outbreaks	Explore psychological and coping

				responses during pandemics
Cowden 2010[23]	Survey	Healthcare workers	Pandemics	Explore willingness to work during a pandemic
De Brier 2020[30]	Review	Healthcare workers	Pandemics	Identify factors linked to mental health
Demartini 2020[31]	Review	Frontline staff	COVID-19	Overview of approaches to care for staff
Donnelly 2020[54]	Descriptive	Intensive care unit staff	COVID-19	Evaluation of interventions to support staff well-being
Draper 2010[42]	Qualitative	Non-professional staff	Influenza pandemic	Exploration of sense of obligation to work during a pandemic
Gómez-Durán 2020[32]	Review	Healthcare workers	Pandemics	Explore the effects of quarantining
Gonzalez 2020[53]	Descriptive	Healthcare staff	COVID-19	Evaluation of mental health initiatives
Halcomb 2020[24]	Survey	Nurses	COVID-19	Identify staff support needs
Heath 2020[33]	Review	Clinicians	COVID-19	Evaluate interventions to minimise effects of COVID-19

Hines 2014[25]	Survey, observation	Emergency department workers	H1N1 pandemic	Evaluate use of respiratory protection
Ives 2009[50]	Qualitative	Healthcare workers	Influenza pandemic	Explore views about working during a pandemic
Kang 2018[43]	Qualitative	Infection control nurse leaders	SARS	Describe barriers to using personal protective equipment
Krol 2020[57]	Descriptive	General hospital	COVID-19	Outline organisational changes made
Krystal 2021[49]	Descriptive	Healthcare workers	COVID-19	Evaluation of actions taken
Lefevre 2021[55]	Descriptive	Healthcare workers	COVID-19	Evaluation of a support programme
Magill 2020[34]	Review	Frontline workers	Epidemics and pandemics	Evaluate effects on mental health
Maunder 2006[26]	Survey	Hospital workers	SARS	Explore mental health outcomes
Maunder 2008[60]	Descriptive	Not specified	SARS	Learning lessons for a future potential influenza pandemic
Muller 2020[35]	Review	Healthcare workers	COVID-19	Evaluation of mental health interventions
Ontario Ministry 2006[48]	Descriptive	Hospitals	SARS	Investigation of handling of SARS outbreak

Pandemic Influenza Preparedness Team 2011[38]	Review	Frontline health and social care professionals	Epidemics and pandemics	Evaluate effectiveness of interventions supporting resilience and mental health
Pollock 2020[36]	Review	Frontline health and social care professionals	Epidemics and pandemics	Evaluate effectiveness of interventions supporting resilience and mental health
Preti 2020[37]	Review	Healthcare workers	Pandemics	Explore psychological impacts on workers
Rangachari 2020[47]	Descriptive	Healthcare workers	COVID-19	Evaluate the effectiveness of approaches to worker safety
Ripp 2020[51]	Descriptive	Hospital employees	COVID-19	Evaluation of approaches to well-being
Ruskin 2021[56]	Descriptive	Clinicians	COVID-19	Describe the challenges of wearing protective equipment
Shearer 2020[44]	Qualitative	Hospital employees	Influenza pandemic	Describe experiences of the pandemic
Tengilimoglu 2020[27]	Survey	Healthcare employees (half nurses)	COVID-19	Report levels of anxiety and stress

Vindrola-Padros 2020[45]	Qualitative	Frontline workers	COVID-19	Report the experiences of workers
Walton 2020[39]	Review	Healthcare staff	COVID-19	Outline ways to support staff
Wei 2020[52]	Descriptive	Healthcare staff	COVID-19	Outline support provided to staff and families
Wong et al. 2012[46]	Qualitative	Workers on isolation wards	H1N1 pandemic	Explore willingness to work

Quality of the included literature

We included studies of any design which related to organisational actions or interventions during times of increased demand. This encompassed studies which did not provide empirical data, and thus may not typically be included in a systematic review. We termed these studies which provided narrative accounts of initiatives, or which outlined recommendations based on specific experiences as "descriptive". We debated their inclusion given their low rigour, but they contained valuable learning which we were reluctant to exclude.

Similarly, we considered whether to include reviews which were not carried out systematically, but we decided that they too contained insights which added to those from the higher quality studies. These studies were labelled as "narrative reviews" rather than systematic reviews. Where possible we used established tools to critically appraise the included literature (see Appendix 4 Table 4, Table 5, Table 6 and Table 7 for completed evaluations). Many descriptive studies however, were not suitable for quality appraising via conventional tools. In order to provide an indication of the credibility of the evidence, we use study design as a proxy for quality, to highlight where the findings are from stronger versus less strong studies in the synthesis.

Overall the literature was dominated by primary studies which used quantitative designs at the lower end of the hierarchy of evidence. Fourteen were descriptive reports of interventions.[19-27] Twelve of the studies were other reviews,[28-39] of which five used systematic review methods.[30, 32, 35, 36, 38] There were eight cross-sectional (survey) studies, [19-21, 23-27] and one study which carried out a survey at time points before and after an intervention.[40] There were no

studies which used a comparator design. Quality appraisal of these sources using tools appropriate for their study design, found that most of the cross-sectional studies selected and described participants adequately, measured outcomes in a valid way, and used appropriate statistical analysis. Of the reviews, only around half described study characteristics adequately, few carried out quality appraisal, justified exclusions, or described a comprehensive search strategy.

There were seven qualitative studies.[41-46] These performed better on appraisal, with almost all meeting eight of the nine criteria for quality.

Synthesis of evidence regarding approaches described in the literature

The literature described different areas of focus for organisational actions to address worker health and well-being during times of increased demand on services. We extracted the details of each action reported into the extraction table (See Appendix 4) and then compiled a simplified list from this. Authors used similar language to describe the approaches (for example "practical/basic needs", "training", "communication", "culture", and "support/supportive strategies" were commonly used terms), so we were able to synthesise across the literature using these terms for the different areas of focus, to provide a structure to our reporting (see Figure 2).

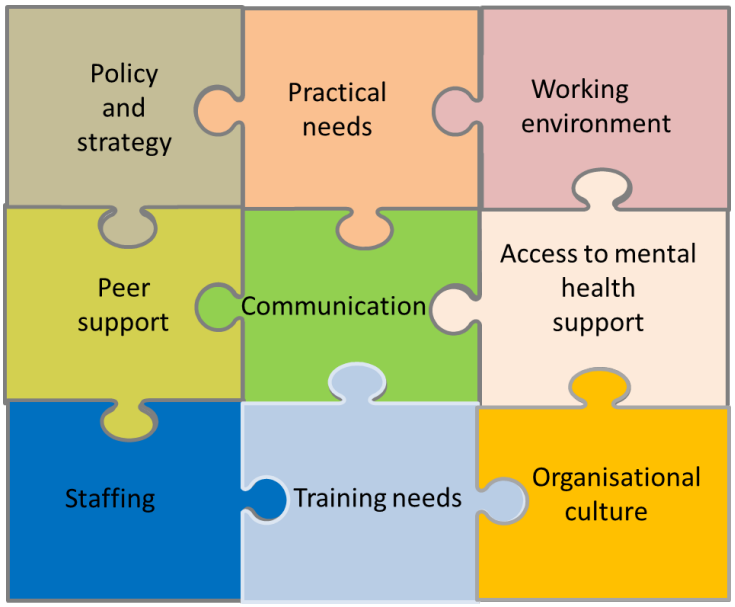

Figure 2. Areas of focus for organisational interventions described in the literature

We drilled down into each of these focus areas to identify and categorise specific components of interventions, which were described by authors in the included studies (see Table 3).

Table 3 Areas of focus and components of organisational interventions

Focus and components	**First author and date of studies reporting each component**
1. Policy and strategy	
	Barello 2020[28] Heath 2020[33] Halcomb 2020[24] Ontario Ministry 2006[48] Vindrola-Padros 2020[45]
2. Practical needs of staff	
Childcare support	Cowden 2010[23] Draper 2010[42] Ives 2009[50] Krystal 2021[49] Rangachari 2020[47] Ripp 2020[51] Walton 2020[39] Wei 2020[52]
Nourishment	Chen 2006[40] Gonzalez 2020[53] Krystal 2021[49] Rangachari 2020[47] Ripp 2020[51] Tengilimoglu 2020[27] Walton 2020[39] Wei 2020[52]
Resting accommodation	Blake 2020[21] Chew 2020[29] Demartini 2020[31] Donnelly 2020[54] Gonzalez 2020[53] Heath 2020[33] Krystal 2021[49] LeFevre 2021[55] Wei 2020[52]
Transport to work	Ives 2009[50] Ripp 2020[51] Wei 2020[52]
Working hours	Chen 2006[40] Heath 2020[33] Tengilimoglu 2020[27]
Protection of workers	Barello 2020[28] Bennett 2020[41] Chen 2006[40] Chew 2020[29] De Brier 2020[30] Draper 2010[42]

	Halcomb 2020[24] Heath 2020[33] Ives 2009[50] Kang 2018[43] Maunder 2006[26] Pandemic preparedness team 2011[38] Preti 2020[37] Rangachari 2020[47] Ripp 2020[51] Ruskin 2021[56] Shearer 2020[44] Tengilimoglu 2020[27] Vindrola-Padros 2020[45] Wong 2012[46]
Protection of families	Donnelly 2020[54] Draper 2010[42] Gomez-Duran 2020[32] Gonzelez 2020[53] Ives 2009[50] Krystal 2021[49] Ripp 2020[51] Tengilimoglu 2020[27] Wei 2020[52] Wong 2012[46]
Family support	Barello 2020[28] Gonzalez 2020[32] Demartini 2020[31]
3. Working environment	Krol 2020[57]
4. Communication within the organisation	
	Alenzi 2021[19] Barello 2020[28] Chew 2020[40] Cowden 2010[23] De Brier 2020[30] Gomez-Duran 2020[32] Gonzalez 2020[53] Halcomb 2020[24] Heath 2020[33] Ives 2009[50] Krol 2020[57] Krystal 2021[49] Magill 202034 Ontario Ministry 2006[48] Rangachari 2020[47] Ripp 2020[51] Vindrola-Padros 2020[45] Walton 2020[39] Wei 2020[52] Wong 2012[46]
5. Peer support	
Mutual support/teams	Alenzi 2021[19]

	Azizodden 2020[58] Barello 2020[28] Blake 2020[21] Chew 2020[29] De Brier2020[30] Donnelly 2020[54] Gonzalez 2020[53] Heath 2020[33] Ives 2009[50] Magill 2020[34] Muller 2020[35] Rangachari 2020[47] Ripp 2020[51] Walton 2020[39]
6. Mental health support	
Access to resources for psychological support	Blake 2020[21] Borgeault 2020[59] Carmassi 2020[22] Chen 2006[40] Chew 2020[29] De Brier 2020[30] Demartini 2020[31] Gomez-Duran 2020[32] Gonzalez 2020[53] Halcomb 2020[24] Heath 2020[33] Krystal 2021[49] Magill 2020[34] Muller 2020[35] Pollock 2020[36] Preti 2020[37] Ripp 2020[51] Vindrola-Padros 2020[45] Walton 2020[39] Wei 2020[52]
Screening of "at risk" staff[47]	Carmassi 2020[22] Chew 2020[29] Demartini 2020[31] Heath 2020[33]
Monitoring/support of staff during isolation	De Brier 2020[30] Gomez-Duran 2020[32] Walton 2020[39]
Support pre, during and after	Barello 2020[28] Carmassi 2020[22] Donnelly 2020[54] Gonzalez 2020[53] Heath 2020[33] Krystal 2021[49] Ripp 2020[51]
7. Organisational culture	
Staff well-being approach	Borgeault 2020[59] De Brier 2020[30]

	Demartini 2020[31] Donnelly 2020[54] Gomez-Duran 2020[32] Heath 2020[33] Krystal 2021[49] Maunder 2006[26]/2008[60] Ontario Ministry 2006[48] Preti 2020[37] Rangachari 2020[47]
Recognition of efforts/positive feedback	Barello 2020[28] Blake 2020[21] Chew 2020[29] De Brier 2020[30] Donnelly 2020[54] Gonzalez 2020[53] Halcomb 2020[24] Ives 2009[50] Ontario Ministry 2009[48] Wei 2020[52] Wong 2012[46]
Trust	Arnetz 2020[20] Ives 2009[50] Ontario Ministry 2009[48] Preti 2020[37] Rangachari 2020[47]
Leadership	Alanezi 2021[19] Bennett 2020[41] Blake 2020[21] Borgeault 2020[59] Chew 2020[29] Krystal 2021[49] Pandemic Influenza Team 2011[38] Rangachari 2020[47] Ripp 2020[51] Walton 2020[39] Wong 2012[46]
Staff empowerment	Arnetz 2020[20] Azizodden 2020[58] Bennett 2020[41] Blake 2020[21] Chew 2020[29] De Brier 2020[30] Ontario Ministry 2012[48] Rangachari 2020[47] Tengilimoglu 2020[27] Vindrola-Padros 2020[45]
8. Training needs	
Psychological	Chew 2006[29] Heath 2020[33] Preti 2020[37] Rangachari 2020[47]
PPE training	De Brier 2020[30] Hines 2014[25]

	Kang 2018[43] Ripp 2020[51]
Other content	Alanezi 2021[19] Blake 2020[21] Carmassi 2020[22] Halcomb 2020[24] Krol 2020[57] Maunder 2006[26] Maunder 2008[60] Rangachari 2020[47]
9. Staffing considerations	
Redeployment	Arnetz 2020[20] Bennett 2020[41] De Brier 2020[30] De Martini 2020[31] Draper 2010[42] Ives 2009[50] Rangachari 2020[47] Vindrola-Padros 2020[45]
Staffing levels	Alanezi 2021[19] Barello 2020[28] Borgeault 2020[59] De Brier 2020[30] Shearer 2020[44]

1. Policies and strategies

Authors of a review of influenza pandemics emphasised the need to have well-developed strategic plans,[28] and findings from a survey of nurses during the COVID-19 pandemic highlighted the importance of clear infection control and patient management protocols to assist staff well-being.[24] Two qualitative studies outlined how changing and inconsistent guidelines were extremely challenging for staff, and frequent policy changes were overwhelming.[45, 46] Authors of a review of interventions to manage psychological effects of COVID-19 on staff, emphasised the need for preventive strategies at an organisational level to build resilience and avoid burnout.[33]

A report into the handling of the SARS epidemic in Canada in 2006 was critical of the failure to use the "precautionary principle" within organisational responses during times of epidemic.[48] This principle refers to the need to take reasonable action to reduce risk, in the absence of scientific certainty, with the authors of the report concluding that it is better to err on the side of caution, especially when dealing with a little-understood new disease. The report describes how infection control and worker safety had operated as two separate elements, and concluded that there had been a profound lack of awareness within the health system of worker safety best practices and principles. A survey outlined within the report found that two-

thirds of nurses believed that their health and safety had been compromised during the SARS outbreak.

2. Practical needs of staff

Included sources outlined organisational actions to address the practical needs of healthcare staff during times of increased demand. These were: childcare support; adequate nourishment; facilities to relieve stress and boredom; resting areas; transport to work; consideration of working hours; self-protection; and protection and support of worker's families.

Childcare support

Studies highlighted the need for organisations to consider childcare support for their staff. One descriptive study from the US concluded that stress related to childcare was a particularly common issue amongst healthcare workers.[49] Childcare concerns were described by one study as being one of the key secondary stressors employees face beyond primary stressors at work.[39] A US survey of the willingness of staff to work during a pandemic identified childcare as an important factor in staff concerns about going to work.[23] This was echoed by a UK study reported in two papers which using methods of focus groups and a survey, which highlighted a concern that working during an influenza pandemic would require parents to give less priority to the needs of their own sick children, or to settle for unsatisfactory childcare.[42, 50]

Actions to address these concerns described by studies included a tool to link employees with childcare services,[51] the provision of a childcare hotline which included offering free childcare in the employees' home,[52] the creation of an in-home provider network,[49] and access to childcare during school closures or if working hours were increased, [47] All these studies provided descriptions of these initiatives, with no evaluative data provided.

Nourishment

Adequate nutrition was another of the basic staff needs highlighted in four descriptive studies and one review.[39, 47, 49, 51, 53]

Actions to address nourishment for hospital employees in a US descriptive study during the COVID-19 pandemic included provision of food for staff and physicians, free or reduced-cost meal options for staff to order, and food options being available in on call rooms on site.[51] Another US descriptive study reported how a call was made for donations which were used to provide free meals for workers during their shifts, and also groceries to take home for their families.[52] A study which used a survey to evaluate a wellness programme in Taiwan during the SARS epidemic described how nutritional supplements were provided to nursing staff.[40]

This study was the only one included in the review which measured wellness before and after the intervention (which was multi-component including training, working hours reduction, a mental health team, and personal protective equipment). The study found indications of reduced anxiety and depression following the introduction of the initiative. An online survey of healthcare employees in Turkey found that a quarter reported problems with nutrition or housing. The authors of this study recommended that sufficient food for health employees must be provided, and in a timely manner.[27]

Resting areas

Two reviews[29, 31] recommended the provision of recreational activities for staff and the provision of facilities to reduce stress and boredom. These were often provided within resting areas as described below.

Included sources used a variety of terms such as respite room, take a minute room, reset room or "the bubble" to describe dedicated non-clinical areas which could be used by staff as respite or for resting.[31, 49, 52-55] A descriptive study from the UK (of actions taken in a paediatric intensive care unit during the COVID-19 pandemic), outlined the provision of a respite area which had facilities including well-being boards and mental health resources, hot drinks, water filters, healthy foods and comfy cushions.[54] A study from the US described how a 10-bed paediatric unit was converted to an employee respite area, which was open 24 hours a day and provided a place to rest, shower, receive emotional support, and re-energise with snacks, drinks, aromatherapy, soothing music, a television, and de-stressing activities (e.g., adult colouring books) which was made possible by donations.[53] Another US study described the creation of rooms in hospitals for staff to mourn colleagues and patients, with memorials being established in them.[52]

These initiatives were described rather than evaluated, however, a study which provided some evaluative data explored the effects of providing a dedicated area for healthcare worker support during the COVID-19 pandemic in France. The area (named "the bubble") received over 800 visits from 379 staff (median 3 visits) over a four week period. Nurses comprised 57% of visitors; physicians, technical and administrative staff each 11%; and nurses' aides 10%. In an informal survey via email, users expressed their appreciation of the service and hoped that it might continue after the pandemic.[55] Another suggestion of positive effects of this type of intervention was provided by a narrative review of strategies to reduce the psychological impact of the COVID-19 pandemic on clinicians. The authors of this work drew an association between providing access to rest areas for hospital-based clinicians and reduced burnout.[33]

A UK survey of hospital employees during the COVID-19 pandemic highlighted the importance of ensuring that staff are able to take regular breaks, and recommended that organisations should have a robust policy around protected work breaks. The policy should include regular monitoring and evaluation of its implementation, and the authors noted that there should be efforts to ensure that line mangers are aware of the importance of staff taking regular breaks.[21]

Transport to work

Three studies (one UK qualitative and two US descriptive) identified potential stress for staff as a result of concerns regarding transport to reach the workplace.[50-52] Actions described to address this outlined in the US studies included transportation vouchers,[52] free parking,[51] and free bike rental or free/low cost car rental.[51]

Working pattern

Three studies reported that patterns of annual leave, resting hours, and frequency of shifts should be considered by organisations.[27, 33, 40] A survey of healthcare employees in Turkey found that 23% of respondents reported that long hours was a problem in their working environment.[27] An intervention to address this was described by one study carried out in Taiwan, in which working hours were limited to eight hours per day and adjustments to staffing were made according to the number of SARS patients who had been admitted.[40] This action was part of a multi-element programme which was evaluated using a before and after survey. The findings indicated a reduction in anxiety and depression scores amongst nurses caring for patients with SARS. The third study relating to working pattern was a narrative review which suggested that organisations should take steps to clarify working hours during times of pandemic.[33]

Protection of workers

A recurring theme within the literature was the central importance of organisations ensuring that workers are protected against infection. While the focus of this review was on organisational, rather than individual level interventions (and thus the efficacy of PPE was not within the review parameters) we considered that provision of PPE to workers was a key action taken by an organisation and should be included. A clear emphasis throughout the literature was the obligation of organisations to provide adequate protective equipment to minimise risk to workers.[24, 27-29, 40, 42] A UK qualitative study explored this sense of obligation and also concerns amongst non-professional healthcare workers during an influenza pandemic. The authors identified the concept of "reciprocity" in respondent views; referring to the perception that "the most obvious thing that workers are owed is some protection against infection".[42]

Other authors (in a review, a Australian survey and a UK qualitative study) referred to the "just" distribution or sharing of protective equipment,[33] such as by ensuring that there are clear and standardised protocols for its use,[24, 43] and awareness of best practice amongst workers.[33] The potential for risk to occur during the process of putting on and taking off equipment was emphasised, which required addressing via training in situ, a safety coach, visual aids and mirrors in areas used for changing.[33, 56] A qualitative study from Korea indicated that the layout of a hospital could often make optimal PPE practice challenging.[43]

The effects of wearing protective equipment on clinicians in the US were described by Ruskin et al.[56] who indicated the need for organisations to put mitigating measures in place, including adequate breaks, measurement of workers temperature, and easy access to hydration. Qualitative studies from Korea and the UK described how incorrect sizing of PPE caused difficulties (especially for smaller stature employees),[43] and that organisational leaders should recognise the impact of wearing PPE on routine practice.[45]

The effect of the level of workers' trust in equipment and infection control was highlighted in a systematic review of factors linked to mental health during pandemics. It found that higher levels of trust protected workers from emotional exhaustion (β: -0.15, 95% confidence interval (CI) -0.26 to -0.05, p = 0.005), reduced their concerns for personal or family health (odds ratio 0.4, 95% CI 0.3 to 0.5, p<0.05), and reduced anger (β: -0.14, 95% CI -0.25 to -0.03, p = 0.011).[30] A survey of hospital workers carried out after the SARS pandemic in Canada associated levels of protection and support from the organisation (alongside training) with degree of burnout and post-traumatic stress.[26] Similarly, a review of psychological impact on healthcare workers during pandemics, concluded (based on evidence from eight studies) that staff having confidence in protective measures was related to less severe psychological outcomes.[37]

A qualitative study from the UK reported staff views that risk assessments during the COVID-19 pandemic were insufficient, and had failed to protect at-risk frontline workers.[41] In an earlier UK qualitative study during an influenza pandemic, workers reported concerns that the PPE which was provided would not be of the best quality.[50] Workers on isolation wards in a hospital in Hong Kong during a swine flu epidemic emphasised that not having an individual quota for PPE was important to them, as they felt safer and could better keep comfortable and clean.[46] Staff at a hospital in the US during the COVID-19 pandemic highlighted that there should be routine provision of scrubs to workers.[51]

Two studies referred to the role of worker access to testing in keeping staff protected.[45, 47] One of these surveyed staff in Turkey during the COVID-19 pandemic, and found a lack of

streamlined and consistent system for the testing of staff.[45] The other study (carried out in the US) used an organisational resilience framework to provide a descriptive analysis of the effectiveness of approaches to worker safety. It found that one of eight sources of anxiety described by workers in an intensive care unit was inadequate access to COVID-19 testing if symptoms develop, since the infection could be propagated at work.[47]

A review by the Pandemic Preparedness Team in 2011 (of resilience and mental health interventions for frontline health and social care professionals during influenza pandemics) reported that they had found no studies which had developed and tested measures to reassure workers about their safety.[38]

Protection of workers' families

Studies described organisational interventions to protect workers' families by either enabling workers to avoid contact by temporarily living away from home,[27, 32, 42, 49-52] or by putting in place measures to reduce the potential transmission of infection via clothing.[42, 46, 52-54]

A systematic review of the psychological impact of quarantine for healthcare workers[32] reported that suitable alternative accommodation and personalised monitoring during quarantine are useful intervention measures to prevent adverse effects. Two descriptive studies from the US outlined how local hotel options (at reduced rates or at no cost) had been provided for workers who were concerned about returning home and infecting their families.[51, 52] A survey study carried out by Tengilimoglu et al. during the COVID-19 pandemic in Turkey reported that the major cause of the anxiety or stress for healthcare staff was fear of contaminating their families and immediate surroundings (reported by 86.9% of respondents). The authors recommended that individuals who have at risk family members should be provided with alternative accommodation.[27]

Included studies (two from the UK and one from Korea) described the importance of providing showers and facilities to change clothing prior to returning home.[42, 46, 54] Qualitative data from Korea reports how shower facilities could however be inadequate, or changing rooms too small to distance sufficiently.[46] One descriptive study of support provided during the COVID-19 pandemic in the US, recommended that replacement scrubs should be provided so that staff could wear them home, and thereby not be worried about taking home clothing contaminated with the virus.[52]

Family support

Three studies described the need for consideration of not only workers themselves, but also their families.[28 31 53] A review of stress and psychological responses during influenza

pandemics emphasised that social support should be provided for workers' families.[28] A descriptive evaluation of initiatives in an Australian hospital during the COVID-19 pandemic, outlined how a helpline for both employees and their family members had been set up and provided brief counselling and other resources.[53] A review of approaches to caring for staff during the COVID-19 pandemic recommended that families could be included in temporary accommodation provided for staff.[31]

3. Working environment

We identified only one study which reported on measures which were taken to reconfigure the working environment during periods of increased demand. This study from Poland was descriptive with no evaluation, and outlined how a hospital had been re-designed to become a dedicated COVID-19 centre.[57] Wards were divided into observation (patients awaiting test results) and isolation wards for patients with confirmed COVID test results. Administrative and staff offices/social spaces were re-located outside the wards with communication via visuals and walkie-talkies. An air lock was installed at the entrance to each ward for donning and removing PPE at the beginning and end of a shift, with a one way system in place. Entries and exits to the wards were limited, and specific routes through the hospital were used for suspected COVID-19 patients. Centralised training provided by a team of instructors was rolled out, and safety procedures were clarified.

4. Communication within the organisation

Eight included sources emphasised the key role of good communication channels within organisations during times of increased demand.[19, 24, 28, 29, 32, 33, 39, 53] Findings of a systematic review and a narrative review concluded that communication should be clear and consistent and be timely.[30, 34] A descriptive US study reported the importance of providing adequate levels of information during the COVID-19 pandemic.[47] A report following the SARS outbreak in Canada described how poor communication had exacerbated confusion, how directives had failed to provide information or guidance, and how risk communication overall was poor.[48] A systematic review of factors linked to the mental health of workers during pandemics suggested that clear communication and provision of information could partially contribute to workers' sense of control, although statistical analysis found that confidence in the information provided was not found to be significantly associated with levels of stress.[30]

In terms of the content of communications, a descriptive, two qualitative, and a survey study recommended information on what is known, what is not known, and what expectations might be,[50] information which addresses concerns regarding personal and family safety,[23] the provision of clear and concise safety procedures, with hard copies given to staff,[57] the regular

sharing of good news,[45] and communication regarding the importance of staying at home when ill.[23]

The suggested formats for communication included websites with resources, town halls, emails, meetings for information sharing and allowing questions/concerns to be raised,[51] a public facing website, daily updates, e-newsletters, social media, daily meetings,[52] and notice boards, email, infection control, and staff meetings.[46] A descriptive study from the US outlined how attendance at "town hall" type meetings reduced over time, and recommended instead that meetings should be for specific staff groups rather than large bodies of workers.[49] A survey of practitioners' views during the COVID-19 pandemic in Saudi Arabia highlighted that effective communication was needed not just at an organisational level, but also at the level of team members and sharing of information across teams.[19]

5. Peer support

The literature (two narrative reviews and a UK descriptive study) outlined the importance of peer support and mutual support within healthcare teams.[28, 39, 54] A UK qualitative study described the need for team cohesion,[50] a UK survey recommended fostering team work and collaboration,[21] and review of COVID-19 interventions referred to the requirement for supportive professional relationships.[33]

There was the recommendation in a US descriptive study and a systematic review that organisations should promote an environment of collegial social support, and encourage workers to ask for help and rely on each other for support, rather than feeling that they were on their own,[30, 47] In this latter study (a systematic review) the authors reported that support from supervisors and colleagues was beneficially associated with post-traumatic stress (OR: 0.33, 95% CI 0.16 to 0.69, p = 0.003) and psychiatric symptoms (OR: 0.35, 95% CI 0.17 to 0.69, p = 0.003).[30]

Initiatives to address peer support recommended by authors of three reviews and two descriptive studies (one UK and one US) included establishing a mentoring or buddy system,[29, 33] having a team badge and making support telephone calls to team members who have been relocated,[54] and establishing peer support groups.[34] There were suggestions of online tools to link employees,[51] and virtual support groups [53] although only descriptive data were provided. One US study which evaluated a virtual nightly clinical debriefing reported that the initiative allowed clinicians to connect to each other via technology. On average three clinicians joined each session (no resident physicians), but attendance was described as reducing over time.[58]

A UK descriptive study of staff in an intensive care unit during COVID-19 outlined the provision of online group social meetings and quizzes for staff.[54] A systematic rapid review of mental health interventions during COVID-19 indicated the potential importance of these type of peer support initiatives. The authors concluded that staff prefer to rely on social support and contact with colleagues to professional help, although they noted that there were no evaluative studies included in their review.[35]

6. Mental health support

Our review excluded the large body of literature on mental health and psychological interventions aimed at individual staff (for example mindfulness and counselling sessions, and online mental health information and resources) as the focus was on actions taken to intervene at an organisational level. While the effectiveness of these individual interventions was thus outside the review parameters, we included literature which related to organisations providing or enabling worker access to these mental health and well-being supports.

Nine studies outlined the introduction of or scaling up of psychological and mental health resources available to staff.[21 24 30 32 33 40 51 52 53] These included opening up mental health clinics,[40] wellness centres,[21] introducing wellness champions and providing in-person psychological support,[53] having an efficient referral path to mental health specialists,[32] providing unit-based mental health consultants,[33] both formal and informal mental health services,[24] mental health services deployed to units,[51] increasing the availability of a mental health team,[30] and introducing wellness rounds.[52] or support visits to units.[53]

Only two of these studies provided evaluative rather than descriptive data. A UK study which evaluated a well-being centre [21] reported that well-being was higher in those who had accessed it, although there were no significant differences in perceived job stressfulness, job satisfaction, presenteeism or turnover intentions between those who did, or did not, access the centre. The authors proposed that this type of intervention may be best targeted to staff groups that have particular well-being concerns or challenges with access to support, and should only be one element of a range of options. They also noted that attendance declined from an initial peak during the first few months of the pandemic.

A study from Taiwan which evaluated a comprehensive well-being programme during the SARS pandemic which included a mental health clinic and a mental health team. The study findings indicated that anxiety and depression scores reduced after implementation of the intervention however, the approach was wide ranging and change not attributable to particular elements.[40] A systematic review of factors linked to worker mental health during pandemics reported that the perception of adequate counselling and psychological support from the

employer was found to statistically lower the psychiatric morbidity of healthcare workers (odds ratio 0.53, 95%CI 0.31 to 0.89, p<0.05). A review of interventions which aim to support resilience and mental health during epidemics and pandemics reported that there is little evidence of effectiveness of training workers to deliver psychological first aid.[36]

A UK study used a survey to explore barriers to staff using well-being centres. [21] These included staff not having time for breaks, or their breaks not being long enough to reach or make use of the facility, also, not feeling the need, or having a lack of awareness of the help available. Issues of access to psychological help due to inconvenient timing of sessions, lack of time to take part in an intervention, or unavailability of mental health team members were described by authors of a systematic review, a narrative review, and a UK qualitative study.[30, 36, 45] Other authors in descriptive studies from Norway and Italy, and a narrative review referred to a reluctance to access psychological interventions,[22] the uptake of individual counselling as being "low",[49] and "low interest" in professional help.[35]

There was criticism of a perceived mismatch between the needs and preferences of healthcare workers, and the individual psycho-pathology approach to much intervention in a narrative review of mental health interventions during the COVID-19 pandemic.[35] A review of the mental health effects of epidemics and pandemics on frontline workers highlighted that only a minority of staff require specialised services, with organisational-level interventions having potential to alleviate distress for most workers.[34] Authors of another review concluded that there is a need to shift the focus from support for workers who have developed issues of well-being or mental health, to instead an approach based on prevention and mitigation of causative factors.[39] A descriptive study from Canada emphasised that protecting and promoting the psychological health and safety of all workers should be the objective.[59]

Three reviews (one systematic) and a descriptive study from Italy proposed identification/screening and then offering support for workers who might be at risk of adverse mental health effects, or who were experiencing stress, anxiety or depression.[22, 29, 31, 33] Two further reviews concluded that staff who are isolating/in quarantine should be particularly closely monitored and offered continuous support from supervisors and colleagues.[32, 39] In support of this, there was evidence from a narrative review and a systematic review that these staff can have worse mental health outcomes than those who have not quarantined (p = 0.063).[30, 39]

Two descriptive studies and two narrative reviews cautioned that support for staff should be considered both pre, during and post periods of increased demand.[22, 28, 33, 53] Descriptive studies from the UK and US during the COVID-19 pandemic highlighted that it is important to

plan and prepare for the future and consider long terms needs of staff and sustainability of support.[49, 51, 54]

7. Organisational culture

The literature emphasised that the culture of the organisation is a key element in staff health and well-being during times of increased demand. Elements of organisational culture which should be the focus of action are: a staff well-being approach; recognition and positive feedback; trust; leadership; and staff empowerment.

A staff well-being approach

A survey of practitioners across seven hospitals in Saudi Arabia during the COVID-19 pandemic found that 70% of responders agreed or strongly agreed that organisational culture was poor.[47] The need for a whole-organisation well-being approach, with a focus on caring for staff (not just patients) was emphasised in a UK descriptive study, also during the COVID-19 pandemic.[54] Three review sources and a US descriptive study recommended that organisations should have a sensitive view of healthcare workers,[31, 32] provide reassurance that the organisation will support their well-being,[47] and manage expectations clearly and compassionately.[33]

Authors of descriptive studies referred to concepts of justice,[60] and social equity[59] in optimal organisational culture, with a need to consider racism, gender and health disparities when focusing support for healthcare workers.[49] Authors of a case study of workers in a US University healthcare system during the COVID-19 pandemic, emphasised the need for a culture change within organisations towards identifying and treating mental illness in healthcare workers, together with ensuring sustainability of support.[49] A rapid review of the impact of pandemics on healthcare workers linked organisational support to less severe psychological outcomes.[37]

The need for a culture of safety within an organisation was emphasised in a report following the SARS outbreak in Canada, with a good safety climate and a joint infection control/worker safety approach required.[48] A descriptive report of approaches to worker safety during the COVID-19 pandemic in the US recommended greater recognition of psychological safety and broader emotional distress, together with a holistic consideration of worker safety.[47]

Specific links between organisational culture and mental health were made in a study which reported a survey of healthcare workers in Canada after the SARS pandemic. The results indicated an association between a culture of support for staff, with bolstered resilience and reduced burnout and stress.[26] A systematic review of factors affecting staff mental health

emphasised the need to normalise stress reactions, praise achievements, and promote challenge rather than threat.[30]

Recognition and positive feedback

The need for praising achievement, recognising efforts, and giving positive feedback was a theme echoed by two narrative reviews and a descriptive report of well-being initiatives.[21, 28, 29] A descriptive report of interventions at a paediatric intensive care unit in the UK during the COVID-19 pandemic outlined introduction of a "Positivi-Tree" laminated messages to share small positive achievements with the team, "thank you NHS" teacups, and a "going home checklist" to end the day positively.[54] Gonzalez et al. provided descriptive data regarding how a "community messages of support channel" had been introduced in a hospital in the US, as part of wide-ranging mental health support initiatives, where employees could view photos and video messages of support from local community members (messages were also printed out and posted to staff).[53] Another example from the US describes rituals to celebrate patients being weaned off ventilators or were being sent home including text messaging, group chats, playing music, and staff returning from COVID-19 illness being welcomed back by staff lining halls and cheering and applauding. A public-facing website was created that displayed daily updates, as well as scorecards for each hospital and this was shared via e-newsletters, social media, email, and daily staff meetings. A qualitative study of workers on isolation wards during the swine flu pandemic in Hong Kong outlined how staff had been provided with fruit and vitamin tablets from their employer in appreciation of their efforts, and also had been rewarded with an extra day off.[46]

The value of displays of recognition was supported by findings from staff surveys during an 2009 influenza pandemic and 2020 COVID-19 pandemic which reported staff perceptions that their efforts were under-appreciated by the organisation[50] and that there should be greater acknowledgement of their value and contribution.[24] In a report following the SARS outbreak in Canada, more than half of nurses surveyed perceived that their work during the pandemic was not adequately respected or they were unsure if it was respected.[48]

Trust

The key element of trust between employees and the organisation was highlighted by the literature. A review of the impacts of pandemics on workers described trust as being essential to reduce employee perceptions of risk.[37] Authors of a survey study carried out in Saudi Arabia during COVID-19 pandemic concluded that an environment of trust and safety lead workers to feel safe and empowered, which then builds their resilience.[19] An online survey of nurses in the US during the COVID-19 pandemic reported fear and lack of trust in workplace

protection, perceptions of their employer not being truthful, and them not having worker safety as a priority.[20] Similarly, a UK qualitative study carried out during an influenza pandemic described a perception amongst workers that the employing organisation did not care or did not take their needs seriously.[50] A report on the SARS pandemic in Canada outlined a situation where healthcare workers' trust in their employer to safeguard them was broken, with a perception that leaders were poorly informed.[48]

Leadership

The important role of leadership within organisations was emphasised throughout the literature.[29, 39, 46, 47, 51] In a narrative review and a descriptive study, worker well-being during a pandemic was linked to their confidence in the organisations' ability to minimise infections and therefore their risk,[38] with trust in leadership a critical component.[51] A study in Saudi Arabia described worker perceptions of a poor organisational framework and poor leadership during the COVID-19 pandemic.[19] A qualitative study of experiences of frontline staff in the UK during the COVID-19 pandemic reported that "senior managers disappeared and gave instruction and criticism from afar".[41]

One of the included narrative reviews provides a table of strategies and tactics for leaders, which includes being decisive and confident, being flexible, clearly outlining support resources, looking at the bigger picture and building on the strengths of others.[39] Authors of three descriptive and one qualitative study recommended a management style which is flexible, supportive and encourages autonomy,[46] with transparent flexible leadership and empathetic and open communication,[59] and leaders being visible on the front line.[21, 47] The importance of leaders promoting a culture of well-being and advocating breaks and accessing counselling was outlined in a UK qualitative study and a US descriptive study.[21, 49] The qualitative study also advocated the training of leaders in well-being, morale and signposting.[21]

Staff empowerment

A key element of organisational culture reported was the empowerment of staff, and their ability to speak up and influence decision-making. A systematic review described the need for a personal sense of control,[30] and a survey evaluation of a UK well-being centre emphasised the need for a safe work environment which allowed workers to speak up when they have difficulties.[21] An online survey of over 2000 health employees in Turkey during the COVID-19 pandemic found that 20% perceived an inability to report concerns around protective equipment to managers.[27] This study recommended that the needs and demands of workers should be learned via meetings and feedback sessions. A qualitative study which explored experiences of frontline staff during the COVID-19 pandemic in the UK described perceived

"clear rifts between those staff with more and less power within the system" and clinician views being disregarded.[41] The study emphasised the importance of pathways of communication to enable the voice of workers at the frontline to be heard. Another qualitative study from the UK confirmed the need to take account of the experiences and concerns of frontline staff.[45] A further survey study of nurses in the US during the COVID-19 pandemic and descriptive report from Canada following the SARS epidemic confirmed the need to provide opportunities for workers to ensure their voices were heard.[20, 48] While these studies asserted the importance of staff being able to express their opinions, a systematic review found no statistical association between expressing opinions via a staff union and measures of mental health and well-being.[30]

A study from the US emphasised the need for workers to be enabled to communicate their concerns to managers.[47] This descriptive study which outlined approaches to worker safety during the COVID-19 pandemic, emphasised the need for communication structures which enabled organisations to learn from strategies which were being developed by frontline clinicians. The need for responsiveness to feedback was highlighted by a review of psychological and coping responses during pandemics.[29] The value of enabling and acting on feedback from workers was further highlighted by a descriptive report of a de-briefing initiative in the US which included feedback from the sessions to senior staff in the organisation. The study outlined that the feedback process had allowed leaders to successfully instigate changes in procedures.[58]

8. Training needs

Provision of training in stress management, resilience and coping,[29, 33, 37, 47] use of personal protective equipment[25, 30, 43, 51] and other skills needed for times of increased demand was reported to be a critical component of organisational intervention. [19, 21, 22, 24, 26, 47, 51, 57, 60]

A survey study recommended training in resilience at levels of the individual, team and organisation which should include the elements of foresight, coping and recovery.[47] A review of the psychological impacts of pandemics on workers also emphasised the need for preventive training relating to coping and resilience.[37] The need for clear procedures in regard to training on the use of personal protective equipment was reported by a US survey study which evaluated the use of respiratory protection during a swine flu outbreak,[25] and a US descriptive evaluation of COVID-19 well-being interventions.[51] Authors of a systematic review concluded that there was a suggestive trend that the provision of physical safety and training protects healthcare workers from developing mental health problems. In multivariate logistic regression analyses the perceived adequacy of training and support was negatively

associated with post-traumatic stress (β: -0.22, 95% CI -0.38 to-0.06, p = 0.01), burnout (β: -0.27, 95%CI -0.44 to 0.10, p = 0.002), and psychological disorder (β: -0.20, p = 0.03).[30]

Earlier survey work from Canada following a SARS outbreak also concluded that training had a protective effect on burnout and stress (poor coping and perceived adequacy of training and protection and support explained 18% of variance in burnout, and 21% in post- traumatic stress).[26] The authors highlighted that the degree of distress was not associated with exposure to patients, suggesting the work and environment as a whole were most influential. They recommended training in skills required for pandemics and preparation for future outbreaks. This should include training in skills that will be required when adaptation to the pandemic requires staff to work outside of their usual area of familiarity, and may also include training in psychological first aid and coping.[60] Although another study in contrast reported limited evidence that psychological first aid is effective.[36]

Other training recommended included education sessions on COVID-19, screening procedures and infection control,[24] and training on communicating with patient's families.[22] A descriptive study from Poland highlighted that centralised in-person staff training was important, as information was then based on reliable sources of information, and it allowed direct contact between staff and trainers. Furthermore, in-person training allowed practice of demonstrated procedures, and provided reassurance and the opportunity to ask questions.[57]

9. Staffing considerations

A key area of consideration during times of increased demand on services is staffing levels, as there can be personnel shortages stemming from both increased patient influx and also staff absenteeism (due to personal or family illness).[44] This potentially leads to the need for staff to be relocated to priority areas which might entail a change in their usual role. A review and a qualitative study suggested that moving staff to the care of patients with infectious disease should be voluntary wherever possible, and that organisations should take full account of the fact that exposure to infection poses a greater risk to some individual staff members than others.[31, 42] A survey of nurses in the US reported how there can be poor training for those who are redeployed,[20] with concerns described amongst staff in Saudi Arabia of not having sufficient ability in the new area,[47] These concerns were also voiced in a UK qualitative study, with staff perceiving they were not adequately skilled and potentially at risk of complaints and litigation regarding their competency.[50]

A systematic review recommended that the impact of changed job demands could be reduced by clear communication and definition of the changed duties.[30] The need to consider the feelings of staff classed as vulnerable who are deployed away from high risk areas was

highlighted, with descriptions of “survivor guilt” and “feeling worthless” in a UK qualitative study.[41]

A US qualitative study carried out during an influenza pandemic found that there had been challenges with the timely use of agency staff, as the system did not allow prediction of staff shortages and staff could only be sought once shortages has become apparent but could not be predicted in advance.[44] A study from Saudi Arabia emphasised the need for an organisational culture which uses available resources efficiently and effectively.[19] A systematic review emphasised the need for detailed manpower allocation[30] and a descriptive study advocated a whole of the health workforce approach including public health and clinical care roles, those training and retired.[59]

Discussion and conclusions

This systematic review identified and synthesised 42 sources which provide learning for healthcare organisations on where to focus attention to staff health and well-being during periods of increased demand on services. We identified studies relevant to times of epidemic and pandemic, but were unable to identify any literature relating to the well-being of staff during periods of increased seasonal (winter) demand. The literature we identified, and the areas of focus reported however, may be relevant to other periods of greater than usual demand.

The literature distiniguishes nine key areas of focus for consideration and organisational action: policy and strategy; practical needs of staff; the working environment; access to mental health support; peer support; communication within the organisation; organisational culture; training needs and staffing. Within these areas of focus we categorised components of interventions reported in the literature. While we have reported these as individual components, we acknowledge that many will overlap. This is particularly in regard to organisational culture, where trust, leadership, and staff empowerment are likely to be inter-linked, and also in regard to communication within the organisation, which may underpin many of the other elements.

The evidence available for review was predominantly primary studies which provided descriptive reports of initiatives (13 studies) rather than evaluative data, or narrative reviews (seven studies) which provided an overview of literature rather than systematic evaluation. We identified only one primary study which took measurements both before and after introduction of an intervention in order to evaluate its effectiveness.[40] The other studies which provided

empirical data used survey methods (eight studies) or qualitative methods (seven studies) to explore staff perceptions and experiences. It is important to recognise therefore that the recommendations made are limited by the quality of the evidence available.

Considering each of our research questions in turn:

1. What is the evidence of effectiveness of system-level interventions to support staff physical and mental well-being during times of particular pressure or crisis in health services?

The review found a paucity of literature which evaluated the effectiveness of organisational-level interventions. A small number of studies however, reported associations between organisational interventions and staff mental well-being as outlined below:

- There was very limited evidence (one narrative review) of an association between organisational interventions and increased resilience and avoidance of burnout.[33]
- There was very limited evidence (one before and after study) of an association between a wellness programme (which included training, working hours reduction, a mental health team, personal protective equipment and nutritional supplements) and reduced anxiety and depression.[40]
- There was very limited evidence (one survey) that a well-being centre may lead to greater well-being but no difference in job stressfulness, job satisfaction, presenteeism or turnover intentions in those who access it. [21]
- There was very limited evidence (one survey) of an association between training and reduced burnout and stress.[26]

In addition, some studies drew associations between characteristics of organisations and staff mental well-being as below:

- There was limited evidence (one systematic review) of an association between support from supervisors and colleagues and reduced post-traumatic stress and psychiatric symptoms.[30]
- There was limited evidence (one systematic review) of an association between perceived adequacy of psychological support from an employer and lower psychiatric morbidity.[36]
- There was very limited evidence (one survey) of an association between a culture of support for staff, and bolstered resilience and reduced burnout and stress.[26]

- There was limited evidence (one systematic review) of an association between perceived adequacy of training and support and reduced post-traumatic stress, burnout, and psychological disorder.[30]

2. What factors may enable or act as barriers to implementation of these interventions?

We identified no evidence which related to processes of implementation for organisation-wide interventions.

3. What is the evidence regarding effectiveness for different sub-groups of staff e.g. professionals versus lower paid staff, different local areas, and national versus local programmes?

We identified little evidence regarding differential effects of organisational interventions on groups of staff. One review suggested that physicians were less affected than nurses by personal factors which were associated with poorer outcomes (coping abilities, resilience, psychiatric history).[37] This study also commented that nurses have more intense physical exposure to infected patients than physicians, which may suggest that actions require adapting to different professional groups. Our review included studies with populations of practitioners, nurses, emergency department professionals, intensive care unit staff, frontline staff, non-professional staff, all hospital employees, and workers caring for patients with infectious disease, with little comment from authors regarding the need for different actions or effects. Some studies reported that nurses were the predominant group to access interventions which had been introduced, and contrasted this with the small numbers of physicians.[27, 55] This may suggest that groups of staff have different needs or access requirements. Other authors emphasised the need to ensure that all staff (not just those working directly with patients) should be considered when planning organisational actions. [48, 52, 59] While many studies described their populations in general terms such as “healthcare staff” or “healthcare workers”, there seemed to be a dominance of employees in hospital settings, with no studies which specified that they included workers in community (primary care/non-hospital) settings.

4. Are there particular features of effective interventions during different types of crisis, for example are there particular system level approaches required during a COVID-type pandemic which differs from other stress points?

We identified literature relating to epidemics and pandemics (SARS, influenza, COVID-19, Swine Flu, MERS), and no literature relating to seasonal demands. We are therefore not able to compare whether times of increased demand due to outbreaks of infectious disease may require particular organisational interventions that are not applicable to times of seasonal demand. Studies spanned the years 2002 to 2020, and it is noteworthy that many of the findings and author conclusions from historic epidemics and pandemics (such as SARS) are echoed by the current literature relating to the COVID-19 pandemic.

Strengths and limitations

This systematic review was undertaken by an experienced team, including methodological experts. We followed a protocol developed in collaboration with the NIHR HS&DR programme team as the review was designed to provide timely information to stakeholders, and to help clarify research priorities. The protocol was registered prospectively with the PROSPERO database of systematic review protocols.

We performed a search for published literature dating back to 2002 (the date of the SARS-CoV-1 pandemic) supplemented by reference list checking of included sources. We are aware that given the current COVID-19 pandemic that there are many new studies in preparation or published since our searches were carried out. We updated the searches which had been run in November 2020, in January 2021 in order to include as much recent literature as possible. We have commented above that it is interesting to note that findings of studies dating back to 2002 often include similar messages to that of very recent sources. When we added the extra studies identified in our updated search, no new areas of focus or new components of interventions were added. We conjecture that continuing to add studies may have only further saturated the findings.

A strength of the review is that we considered both quantitative and qualitative data, with the evidence regarding views and perceptions of staff providing key insights into actions taken by organisations, particularly given the dearth of robust quantitative evaluations. In the narrative synthesis, we drew on both these sources of evidence to provide a detailed examination of how and where intervention elements may be beneficial. We have summarised the evidence from the studies using a framework which we hope will be helpful for decision-makers and organisational leaders needing a summary overview.

We acknowledge that there was no engagement with stakeholders to discuss the findings of the review and implications. Given the rapid nature of this review and the con-current pandemic, engagement activities were not possible to undertake.

We acknowledge that there is a considerable body of evidence on organisational interventions from non-healthcare settings, and it may be that this has relevance to examining organisational responses to workforce crises in healthcare.

Implications for service delivery

We have identified the following implications for service delivery which should be considered with regard to the limited evidence available:

1. Actions at a whole organisation level are required to address staff health and well-being, in addition to those targeting individual workers' mental health.

2. Actions are needed to address the practical needs of staff including child care, adequate nutrition, resting areas, transport to work, protection of workers, and protection of workers' families.

3. The organisational culture should support a staff well-being approach, with recognition of efforts and positive feedback, mechanisms to ensure staff feedback is heard and acted upon, and leadership which inspires trust that staff well-being is a concern.

4. Communication systems within organisations should provide clear and timely information to staff.

5. Attention should be paid to developing peer support systems within teams. Some evidence suggested that optimising mutual support systems within teams could be more valuable for many staff than providing individual-targeted interventions.

6. Ease of access to mental health support should be considered, to ensure that staff requiring this input are able and have time to access.

7. Monitoring and support of staff who are isolating or shielding is important as they are at risk of mental health difficulties.

8. There should be consideration of needs of staff in pre-planning for times of increased demand, during periods of increased demand, and continued support post- periods of increased demand.

9. Staff training needs include psychological preparedness such as resilience, in-person PPE training, and other training in preparation for pandemics.

Implications for research

We have identified the following implications for further research:

1. There is a need for higher quality evaluative designs (in particular comparing baseline to follow up) to provide further evidence regarding the effectiveness of organisational interventions.
2. There is a need for exploration of organisational interventions to address staff health and well-being outside hospital settings. Currently there is little evidence regarding implementation of organisational interventions, and whether findings are generalisable between hospital and other settings.
3. There is currently a lack of evidence regarding actions to address staff health and well-being during times of seasonal increased demand on services. Needs during these periods may differ from times of infectious disease outbreaks.
4. We identified a dearth of evidence regarding optimal implementation processes for organisation-wide interventions.
5. We found only one study which considered the working environment and effects on staff, with changes to the working environments potentially an avenue worthy of further exploration.
6. It may be helpful to investigate the applicability of research on crisis management from non-healthcare settings, and also to further draw on the wider organisational literature in future studies.

Conclusions

We identified nine key areas of focus for consideration and organisation-wide action during periods of increased demand on services: policy and strategy; practical needs of staff; the working environment; access to mental health support; peer support; communication within the organisation; organisational culture; training needs and staffing. Within these areas of focus we categorised components of interventions reported in the literature. While there may often be a focus on interventions which target individual workers' mental health and well-being (such as online wellness materials or counselling), the evidence suggests that organisation-wide interventions such as ensuring a culture of staff well-being, encouraging peer support systems, and implementing actions to address basic staff needs can have a positive effect on stress, burnout, and post-traumatic stress. It is noteworthy that many of the findings and author conclusions from past epidemics and pandemics are echoed by the current literature

relating to the COVID-19 pandemic. This suggests that organisational responses to maintain the health and well-being of staff during times of increased demand continue to require attention.

Disclaimer

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Data sharing

Any additional data not included in this report and its appendices are available on request. All queries should be submitted to the corresponding author.

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Appendices

Appendix 1. Search strategy

Example database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily <1946 to September 28, 2020>

Search Strategy:

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1 Mental Health/ (39250)

2 Mental Disorders/ (163343)

3 (well-being or well being).ti,ab. (92947)

4 mental health.ti,ab. (146254)

5 Depression/ (120481)

6 depress$.ab,ti. (463694)

7 Anxiety/ (82022)

8 exp Anxiety Disorders/ (79709)

9 anxiet$.ab,ti. (194788)

10 Suicide/ (39436)

11 suicid$.ab,ti. (78427)

12 Health Status/ (82149)

13 "Quality of Life"/ (197470)

14 health$.ab,ti. (2776814)

15 exp Health/ (368536)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 (3700129)

17 health workforce/ or exp health personnel/ (529152)

18 "nhs staff".ab,ti. (562)

19 "nhs workforce".ab,ti. (112)

20 17 or 18 or 19 (529593)

21 16 and 20 (169960)

22 Pandemics/ (31302)

23 pandemic$.ab,ti. (48631)

24 exp coronavirus/ (34337)

25 exp Coronavirus Infections/ (36584)

26 ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw,kf. (2002)

27 (coronavirus* or coronovirus* or coronavirinae* or CoV or HCoV*).ti,ab,kw,kf. (44053)

28 ("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARScoronavirus2 or "SARS-coronavirus-2" or "SARScoronavirus 2" or "SARS coronavirus2" or SARScoronovirus2 or "SARS-coronovirus-2" or "SARScoronovirus 2" or "SARS coronovirus2").ti,ab,kw,kf. (56157)

29 (respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,kf. (523)

30 (("seafood market*" or "food market*" or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,kf. (1587)

31 ((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei or China* or Chinese* or Huanan*)).ti,ab,kw,kf. (306)

32 Middle East Respiratory Syndrome Coronavirus/ (1325)

33 ("middle east respiratory syndrome*" or "middle eastern respiratory syndrome*" or MERSCoV or "MERS-CoV" or MERS).ti,ab,kw,kf. (5796)

34 ("severe acute respiratory syndrome*" or SARS).ti,ab,kw,kf. (29487)

35 ("SARS-CoV-1" or "SARSCoV-1" or "SARSCoV1" or "SARS-CoV1" or SARSCoV or SARS-CoV or SARS1 or "SARS-1" or SARScoronavirus1 or "SARS-coronavirus-1" or "SARScoronavirus 1" or "SARS coronavirus1" or SARScoronovirus1 or "SARS-coronovirus-1" or "SARScoronovirus 1" or "SARS coronovirus1").ti,ab,kw,kf. (20367)

36 or/24-35 (86416)

37 Influenza A Virus, H1N1 Subtype/ (15446)

38 (h1n1 or "swine flu" or "swine adj3 influenza").ab,kf,kw,ti. (18201)

39 Influenza, Human/ (49736)

40 (flu$ or influenza$).ab,ti. (1675746)

41 or/22-40 (1771750)

42 21 and 41 (5271)

43 Health Promotion/ (74270)

44 ((organi?ation$ or workplace$ or workforce$ or staff$) adj3 (intervention$ or program$ or project$ or support$)).ab,ti. (28219)

45 ((promot$ or support$ or service$ or project$ or program$ or priorit$) adj3 (emotion$ or health$ or well-being or "well being" or wellness)).ab,ti. (301492)

46 or/43-45 (370340)

47 42 and 46 (758)

48 limit 47 to humans (742)

49 limit 48 to english language (706)

50 limit 49 to yr="2002 -Current" (504)

Additional focused search for seasonal demand literature

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily <1946 to October 27, 2020>

Search Strategy:

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1 Mental Health/ (39723)

2 Mental Disorders/ (163754)

3 (well-being or well being).ti,ab. (93786)

4 mental health.ti,ab. (147222)

5 Depression/ (121205)

6 depress$.ab,ti. (465175)

7 Anxiety/ (82536)

8 exp Anxiety Disorders/ (79905)

9 anxiet$.ab,ti. (196032)

10 Suicide/ (39582)

11 suicid$.ab,ti. (78619)

12 Health Status/ (82534)

13 "Quality of Life"/ (198843)

14 health$.ab,ti. (2792168)

15 exp Health/ (370677)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 (3718008)

17 health workforce/ or exp health personnel/ (531414)

18 "nhs staff".ab,ti. (563)

19 "nhs workforce".ab,ti. (111)

20 17 or 18 or 19 (531855)

21 16 and 20 (171197)

22 Pandemics/ (36929)

23 pandemic$.ab,ti. (52981)

24 exp coronavirus/ (39116)

25 exp Coronavirus Infections/ (42273)

26 ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw,kf. (2176)

27 (coronavirus* or coronovirus* or coronavirinae* or CoV or HCoV*).ti,ab,kw,kf. (49089)

28 ("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCoV or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARScoronavirus2 or "SARS-coronavirus-2" or "SARScoronavirus 2" or "SARS coronavirus2" or SARScoronovirus2 or "SARS-coronovirus-2" or "SARScoronovirus 2" or "SARS coronovirus2").ti,ab,kw,kf. (64825)

29 (respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,kf. (537)

30 (("seafood market*" or "food market*" or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw,kf. (1634)

31 ((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei or China* or Chinese* or Huanan*)).ti,ab,kw,kf. (313)

32 Middle East Respiratory Syndrome Coronavirus/ (1371)

33 ("middle east respiratory syndrome*" or "middle eastern respiratory syndrome*" or MERSCoV or "MERS-CoV" or MERS).ti,ab,kw,kf. (5948)

34 ("severe acute respiratory syndrome*" or SARS).ti,ab,kw,kf. (32888)

35 ("SARS-CoV-1" or "SARSCoV-1" or "SARSCoV1" or "SARS-CoV1" or SARSCoV or SARS-CoV or SARS1 or "SARS-1" or SARScoronavirus1 or "SARS-coronavirus-1" or "SARScoronavirus 1" or "SARS coronavirus1" or SARScoronovirus1 or "SARS-coronovirus-1" or "SARScoronovirus 1" or "SARS coronovirus1").ti,ab,kw,kf. (23449)

36 or/24-35 (95654)

37 Influenza A Virus, H1N1 Subtype/ (15501)

38 (h1n1 or "swine flu" or "swine adj3 influenza").ab,kf,kw,ti. (18192)

39 Influenza, Human/ (49968)

40 (flu$ or influenza$).ab,ti. (1679683)

41 or/22-40 (1784719)

42 21 and 41 (5576)

43 Health Promotion/ (74553)

44 ((organi?ation$ or workplace$ or workforce$ or staff$) adj3 (intervention$ or program$ or project$ or support$)).ab,ti. (28357)

45 ((promot$ or support$ or service$ or project$ or program$ or priorit$) adj3 (emotion$ or health$ or well-being or "well being" or wellness)).ab,ti. (303030)

46 or/43-45 (372146)

47 42 and 46 (800)

48 limit 47 to humans (784)

49 limit 48 to english language (747)

50 limit 49 to yr="2010 -Current" (545)

51 winter demand$.ab,ti. (3)

52 winter pressure$.ab,ti. (79)

53 winter surge$.ab,ti. (11)

54 Seasons/ (107508)

55 Cold Temperature/ (51645)

56 51 or 52 or 53 or 54 or 55 (157260)

57 16 and 20 and 46 and 56 (48)

58 limit 57 to humans (48)

59 limit 58 to english language (45)

60 limit 59 to yr="2002 -Current" (29)

61 60 not 50 (11)

Appendix 2. Grey literature sources identified via website searching

NHS staff well-being Grey Lit search (Completed 17th and 18 November 2020)

Institute for Employment Studies

Health and Well-being Interventions in Healthcare: a rapid evidence review
https://www.employment-studies.co.uk/system/files/resources/files/556.pdf?utm_source=The%20King%27s%20Fund%20newsletters%20%28main%20account%29&utm_medium=email&utm_campaign=11910401_NEWSL_HMP%202020-10-23&dm_i=21A8,73A4H,MJWSNV,SNQFY,1

Kings Fund

Response to the Health and Social Care Select Committee inquiry into workforce burnout and resilience in the NHS and social care. 2020. https://www.kingsfund.org.uk/sites/default/files/2020-10/Health-social-care-select-committee-evidence-submission-workforce-burnout_0.pdf

NHS England

Supporting staff health and well-being https://www.england.nhs.uk/nhsbirthday/get-involved/work-well/supporting-staff-health-and-well-being/

NHS People well-being support https://people.nhs.uk/

Google search

NHS Employers - Health and Well-being https://www.nhsemployers.org/retention-and-staff-experience/health-and-well-being

NHS Improvement – A focus on staff health and well-being. 2018. https://improvement.nhs.uk/resources/focus-staff-health-and-well-being/

NHS Health at Work Network https://www.nhshealthatwork.co.uk/health-well-being.asp

DH Health and Well-being Strategy https://www.nhshealthatwork.co.uk/dh-strategy.asp

The Government's Work and Health Unit https://www.nhshealthatwork.co.uk/health-work-well-being.asp

NHS recovery to put staff well-being at its heart https://www.gov.uk/government/news/nhs-recovery-to-put-staff-well-being-at-its-heart

NHS England. NHS Long Term Plan – 5. Supporting our current staff https://www.longtermplan.nhs.uk/online-version/chapter-4-nhs-staff-will-get-the-backing-they-need/5-supporting-our-current-nhs-staff/

Covid Support – DPS framework https://www.nhshealthatwork.co.uk/dpsframework.asp

NHS Practitioner Health – COVID-19 Workforce Well-being https://www.practitionerhealth.nhs.uk/covid-19-workforce-well-being

Royal College of Physicians – Work and well-being in the NHS: why staff health matters to patient care. 2105. https://www.rcplondon.ac.uk/file/2025/download

Nottingham University Hospitals – Staff well-being https://www.nuh.nhs.uk/staff-well-being/

NHS Health Education England – 2019. NHS Staff and Learners' Mental Well-being Commission
https://www.hee.nhs.uk/sites/default/files/documents/NHS%20%28HEE%29%20-%20Mental%20Well-being%20Commission%20Report.pdf

East London NHS Foundation Trust Staff Well-being
https://www.elft.nhs.uk/Professionals/Information-for-ELFT-Staff/People--Culture/Staff-Well-being

King's Health Partners – COVID-19 Staff health and well-being
https://www.kingshealthpartners.org/our-work/mind-and-body/staff-health-and-well-being

Appendix 3. Studies excluded at full paper screening

Aiello A, Khayeri MY, Raja S, Peladeau N, Romano D, Leszcz M*, et al.* Resilience training for hospital workers in anticipation of an influenza pandemic. *J Contin Educ Health Prof* 2011;**31**:15-20.

Al Knawy BA, Al-Kadri HMF, Elbarbary M, Arabi Y, Balkhy HH, Clark A. Perceptions of postoutbreak management by management and healthcare workers of a Middle East

respiratory syndrome outbreak in a tertiary care hospital: a qualitative study. *BMJ open* 2019;**9**:e017476.

AlAteeq DA, Aljhani S, Althiyabi I, Majzoub S. Mental health among healthcare providers during coronavirus disease (COVID-19) outbreak in Saudi Arabia. *Journal of Infection and Public Health* 2020;**13**:1432-7.

Albott CS, Wozniak JR, McGlinch BP, Wall MH, Gold BS, Vinogradov S. Battle Buddies: Rapid Deployment of a Psychological Resilience Intervention for Health Care Workers During the COVID-19 Pandemic. *Anesthesia and analgesia* 2020;**131**:43-54.

Alquezar-Arbe A, Pinera P, Jacob J, Martin A, Jimenez S, Llorens P*, et al.* Impact of the COVID-19 pandemic on hospital emergency departments: results of a survey of departments in 2020 - the Spanish ENCOVUR study. *Emergencias* 2020;**32**:320-31.

Anonymous. The medical workforce BC (Before Covid-19): the 2019 UK consultant census. 2020.

Anonymous. Caring for people who care: supporting health workers during the COVID 19 pandemic. *EClinicalMedicine* 2020;**28.**

Asmundson GJG, Taylor S. How health anxiety influences responses to viral outbreaks like COVID-19: What all decision-makers, health authorities, and health care professionals need to know. *Journal of Anxiety Disorders* 2020;**71.**

Austin Z, Martin JC, Gregory PA. Pharmacy practice in times of civil crisis: The experience of SARS and the blackout in Ontario, Canada. *Research In Social & Administrative Pharmacy* 2007;**3**:320-35.

Bajorek Z HJ. *Health and Well-being Interventions in Healthcare. A rapid evidence review*. London: Institute for Employment Studies; 2020.

Basta NE, Edwards SE, Schulte J. Assessing Public Health Department Employees' Willingness to Report to Work During an Influenza Pandemic. *Journal of Public Health Management and Practice* 2009;**15**:375-83.

Bielicki JA, Duval X, Gobat N, Goossens H, Koopmans M, Tacconelli E*, et al.* Monitoring approaches for health-care workers during the COVID-19 pandemic. *The Lancet Infectious Diseases* 2020;**20**:e261-e7.

Blake H, Bermingham F, Johnson G, Tabner A. Mitigating the Psychological Impact of COVID-19 on Healthcare Workers: A Digital Learning Package. *International Journal of Environmental Research & Public Health* 2020;**17**:26.

Boorman S. *NHS Health and Well-being - Final Report*. London: Department of Health; 2009.

Boustead K, McDowall K, Baker KF, Pareja-Cebrian L, Gibson L, Cunningham M*, et al.* Establishing a healthcare worker screening programme for COVID-19. *Occupational Medicine* 2020;**70**:456-7.

Bridson TL, Jenkins K, Allen KG, McDermott BM. PPE for your mind: a peer support initiative for health care workers. *Medical Journal of Australia* 2021;**214**:8-11.e1.

Butler-Jones D. Canada's public health system: Building support for front-line physicians. *CMAJ* 2007;**176**:36-7.

Calo F, Russo A, Camaioni C, De Pascalis S, Coppola N. Burden, risk assessment, surveillance and management of SARS-CoV-2 infection in health workers: a scoping review. *Infectious Diseases of Poverty* 2020;**9**:139.

Calo F, Russo A, Camaioni C, De Pascalis S, Coppola N. Burden, risk assessment, surveillance and management of SARS-CoV-2 infection in health workers: A scoping review. *Infectious Diseases of Poverty* 2020;**9**.

Cantu L, Thomas L. Baseline well-being, perceptions of critical incidents, and openness to debriefing in community hospital emergency department clinical staff before COVID-19, a cross-sectional study. *BMC Emergency Medicine* 2020;**20**:82.

Capolongo S, Gola M, Brambilla A, Morganti A, Mosca EI, Barach P. COVID-19 and healthcare facilities: A decalogue of design strategies for resilient hospitals. *Acta Biomedica* 2020;**91**:50-60.

Carenzo L, Costantini E, Greco M, Barra FL, Rendiniello V, Mainetti M*, et al.* Hospital surge capacity in a tertiary emergency referral centre during the COVID-19 outbreak in Italy. *Anaesthesia* 2020;**75**:928-34.

Carlson AL, Budd AP, Perl TM. Control of influenza in healthcare settings: early lessons from the 2009 pandemic. *Current opinion in infectious diseases* 2010;**23**:293-9.

Carmassi C, Cerveri G, Bui E, Gesi C, Dell'Osso L. Defining effective strategies to prevent post-traumatic stress in healthcare emergency workers facing the COVID-19 pandemic in Italy. *CNS Spectr* 2020; 10.1017/S1092852920001637:1-2.

Carmassi C, Foghi C, Dell'Oste V, Cordone A, Bertelloni CA, Bui E*, et al.* PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. *Psychiatry Research* 2020;**292.**

Challener DW, Breeher L, Frain J, Swift MD, Tosh PK, O'Horo J. Healthcare Personnel Absenteeism, Presenteeism, and Staffing Challenges during Epidemics. *Infection Control and Hospital Epidemiology* 2020.

Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L*, et al.* Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry* 2020;**7**:e15-e6.

Chen W, Huang Y. To Protect Health Care Workers Better, to Save More Lives with COVID-19. *Anesthesia and Analgesia* 2020.

NHS Confederation. Covid-19 and the health and care workforce: supporting our greatest asset. 2020: London, NHS Confederation,

Conversano C, Marchi L, Miniati M. Psychological distress among healthcare professionals involved in the COVID-19 emergency: Vulnerability and resilience factors. *Clinical Neuropsychiatry* 2020;**17**:94-6.

Damery S, Wilson S, Draper H, Gratus C, Greenfield S, Ives J*, et al.* Will the NHS continue to function in an influenza pandemic? A survey of healthcare workers in the West Midlands, UK. *BMC Public Health* 2009;**9**:142.

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de Vroege L, van den Broek A. UpdatesMental support for health care professionals essential during the COVID-19 pandemic. *Journal of Public Health* 2020;**42**:679-80.

Demartini K, Konzen VM, Siqueira MO, Garcia G, Jorge MSG, Batista JS*, et al.* Care for frontline health care workers in times of covid-19. *Revista da Sociedade Brasileira de Medicina Tropical* 2020;**53**:1-3.

Dewey C, Hingle S, Goelz E, Linzer M. Supporting Clinicians During the COVID-19 Pandemic. *Ann Intern Med* 2020;**172**:752-3.

Dow AW, DiPiro JT, Giddens J, Buckley P, Santen SA. Emerging From the COVID-19 Crisis With a Stronger Health Care Workforce. *Academic Medicine* 2020;**95**:1823-6.

Draper H, Wilson S, Ives J, Gratus C, Greenfield S, Parry J*, et al.* Healthcare workers' attitudes towards working during pandemic influenza: a multi method study. *BMC Public Health* 2008;**8**:192.

Duncan DL. What the COVID-19 pandemic tells us about the need to develop resilience in the nursing workforce. *Nursing management* 2020;**27**:22-7.

Dunn M, Sheehan M, Hordern J, Turnham HL, Wilkinson D. 'Your country needs you': the ethics of allocating staff to high-risk clinical roles in the management of patients with COVID-19. *Journal of medical ethics* 2020;**46**:436-40.

El-Hage W, Hingray C, Lemogne C, Yrondi A, Brunault P, Bienvenu T*, et al.* Health professionals facing the coronavirus disease 2019 (COVID-19) pandemic: What are the mental health risks? *Encephale* 2020;**46**:S73-S80.

Enback S. Covid-19 insights: impact on workforce skills. 2020.

Ey S, Soller M, Moffit M. Protecting the Well-Being of Medical Residents and Faculty Physicians During the COVID-19 Pandemic: Making the Case for Accessible, Comprehensive Wellness Resources. *Global Advances In Health and Medicine* 2020;**9**.

Feinstein RE, Kotara S, Jones B, Shanor D, Nemeroff CB. A health care workers mental health crisis line in the age of COVID-19. *Depression and anxiety* 2020;**37**:822-6.

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Appendix 4. Table 4. Extraction table

Author Year Location	Study population Sample size Context	Study design	Aim of study/research question Outcomes	Main findings	Main author conclusion Other notes
Alanezi 2021[19] Saudi Arabia	102 practitioners, mostly nurses or senior physicians 7 hospitals During covid pandemic	Online questionnaire, Lickert ratings	Explore attitudes of practitioners towards management of pandemic	Key challenges included work overload, lack of training, insufficient staff, poor operational framework for managing the pandemic, poor leadership, poor organizational culture, lack of healthcare resources, and lack of support from government, community, and people. Need for an organizational culture that uses the available human and material resources efficiently and effectively, and minimizes work overload. 70% of responders agreed or strongly agreed that organisational culture was poor. 67% agreed or strongly agreed that leadership was poor. 70% agreed or strongly agreed that the organisational framework for managing the pandemic was poor.	Key factors - communication, effective leadership, coordination and work planning, strict compliance with hospital rules and procedures, preventive and regulatory measures, and training and support for health professionals

				Workload management, collaboration between teams, sharing responsibilities, effective leadership, and information sharing across the teams are important aspects. Effective communication needed at level of stakeholders to develop procedures and maintain resources, but also at level of team members and across teams in order to share workload, effective leadership and management. 80% of respondents agreed or strongly agreed that debriefing after a shift is an important part of team cohesion.	
Arnetz 2020[20] US	Nurses, during covid N=455	Online survey	To explore perceptions of feelings of stress amongst nurses	Work-related problems included: relationships with co-workers, perceived workplace administrative failings, and being assigned to new departments without training. Fear and lack of trust in workplace protections, lack of trust in employer perception of not being truthful and not having worker safety as a priority. Poor training for re-deployment. Reports of not having enough PPE, cleaning supplies, ventilators, and testing supplies. Descriptions of having to re-wear PPE, unclear PPE guidelines, and	Organisations should provide opportunities for nurses to discuss the stress they are experiencing, support one another, and make suggestions for workplace adaptations

				physical discomfort related to wearing PPE.	
Azizodden 2020[58] US	2 hospital ED departments. Physicians, medical residents, nurses, PAs, emergency service assistants, pharmacists, case managers, and emergency radiologists and technicians. During Covid-19	Descriptive	Evaluation of nightly, technology-based 30 minute debriefing discussions with ED clinicians. Reports of the discussions were shared with leadership and leaders responded.	51 sessions held, 47% attended by at least on de-briefer and one participant. Average 3 per group, 81 clinicians joined, no resident physicians. 24 sessions in the first 40 days of the programme, attendance dropped off towards the end. Part of quality improvement programme. Outcomes – many related to patient care, but ones relating to clinician well-being were: education was provided during faculty meeting and through web-based learning opportunities, during faculty meetings, individual experiences with mindfulness apps were discussed and encouraged, daily huddle topics were adjusted to include introductions to new team members who were joining the ED team during surge, schedule re-evaluations including shorter shifts and increased back up options for clinicians, mental health professionals presented to MD and PA groups about coping strategies and validated complex responses during COVID-19.	The clinical debriefing program cultivated ED clinicians' abilities to connect offsite through technology, and provided an optional and confidential avenue to share their critical concerns with department leaders. Feedback allowed leaders to instigate changes in procedures.

Barello 2020[28] N/A	Health care workers (HCWs) providing direct patient care during an influenza pandemic 13,711 (quant); 246 (qual) Studies following SARS, H1N1 and MERS epidemics and during COVID-19 pandemic	Rapid review of the literature Peer reviewed articles in English, Spanish or Italian that focused on the effects on perceived stress or psychological responses or psychosocial functioning or mood status in HCWs were included No formal QA	To assess the available literature on perceived stress and psychological responses to influenza pandemics in HCWs and identify implications for healthcare practice and future research.	36 studies were included. Both quantitative and qualitative studies found that HCWs reported frequent concerns regarding their own health and fear of infecting families, friends and colleagues. Social isolation, fear of stigmatisation and reluctance to work/absenteeism were frequently reported. Studies highlighted high prevalence of stress, anxiety and depression symptoms, with potential long-term consequences for HCWs' mental health. Preventive strategies were classified as policy, organisational or person-directed: Policy: Develop a strategic plan for future outbreaks; develop public campaigns to protect HCWs Organisational: Offer favourable work conditions; provide PPE; recognise efforts and provide positive feedback; promote personal coping strategies Person-directed Practical: Provide accurate and timely information; provide training Personal: Psychological support before, during and after pandemic; promote mutual support within	Conclusion: Studies suggested investing in preventive psychological, social, family and physical support and guaranteeing reasonable work conditions to protect HCWs from the long-lasting psychological effect of the COVID-19 pandemic. Note: Studies were not required to report an intervention and it appears that the preventive strategies discussed were derived from authors' discussions rather than being directly evaluated.

				teams; provide social support for HCWs' families; provide physical support	
Bennett 2020[41] UK	N=44 frontline healthcare workers 27 doctors, 13 nurses, 2 physiotherapists, 1 radiographer, 1 healthcare assistant and 10 'other' including managers. Providing care to patients with covid	Qualitative Participants accessed a website to leave an anonymous 5 minute "story"	To explore experiences of working during covid-19 pandemic	Frequently reported disconnect between senior management and front- line staff, with clinicians' views and requests reported as being disregarded. Risk was perceived as being disproportionately assigned to the front line and there was a perception that those who were most vulnerable (such as BAME front-line workers) were not adequately protected by insufficient risk assessments. Senior managers "disappeared" and were perceived to be giving instructions, advice and criticisms from afar. Staff who were re-deployed due to health risks reported "survivor guilt" and feeling "worthless".	The voices of workers at the front- line need to be heard and the effects of stress mitigated. There were clear rifts between 'workers' and 'management', senior and junior colleagues, and those with more or less power within the system. Pathways of communication between each group, and subgroups within them (such as people from black, Asian and minority ethnic backgrounds or those with legitimate personal health concerns) need to be established or re- established.
Blake 2020[21] UK	Any employees of two sites of an acute hospital 14,934 visits, n=819 completed survey, 52% frontline	Monitoring of use during 17 week period, online survey of employees (users and non-users). Two well-being centres.	To evaluate a well-being centre (respite room). Volunteer well-being "buddies"/support workers available at the centres to	Attendance peaked during mid April and then declined May to July. Total resource cost was £15,644. **List of benefits of the centre included** - Time out/work break Rest and Relaxation More hydrated	Well-being was higher in those that accessed a well-being centre. Well-being was lowest in younger staff and lower paid staff, and non-nursing clinical support workers and ambulance

	workers, 37% working in Covid high risk area. 67% nursing/allied health professions		provide emotional support if needed and signposting	Improved mental well-being/less stressed Social contacts/Peer support Access to charitable donations Better work relationships More positive outlook Chance to eat Getting personal health or well-being advice Changes to work activities Signposted to other services Getting job-related information or advice Other benefit **Barriers reported included** – Break not long enough Room too far away Unable to take a break Prefer to take a break in private Not felt the need Remote working/working from home Lack of awareness of the centres Not enough space/seating No well-being Buddy available Other barriers Participant satisfaction ratings with the well-being centres ranged from 1–10 (mean = 8.15, s.d. = 2.27). No significant differences in perceived job stressfulness, job satisfaction, presenteeism or turnover intentions between those	workers reported lower well-being than any other occupational group. Employers should offer multiple dedicated well-being areas intended solely for rest and recuperation. Ideally, these should be proximate to, but separate from, clinical areas and should not be dual purpose. Target promotion of well-being initiatives to staff groups that may have particular well-being concerns or challenges with access to support. Embrace a culture of well-being through top-down promotion and advocacy of well-being and visibility of leaders. Ensure policy is in place around protected work breaks and undertake monitoring and evaluation of how policy is being implemented. Provide line manager training and support to

				who did, or did not, access a centre. Mean scores for the UWES dedication subscale (enthusiasm, inspiration, and proud of work) were significantly higher for those staff who accessed a well-being centre (m = 5.02, s.d. = 1.14) compared to staff who did not access a centre (m = 4.83, s.d. = 1.15).	increase awareness of well-being policy and the importance of work breaks with relation to fatigue, dehydration and physical or mental ill-health. Raise awareness of presenteeism and the risks to potential healthcare-associated COVID-19 transmission, staff mental well-being and staff morale amongst managers. Train line managers or dedicated team members in psychological first aid and signposting. Build psychologically safe work environments that allow workers to speak up when they have high stress, low well-being or have physical or mental ill-health. Provide multiple support options. Give reward and recognition for excellence and engagement, foster teamwork and collaboration,

					demonstrate a clear growth path—invest in education and continual learning.
Borgeault 2020[59] Canada	None Covid-19	Descriptive overview	Description of workforce requirements during pandemics	Employers should - integrate explicit health workforce requirements in pandemic response plans, Take a whole of the health workforce approach.	
Carmassi 2020[22] Italy	Healthcare workers (HCWs) caring for patients with COVID-19 in Codogno Hospital and Pisa University Hospital Sample size not reported COVID-19 pandemic in Italy up to May 2020	Descriptive	To describe and report preliminary outcomes of a programme to prevent post-traumatic stress in HCWs during the COVID-19 pandemic	HCWs frequently had risk factors for PTSD, including being female and young or middle-aged with young children. This was exacerbated by features of the disease itself (rapidly increasing number of patients, rapid worsening of symptoms leading to death, lack of effective treatments, need for isolation etc.) and its impact on the health system (frequent reorganisation and need to work outside normal speciality and team structures). Codogno Hospital (Lodi) rapidly deployed mental health support to first-line HCWs in collaboration with researchers at the Pisa University Hospital (Psychiatric Clinic), based on their expertise developed in recent years, in particular during the L'Aquila	Conclusion: supporting HCWs' mental health requires diverse interventions which should be implemented both in the immediate aftermath of the COVID-19 crisis and in the longer term.

				earthquake. The service was provided by a psychiatrist and a psychologist. HCWs were reluctant to access the psychological interventions, requiring instead support for patient management. Technological support for communicating with patients' families and allocating specific times to do this was helpful for both HCWs and families. As the number of patients decreased over time, requests for psychological support increased. A screening programme for acute stress, anxiety and depressive symptoms was implemented.	
Chen 2006[40] Taiwan	Nurses caring for patients with SARS N=116 Largest hospital treating patients with SARS in Taiwan	Longitudinal questionnaire study	To assess anxiety, depression and sleep quality before, during and after caring for SARS patients with support from a 'SARS prevention programme' Zung's self-rating anxiety scale, Zung's self-rating	Anxiety and depression scores decreased from moderate levels at the outset to mild after 2 and 4 weeks. Sleep quality scores remained poor but estimates using general estimating equations to control for changes over time and possible confounders indicated a statistically significant improvement.	Conclusion: the rapid deployment of a comprehensive prevention programme should be a priority of governmental authorities when facing an epidemic Note: The 'SARS prevention programme' included in-service training (53 classes). Unit-

			depression scale, Pittsburgh sleep quality index Outcomes measured before, 2 and 4 weeks into the programme and 1 month after the hospital returned to its normal role		based work assignments were made weekly, three or four units caring for SARS patients while others rested. Working hours were limited to 8h/day. Adjustments to staffing were made according to the number of SARS patients admitted. Nutritional supplements were available to nursing staff. The staff had personal protective equipment, including scrub suits, isolating dresses, surgical caps, sterilized gloves, foot wraps, N95 masks, surgical masks, P100 masks, and safety glasses. A mental health team consisting of psychiatrists, social workers, psychological counsellors and psychiatric nurses were available to both patients and medical staff. A mental health clinic was opened for healthcare workers

Chew 2020[29] n/a	HCWs dealing with infectious disease outbreaks, including Ebola, MERS and SARS Sample size unclear	Rapid review of the literature	To review the literature on psychological and coping responses and identify implications for supporting HCWs during the COVID-19 pandemic	Twenty three studies were included (15 quantitative, 8 qualitative); 17 studies focused on SARS, 5 on Ebola and 1 on MERS. Included studies reported that training provided by their institutions was helpful in managing psychological stress, particularly when combined with adequate PPE and infection control. Support from hospital leadership was also important and took the form of special recognition, financial compensation, facilities to relieve stress and boredom, and appropriate shift patterns. Several studies reported on the value of psychosocial or psychological support (e.g. clinics, workshops, mentoring or a buddy system) set up or provided by their institution.	Conclusion: Institutional support for HCWs should focus on clear communication; maintaining access to resources for psychological support; empowerment of self-help groups; early identification of 'at risk' individuals; and responsiveness to staff feedback. Note: Data extraction focused on psychological and coping responses; source of evidence on institutional support was indicated but limited data reported
Cowden 2010[23] USA	HCWs employed by the Children's Hospital, Denver, Colorado Context: planning for possible	Cross-sectional survey (February to June 2007)	To determine the relationship between healthcare worker (HCW) reporting willingness to work during a pandemic and perception of job importance,	Overall, 60% of respondents (464/778) reported willingness to work. Expecting to be asked to work and having a high level of professionalism were associated with reported willingness. Support staff were less likely to report willingness compared with clinical staff. Concern for personal safety,	Conclusion: Educational programmes should focus on professional responsibility and the importance of staying at home when ill. Targeted programmes for hospital infrastructure support and patient and family support

	influenza pandemic Sample size: 778 (31% response rate)		belief that one will be asked to work, and sense of professionalism and to assess HCWs' opinions regarding specific policy issues as well as barriers and motivators to work during a pandemic	concern for safety of family, family's concern for safety, and childcare issues were important barriers to coming to work. Authors noted that the role of patient and family support staff would be critical in the event of a pandemic, although support for staff mental health was not mentioned.	staff stressing the essential nature of these jobs may improve willingness to work. Institutions should evaluate whether policies to mitigate the identified barriers would be effective and/or feasible Note: Assumes measures to support willingness to work may also improve well-being in that situation. Authors note there is no evidence on correlation between reported and actual willingness to work. Interventions to prevent staff working when ill should also benefit health, at least at the individual level.
De Brier 2020[30] N/A	33 studies (32 cross-sectional) included 23 SARS outbreak, seven during the current COVID-19 pandemic and three during	Systematic review Used vote counting based on direction of effect by comparing the number of	To identify factors linked to worker mental health	HCWs who were quarantined (100%, 95%CI [48%;100%], p = 0.063) have worse mental health outcomes. Support and adequate insurance and compensation by the organization was significantly associated with relieved feelings of	Clear communication and support from the organization, social support and personal sense of control are protective factors. Reduce the impact of changing job demands

	the MERS outbreak	comparisons showing harm and benefit		anger (β: 0.24, 95%CI [0.13;0.35], p = 0.000). Implementing a supportive prevention program substantially improved symptoms of anxiety and depression. Perception of adequate counselling and psychological support statistically lowered the psychiatric morbidity of HCWs (OR: 0.53, 95%CI [0.31;0.89], p<0.05) Perceived adequacy of training and support was negatively associated with post-traumatic stress (β: -0.22, 95%CI [-0.38;-0.06], p = 0.01), burnout (β: -0.27, 95%CI [-0.44;0.10], p = 0.002) [39], and psychological disorder (β: -0.20, p = 0.03). Trust in precautionary measures, equipment and infection control initiatives also protected HCWs from emotional exhaustion (β: -0.15, 95%CI [-0.26;-0.05], p = 0.005).	(such as unfamiliar tasks, changing working conditions, work overload). HCWs that are quarantined should receive continuous support from supervisors and colleagues. Provision of information, clear communication and efficient organization could partially contribute to a sense of control. Normalize stress reactions and praise achievements. Promote the idea of challenge instead of threat.

				Support from supervisors and colleagues is beneficially associated with posttraumatic stress (OR: 0.33, 95% CI [0.16;0.69], p = 0.003) and psychiatric symptoms (OR: 0.35, 95% CI [0.17;0.69], p = 0.003).	
Demartini 2020[31] Brazil	15 articles included. Interventions to support frontline health care staff during the Covid-19 pandemic.	Literature review (not systematic) Searches to May 2020. Medline/Pubmed, Scielo, Lilacs, and Web of Science. "coronavirus," "Covid-19," "healthworkers," "caregivers"	Approaches to develop care for frontline health care workers in the time of Covid-19.	Importance of physical and mental care for health workers. Resting accommodation and temporary family isolation (family members could share in the worker's routine). Redistribution of staff to care for patients positive for COVID-19 should be voluntary where possible. Risk factors for psychological distress include: being younger, inexperienced, parents to dependent children and quarantined, having an infected family member, lacking practical support, and stigma. Strategies: clear communication, access to adequate individual protection, sufficient rest, and practical and psychological support.	A sensitive view of care for health care workers is needed to maintain quality of service and health of frontline workers. Discursive recommendations

Donnelly 2020[54] UK	1 paediatric intensive care unit (PICU) Glasgow Covid-19 pandemic.	Descriptive report. Interventions put in place to support staff well-being.	Aim to create a safe and supportive environment for the benefit of all members of the team. Also reactive supportive structure to help those members of staff who have an overwhelming unexpected crisis.	Practical supportive strategies within the PICU using a well-being approach and peer support. Well-being included: Non-clinical space to take a break (away from clinically focused staff room) including, well-being boards and mental health resources, hot drinks, water filters, healthy foods and comfy cushions. "Positivi-Tree"- laminated messages to share small positive achievements with the team. PICU team badge and support phone calls for team members relocated elsewhere. "Thank you NHS" teacups, shower facilities and "Going home checklist" to end the day positively. Friday Zoom sessions for "coffee and a chat to discuss anxieties and concerns as well as share coping strategies and positive messages. Weekly quiz. Rescue strategy: Take a minute room: anxieties and concerns as well as share their coping strategies and positive messages. Critical Care Peer-Support Network with other departments. Planning for the future.	Opportunity to design well-being interventions aiming for practical solutions that are welcomed, effective, and sustainable. A novel service that focuses on caring for the staff. Descriptive only – no indication of effectiveness.

Draper 2010[42] UK (same study as Ives)	Non - professional health care workers (ancillary ward staff, porters, laboratory staff, hospital laundry workers and hospital cleaners). Influenza pandemic.	Focus groups and survey 9 focus groups and 5 interviews (n=64) Survey 3000 health care workers	Do non-professional healthcare workers—porters, domestic service workers, catering staff, clerks, IT support workers, etc.—have an obligation to work to work during an influenza pandemic.	Considered: being in a position to do good, the ethics of work, competing obligations to family members and in particular to children and the obligations of citizens in a state of national emergency. Concerns: how they would get to work if there was disruption to public transport or fuel shortages; or, if they had children, how they could work if schools were closed. Concern that working would require parents to give less priority to the needs of their own sick children, or to settle for unsatisfactory childcare. Providing this support to clinical colleagues is something in which the A&C workers are trained and are arguably best placed to do, but this specialised skill and ability is not as hard for others to acquire as some other professional skills are – therefore burden could be more widely shared. However, in many cases the risk would not be any greater than being anywhere else in the community during the pandemic. For those working in	Compulsion to work during a pandemic should not be restricted to non-professionals who happen to be working in the health service at the time. Rather, compulsion involving a larger pool of people with the relevant skills and abilities is more equitable.

				close proximity to infection, effective PPE is widely available and used correctly, the risks may be reduced to a level that does not justify a refusal to help. However, for those workers for whom the possibility of infection poses a greater than normal risk to health, their own risk is greater. Risks to family can be mitigated. The use of PPE reduces the risk of 'taking the virus home'. Likewise, changing clothes and showering before leaving work, and even voluntary quarantine at work, will reduce the risk to families of healthcare workers engaged in this work. Some non-professional participants suggested voluntary quarantine as a solution to the problem of bringing the virus home. But being provided with accommodation had little impact on respondents' reported likelihood of working. The idea that there is a duty to pull together at a time of crisis was supported by the vast majority of survey respondents.	

				Reciprocity: The most obvious thing that is owed is some protection against infection which would likely include PPE and vaccination (when available).	
Gómez-Durán 2020[32] Spain	12 articles One cohort study, seven cross-sectional studies and four qualitative studies.	Systematic review (rapid review) quarantine" AND "psych*" OR "mental health" OR "depress*" OR "posttrauma*"	Outcome: psychological impact of quarantine on healthcare Workers Web of Science databases	Quarantine among HCWs is associated with considerable psychological distress with psychopathologies, such as acute stress disorder, PTS symptoms, depressive symptoms and alcohol abuse or dependency symptoms. Studies reported acute stress during quarantine and long-lasting depressive, posttraumatic stress and alcohol dependency and abuse symptoms afterwards. Healthcare workers fear infection for themselves, but more so for their loved ones. They reported stigma as a result of virus exposure and were also concerned about how the stigma may affect their families, most especially their children. Suitable alternative accommodation and personalised	There is a need to develop mental health actions aimed at protecting healthcare workers and to establish a consensus regarding psychological interventions for healthcare workers during quarantine.

				monitoring during quarantine are useful intervention measures to prevent adverse effects in healthcare workers. Clear public health communication will help reduce uncertainty, guilt and stigma. Financial aid should be considered for the more severely affected workers. The development of efficient referral paths and the provision of counselling or psychotherapy during the confinement period are an opportunity for early mental health interventions.	
Gonzalez 2020[53] USA	1 hospital (New York) Covid-19 pandemic.	Descriptive report. Interventions put in place to support staff well-being.	Overview of mental health initiatives implemented at an academic medical centre to support health care workers during Covid-19.	Disaster Mental Health Team met twice weekly (early 2020 and now meets once a week to update and coordinate activities, evaluate efforts, and revise as needed. Team Lavender is an interdisciplinary team response that can be called to provide holistic support following an adverse event (e.g. Covid-19). Important to maintain basic needs (i.e., rest or relaxation, nutrition, physical activity, sleep, and social connectedness):	Supporting health care workers during and post-disaster needs to be a collaborative interdisciplinary effort. Engage all available support resources. Provide in-person support options (if possible). Prioritise the most basic needs, including rest, nourishment, and safety. Descriptive data only. No effectiveness information.

				Laminated posters that included wellness tips and strategies for protecting mental health throughout the hospital. Converted a 10-bed paediatric unit to an employee respite area, open 24/7 - provides a place to rest, shower, receive emotional support, and re-energize with snacks beverages and aromatherapy, soothing music, TV, and other de-stressing activities (e.g., adult colouring books). Supplied by donations. Within 7 weeks of opening, the respite area has had over 10,000 visits. Employees interviewed by local reporters noted positive experiences that have contributed to their sense of well-being. In-person, real-time support most effective means for engaging hospital workers. Psychiatric nurses offer in-person support, including meditations, empathic listening, encouragement, and support resource flyers. Physical, occupational, and recreational therapists visit hospital units to offer de-stress exercises, including stretches and mindful breathing, and provide snacks.	

				Microsoft teams: Wellness Champions channel posts local and national mental health resources and strategies for managing stress, with contributions by various professionals, including psychologists, chaplains, and social workers Community Messages of Support channel, which hosts the Not All Heroes Wear Capes initiative, where employees can view photos and over 500 video messages of support received from local community members (also printed out and posted). Virtual Support Group team: three times a day. Spiritual care hotline (chaplaincy): 9-5 and 24hr answerphone. Department of Psychiatry & Behavioural Health helpline for employees and their family members that provides immediate counselling and other resources, including brief COVID-19 mental health counselling.	
Halcomb 2020[24]	N=637	Online cross-sectional survey	To identify Australian primary	7 categories of perceived support needs: personal protective	Maintaining quality PHC nursing as part of the

Australia	Registered nurses currently working in a primary health care setting: general practice (351; 55.1%), community nurses: (106; 16.6%), other roles (180; 28.3%). Female 613, 96.2%. April 9-20th 2020.	(Survey Monkey). Free text response to one question. Purposefully designed and piloted (6 responses).	health care (PHC) nurses' immediate support needs during the COVID-19 pandemic.	equipment (PPE), communication, funding, industrial issues, self-care, workplace factors and valuing nurses. 77.2% identified the need for access to an adequate supply of PPE, plus clear protocols about the appropriate use of PPE. 55.4% referred to the need for high level communication support including 'continuous up to date information' to be provided in a 'consistent and clear' format in a single location'; clear patient management and infection control protocols, and practical education sessions on COVID-19, screening procedures, infection control considerations and management of patients. Public education and a need to reduce 'confusion in messaging' was also important. 11.0% of statements were concerned with the funding required to support the provision of quality PHC nursing care. Threatened employment/lack of job security and employment	multidisciplinary primary health care team care has the potential to address health and social issues within the community, reduce secondary morbidity and mortality and promote health. The supports identified in this paper should inform pandemic planning into the future.

				conditions (fair pay and leave) was also mentioned (no % given). 4.0% recognized the need for nurses to engage in self-care strategies in order to stay well through access to both informal and formal (funded) mental health services. (3.7%) were about the supports required to maintain quality care related to factors associated with individual workplaces, and (3.1%) focussed on how participants felt that greater acknowledgement of their value and contribution to the pandemic would support their practice.	
Heath 2020[33] Australia	Covid—19 pandemic. Example interventions appear to be from one hospital in Toronto, Canada.	Narrative review Descriptive data – some occasional detail on effectiveness of specific interventions.	To review available literature on strategies for minimising the psychological impact of the COVID-19 pandemic on clinicians and to identify pro-active holistic approaches which may be beneficial for	Preventative strategies are needed to build resilience and avoid burnout in healthcare workers. Both institution and individual level interventions are required. Self-care: , physical activity has shown promising effects on decreasing rates of burnout in clinicians; good sleep hygiene is important; strong meaningful relationships, both personally and professionally; finding meaning and value in one's work;	It is essential that strategies to promote resilience in clinicians are developed and implemented to counter this psychological distress. Some strategies require substantial lead time and potentially challenging negotiations with organisational stakeholders, other

			healthcare workers both for the current crisis and into the future.	pre- and post-preventative counselling; Schwartz rounds (evidence-based forum for healthcare staff to speak about the emotional and social challenges); mindfulness practice and stress management approaches; all associate with building resilience and reduced burn out. Organisational justice (workplace cultures that ensure fairness, respect and social justice): good communication and supportive professional relationships; manage expectations clearly and compassionately, clarify work hours and provide sufficient resources including the just distribution of effective personal protective equipment; enabling adequate sleep and providing access to rest areas for hospital-based clinicians; associated with reduced burnout. Individual strategies: interventions should target evidence-based mediators of psychological distress, identified as job stress, interpersonal isolation, perceived mistrust or fear by others, social support	strategies can be implemented quickly and easily such as: mindfulness interventions; Battle Buddies; and staff feedback sessions.

				barriers, fear of contagion, concern for family health and treating ill colleagues. Appropriate training in use of PPE and up-skilling work duties. Example of a computer-based resilience training module (Canada): knowledge-based modules with content such as: what to expect in a pandemic; what is resilience; normal stress response; working outside your comfort zone; moral dilemmas; work life balance; and getting help. Other modules promoted cognitive interactivity and included relaxation skills and interactive reflective exercises. Identified four variables deemed likely to mediate stress responses in a pandemic: confidence in support and training; pandemic self-efficacy (ability to respond adaptively); coping style; and interpersonal problems. Alternate strategy of didactic education sessions for healthcare workers: training sessions focused on provision of information about normal stress response, and introduced and reinforced	

				principles of effective coping, principles of organisational resilience and resources for further support. Participants reported feeling better prepared to confidently cope with a pandemic after the session. Anticipate, Plan and Deter Responder Risk and Resilience model: create individualised resilience plans in the pre-incident phase training. Organisational strategies: example of the Psychosocial Pandemic Committee (PPC). The committee was responsible for running education training sessions and enabled open lines of communication. The intervention had three levels of support: a Battle Buddy system to provide peer support; unit level support through appointing a mental health consultant; and individual support for at-risk individuals.	
Hines 2014[25] US	23 larger hospitals New York Emergency Department Healthcare workers and	Observation Questionnaire	To evaluate awareness and use of respiratory protection guidance/standards	All hospitals had respiratory protection policies in place, but key components of respiratory protection programmes were missing in many.	While most hospitals had programmes, common deficiencies recorded included incomplete programme components, inappropriate respirator

	managers n=198 Post H1N1 pandemic			Clear written policies and procedures for use, care and maintenance of respirators was in 60-65% of plans. Guidance on choosing the type of respirator which would be the best fit for each individual employee was included in 65.2% of plans. Record keeping and availability of the programme was sufficient in around half of plans (52.2%). Adequate training on respirators was included in 65.2% of plans. Less than half of plans (47.8%) contained an evaluation component. Only 39.1% of hospitals had a designated administrator for the plan. Knowledge and awareness of the plan was high and staff reported equipment being available, over 90% reported receiving training. Selection of the appropriate PPE for specific tasks and infectious disease was a common issue.	selection, failure to perform the seal check when donning a respirator, and unawareness of best practices for the reuse of respirators in the event of a shortage.
Ives 2009[50] (same study as Draper)	N=9 interviews, unclear how many focus group participants. Variety of healthcare workers	Qualitative interviews and focus groups	To explore views about working during an influenza pandemic	Perceived barriers to the ability to work included being ill oneself, transport difficulties, and childcare responsibilities. The study suggests that providing accommodation, building reciprocity, and provision of information and guidance etc may	Effect changes that prevent barriers to willingness to work from becoming insurmountable barriers to ability to work. Need for a policy of education and communicating

	including professionals and ancillary workers, three different healthcare settings			contribute to increasing willingness to work, which will then have the effect of increasing the ability to work. Participants did not believe that the efforts of HCWs would be reciprocated or rewarded. Worry that any PPE provided would be the 'cheaper alternative' and concern that workers would receive little guidance or decision-making support. Lack of information was a key theme across all groups, with the majority finding the lack of information and engagement a de-motivator to work and gave many the impression that their employing Trust did not care about them or take their needs seriously. The majority of participants said they had been given neither information about pandemic influenza, nor been made aware of what would be expected of them during such a crisis. Both clinical and non-clinical participants were worried about being asked to perform a role they had not been trained for, and had concerns both about being a danger to patients and being	emergency plans to staff, outlining what is known, what is not known, and what is expected of them. HCWs may not necessarily expect to be told all the answers, but they want to be kept in the loop and to be reassured that when information becomes available it will be communicated to them. Encourage the feeling that the needs of workers are being acknowledged. Encourage team cohesion in small units Providing transport, accommodation and useful and timely information to staff as well as demonstrating to them that they are needed and valued is important

				subject to litigation if something went wrong. Some participants believed that NHS staff generally felt so under-valued and underappreciated that some would be unlikely to report for work if they thought they were at personal risk.	
Kang 2018[43] Korea	N=7 Infection control nurse leaders. Hospitals from 2 cities. During and after SARS	Qualitative Focus groups	To explore barriers to using PPI	Difficulties observed were ill-fitting sizes (all one size only so didn't fit smaller women), anxiety, confusion from unstandardized protocols (these changed and developed so caused confusion), doubts about PPE quality and effectiveness (wanted evidence on hours PPE effective for), and complexity of using several PPE items together. Layout of hospital made spaces for PPE challenging.	Females were most hampered by the one size fits all PPE. Training was important to improve PPE use.
Krol 2020[57] Poland	One large general hospital, 27 wards, 850 beds plus diagnostic facilities, outpatient clinics, emergency ward	Description	To describe how the hospital was re-designed to become a dedicated Covid-19 centre	Wards divided into observation (patients awaiting test results) and isolation wards for patients with confirmed covid. Administrative and staff offices/social spaces were re-located outside the wards with communication via visuals and walkie-talkies. An air lock was installed at the entrance to each ward for donning and removing PPE at beginning and end of a shift.	Central training was important, based on reliable sources of information, allowed direct contact between staff and trainers, allowed practice of demonstrated procedures and provided reassurance and opportunity to ask questions. Large team of instructors ensured rapid roll out. Set of clear and

				Maximum duration of work in the ward was 4 hours. Staff used FFP2/FFP3 class respirators at all times when entering a ward. Number of times staff exited from wards limited with separate transport for pharmacy, laboratories and waste. Two pairs of gloves – outer removed between each patient. Other actions – patients with suspected covid entered via specific entrances. Specific routes for suspected covid patients to travel through hospitals. Separate lifts for staff and materials, and for patients. Some exits from the lifts blocked. Lifts disinfected after each use. Staff training – simulation of a ward entrance set up in a conference room, team of instructors. Procedures for donning and doffing PPE demonstrated to groups of trainees. Trainers visited nurses in each ward. Specific 30 minute sessions for cleaning staff using a simulated ward. Use of two operating theatres during one surgery Use of two scrub rooms to allow one way system for removal of PPE. 1100 staff members trained over a 2 week period.	concise safety procedures developed, local conditions of wards taken into account. Printed versions of PPE procedures given to staff after training sessions were well received.

				Not evaluated formally.	
Krystal 2021[49] USA	Healthcare workers and staff in Yale School of Medicine and the Yale New Haven Health System (YNHHS) Sample size unclear	Descriptive case study (some quantitative data)	To describe the actions taken to support healthcare workers and other staff In Yale University and the YNHHS in the context of the COVID-19 pandemic Outcomes: Use of services	Interventions were offered at the community, team and individual level. Community: Stress and resilience Town Halls (meetings); Mindfulness sessions; Support, educational and CBT materials via website Team: Unit/department level Town Halls; buddy system and peer support; Palliative care huddles; Psychological medicine and social work consultation; Leadership initiative Individual: Employee Assistance Programmes (EAPs); 24/7 hotlines via EAPs; Web-based 1 to 1 programme; Wellness checks; Quiet Reset Rooms near high-acuity areas; Meals for caregivers; Housing for HCWs wishing to reduce risk to family members. General Town Halls attracted reasonable attendance at first (50-70) but this decreased over time while remaining high for the dedicated meetings targeting particular groups. Uptake of counselling was low (only 7.7% of those who initially expressed interest)	Key lessons learned were: focus on dedicated rather than general 'Town Halls'; mobilise department and section leaders as advocates for counselling; stress related to childcare was particularly common, leading to creation of an 'in-home provider network' to support those with young children; persistent racism created further challenges and refocusing support to encompass the impact of racism and health disparities was critical to support for the workforce. The authors also noted a need to identify long-term stress resulting from COVID-19; ensure sustainability of support; and promote culture change within the organisation towards identifying and treating mental illness in HCWs.

Lefevre 2021[55] France	Healthcare workers and staff of Cochin Hospital (APHP, Paris) 379 people recording >800 visits over 4 weeks	Descriptive case study	To describe a programme developed to provide support for hospital caregivers during the COVID-19 pandemic (the Port Royal Bulle (Bubble)) Outcomes: Use of the service and initial feedback	The Bubble is a dedicated area open from 9am to 9pm 7 days a week offering HCWs a range of support and activities away from the clinical areas of the hospital. The area is covered by strict hygiene protocols (described). The reception area, staffed by health professionals, offers a welcoming environment and access to psychological support. Users can access a range of activities designed to promote relaxation and reduce stress, including massage therapy, Pilates or strength training, sophrology and shiatsu. The Bubble also includes a sitting area (with further support available) and a garden. After 4 weeks, the Bubble had received over 800 visits from 379 people (median 3 visits). Nurses comprised 57% of visitors; physicians, technical and administrative staff each 11%; and nurses' aides 10%. In an informal survey by e-mail, users expressed their appreciation of the service and hoped that it might continue after the pandemic.	The Bubble is a programme that is simple to set up and appears to meet user expectations. Making it permanent and enlarging its scale, as a complement to existing services, may help to support health professionals in their work.
Magill 2020[34] NA	Front line HCWs dealing with	Rapid literature review	Research questions: What are the anticipated	Ninety-four articles were included. Most health workers exhibited some adverse psychological	System-level interventions may alleviate distress for most health workers

	major 21st century epidemics and pandemics (SARS, MERS, Ebola and swine flu) Sample size unclear		mental health sequelae for frontline health workers? What are best practices during health emergencies to address the mental health needs of these workers? Outcomes: occurrence of common, moderate and severe adverse mental health outcomes and interventions to address them	experiences during outbreaks, with stress and anxiety being most common. Some studies reported effects lasting up to 3 years after the outbreak. Hospital-level interventions included clear and consistent communication, public support an affirmation, training and provision of PPE. The review included a wide range of interventions for people with moderate symptoms, including individual and group therapy, peer support groups and narrative writing workshops. These approaches are evidence-based but few have been systematically evaluated in the setting of an epidemic or pandemic. A minority of health workers showed symptoms requiring referral to more specialised services.	without the need for specialised mental health interventions. Referral to therapeutic services and specialised care may be needed in around 50% and 15% of cases, respectively (authors' summary estimates). A stepped-care approach can support appropriate allocation of resources.
Maunder 2006[26] Canada	13-26 months after SARS Hospital workers from 13 hospitals in Toronto N=769 Workers providing care to SARS patients and not in SARS	Survey	To investigate adverse outcomes post epidemic	Variance in adverse outcomes (burnout, distress, post-traumatic stress) was explained by a protective effect of the perceived adequacy of training and support. Poor coping, perceived adequacy of training and protection and support explained 18% of variance in burnout, 21% in post- traumatic stress.	Effective staff support and training in preparation for future outbreaks is required. Enhanced training and support may reduce burnout and post-traumatic stress.

	hospitals, 73% nurses			The extent of distress was not associated with degree of exposure to patients, suggesting the hospital environment and healthcare work as a whole were most influential.	Effective staff support may bolster resilience.
Maunder 2008[60] Canada	Described as based on evidence from SARS outbreak	Descriptive/ discussion	Learning lessons from SARS for a potential influenza pandemic	Need to build trust, and collaborative, interdisciplinary relationships which can provide the basis for formal and informal support during a crisis. Training in skills that will be required when adaptation to the pandemic requires staff to work outside of their usual area of familiarity, and may also include training in psychological first aid and coping.	There is a need to develop an organisation culture of resilience. This is more than providing training and counselling. Need for organisational justice (includes the degree to which supervisors take their employees' viewpoints into account, deal with subordinates in a fair and truthful manner and fairness in formal decision making procedures.
Muller 2020[35] Norway	59 studies Most on prevalence of mental health issues. Only 6 on interventions.	Systematic review (rapid review) Norwegian Institute of Public Health's Live map of covid-19	Identify mental health care interventions for health care workers (HCW) in the Covid-19 pandemic	Six papers reported on interventions but did not discuss their effectiveness. These included those targeting organizational structures ("comprehensive psychological intervention" for quarantine HCW to reduce worries about family health), those	Most studies did not report comparative data for non HCW or prior to the pandemic. There seems to be a mismatch between risk factors for adverse mental

		evidence ((11 May 2020) includes PubMed, CDC and Embase.		facilitating team/collegial support (video/telephone support), and those addressing individual complaints or strategies (online questionnaire and psychiatrists and psychologists providing psychological care to HCW). HCWs reported low interest in professional help, and greater reliance on social support and contact.	health outcomes among HCWs in the current pandemic, their needs and preferences, and the individual psychopathology focus of current interventions.
Ontario Ministry of Health and Long Term Care 2006[48] Canada	Two hospitals and rehabilitation unit in Toronto	Descriptive, reports surveys, government and hospital documents, confidential interviews, public hearings	Report of the SARS commission to investigate the introduction and spread of SARS in Ontario	Two-thirds of nurses reported in a survey that they felt their health and safety had been compromised during the SARS outbreak. More than half felt their SARS work was not adequately respected or they were unsure if it was respected. Profound lack of awareness within the health system of worker safety best practices and principles. Failure to recognize in hospital worker safety the precautionary principle that reasonable action to reduce risk, like the use of a fitted N95 respirator, need not await scientific certainty. Wisdom and prudence of taking a precautionary approach in the absence of scientific certainty.	Key areas - communication, preparation, planning, accountability: who's in charge, who does what, worker safety • systems: infection control, surveillance, independent safety inspections, resources: people, systems, money, laboratories, infrastructure, precautionary principle: action to reduce risk should not await scientific certainty

				Infection control and worker safety operated as two separate elements. The trust of health workers in the ability of government, safety laws, and their employers to safeguard them and their colleagues was broken. Health workers learned that those in charge were poorly informed and inadequately advised to make pronouncements on worker safety and personal protective equipment. Poor communication exacerbated a confusing and terrible time. Directives failed to provide the detailed advice that health workers, their supervisors and their employers needed. All workplace parties, including front-line health workers, employers, unions should provide in a timely manner clear direction and information regarding guidelines for work refusals, pregnant workers and immunocompromised workers. Risk communication to staff should reflect a precautionary approach, that it is better to err on the side of caution, especially when dealing with a little-understood new disease like SARS.	

				There was no process in place to ensure that the voices and experience of front line workers were heard. Concerns, which turned out to be well founded, were dismissed, and the well-intentioned messages of the hospital were disconnected from front-line staff concerns. Listen more carefully to the reasonable concerns of health worker unions which have enormous front-line experience in the actual problems of worker safety on the ground. Value of a safety culture in health workplaces. Expressions of this safety culture included the close cooperation and mutual respect between infection control and worker safety, the emphasis on listening to health workers, and the deployment of joint teams of infection control and worker safety experts. Safety-related attitudes and actions of management play an important role in creating a good or bad safety climate.	
Pandemic Influenza Preparedness Team 2011[38] (Bish et al.)	24 papers included	Systematic review	Evidence on willingness to work during a pandemic	Gender, age and caring responsibilities have an influence on willingness to work during a pandemic. Safety concerns influence willingness to attend for	No studies have developed and tested measures to reassure healthcare workers about

				work during a pandemic. Confidence in ability to minimise the risk of being infected with influenza is associated with willingness to work.	their safety during pandemic influenza
Pollock 2020[36]	16 studies. Health and social care professionals working at the front line during infectious disease outbreaks. SARS: 2; Ebola: 9; MERS: 1; COVID-19: 4	Systematic review (Cochrane) Searches 2002-2020. Cochrane Database of Systematic Reviews, CENTRAL, MEDLINE, Embase, Web of Science, PsycINFO, CINAHL, Global Index Medicus databases and WHO Institutional Repository for Information Sharing. Trials registers. Google Scholar.	To assess the effects of interventions aimed at supporting the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic. Barriers and facilitators impacting on interventions. Outcomes: general mental health and resilience, plus psychological symptoms of anxiety, depression or stress; burnout; other mental health disorders; workplace staffing;	Studies included workplace interventions including: training, structure and communication (6 studies); psychological support interventions (e.g. counselling and psychology services (8 studies); and multifaceted interventions (2 studies). One cluster-randomised trial (mixed methods study), which looked at the effect of a work-based intervention, provided very low-certainty evidence about the effect of training frontline healthcare workers to deliver psychological first aid on a measure of burnout. The two factors which authors reported were barriers to intervention implementation were: frontline workers, or the organisations in which they worked, not being fully aware of what they needed to support their mental well-being; and a lack of	The authors did not have "high confidence" in any of the findings; they report moderate confidence in six findings and low to very low confidence in 11 findings for the barriers and facilitators. There is a lack of both quantitative and qualitative evidence from studies carried out during or after disease epidemics and pandemics that can inform the selection of interventions that are beneficial to the resilience and mental health of frontline workers.

			and adverse events arising from interventions.	equipment, staff time or skills needed for an intervention. Three factors were facilitators of intervention implementation: interventions that could be adapted for local needs; having effective communication, both formally and socially; and having positive, safe and supportive learning environments for frontline workers. The knowledge or beliefs, or both, that people have about an intervention can act as either barriers or facilitators to implementation of the intervention.	
Preti 2020[37] N/A	44 studies included. Any pandemic (SARS, MERS, Covid, Ebola, Influenza	Rapid review – quantitative studies	To summarise evidence on the psychological impacts of pandemic outbreaks on healthcare workers	Personal factors associated with poorer outcomes – coping abilities, resilience, psychiatric history, physicians less affected than nurses. Confidence in protective measures, training, and organizational support were all related to less severe psychological outcomes (8 studies) If resources are limited, interventions should be focused on frontline HCWs, since they are more likely to undergo maladaptive	Preventive interventions are needed so workforce better able to cope during pandemic – training related to coping and resilience required. Pre-disaster training and education can improve employees' confidence in their ability to cope with disasters. Trust between organizations and workers essential to

				psychological consequences, particularly nurses as they have more intense physical exposure to infected patients.	reduce risk perception amongst workers.
Rangachari 2020[47] US	Hospital intensive care unit during Covid-19 pandemic	Descriptive Reports the organisation used listening sessions to hear worker concerns and explore what workers needed from leaders. Also describes "workarounds" that staff developed on the ICU.	To use an organizational resilience framework to discuss the potential impact of a stoic approach to worker safety	Eight sources of anxiety described by healthcare workers: adequate access to PPE; exposure to COVID-19 at work and taking the infection home to family; inadequate access to COVID-19; uncertainty about whether their organization would support their needs if they develop infection; access to childcare during school closures; support for additional needs (food, lodging, transportation); ability to provide competent care in a new area and inadequate communication and information. Resilience at three levels – worker, team and organisation. Three elements – foresight, coping, recovery. Meaningful support for emotional distress will enable healthcare workers to trust that their organization has their backs.	Create an environment of trust, psychological safety, and empowerment to enable individual workers to communicate patient safety concerns to managers. Develop communication structures to enable the organization to learn from the clinician problem-solving strategies and enable communication systems to promote learning.

				Leaders must acknowledge unprecedented challenges faced by healthcare workers and encourage individuals to ask for help and rely on each other for support. Leaders need to be visible on the frontlines during the pandemic, more than ever.	
Ripp 2020[51] US	One large hospital New York City 40000 employees. Already had a system of well-being champions for medics within departments.	Description of elements of programme, no evaluation	To describe their approach to addressing well-being of the workforce during the covid-19 pandemic	Material support, staff preparation and training, and trust that the leadership cares for staff well-being are all critical components. Employee, Faculty, and Trainee Support Task Force established which conducted a rapid staff needs assessment. Used a work group strategy to review and operationalise plans. Needed co-operation and collaboration from various groups including HR, and departments. The task force ensured close connections with workers and system, hospital and departmental leaders. **Basic needs** - System-wide provision of food for staff and physicians, free or reduced-cost options for staff to order, onsite call room food options, on-campus option, local hotel options (reduced	Three key areas - meeting the basic needs of the workforce, enhancing communications to ensure up to date, reliable and reassuring messages, and developing a robust array of easily accessible psychosocial and mental health support options.

				rates), free parking, reduced-cost/free car rentals, free bike rental options, clear guidelines for use of and updates on status of PPE, provision of scrubs, clear guidelines for reducing exposure for self and loved ones, online tool to link employees, faculty, trainees in need of childcare with available services. **Communications** - website with pandemic resources and well-being resources, town halls with leadership and infection prevention personnel (weekly to a few times per week), department/division emails (daily updates, with information distilled to fit group), department/division conference meetings (daily to weekly) to allow for information sharing, and questions and concerns to be raised. **Psychosocial and mental health support** - virtual mindfulness, yoga, music therapy, social networking groups, free apps for the above, virtual social worker-/psychologist-facilitated support group, spiritual care support groups, system-wide peer support hotline, employee assistance program counselling, spiritual care	

				one-on-one counselling, government/non-profit help lines, institutional psychiatry and mental health services, voluntary and offsite mental health services, system-wide peer support hotline, 24/7 Mental health crisis support, deployment of mental health providers to units in need (virtually or in person), government/non-profit crisis lines. Existing resources were scaled up, trained mental health staff shifted responsibilities or voluntarily provided time.	
Ruskin 2021[56] US	Covid-19	Descriptive	To discuss the challenges of wearing PPI and potential mitigation strategies	Respirators (N95) can cause psychological distress, especially in those with claustrophobia or asthma. Clinicians should be aware of the common symptoms of hypoventilation, which include anxiety and shortness of breath, and of hyperventilation, which include light-headedness and tingling fingers. Mental fatigue is exacerbated by personal protective equipment, this mental fatigue can present as anxiety. Dividing strenuous tasks may decrease the fatigue associated with wearing protective equipment.	Seek recurrent, just-in-time training (focus on error-prone steps) Be alert for compromised personal protective equipment Develop visual cognitive aids Use a safety coach to supervise donning, doffing Develop awareness of breathing restrictions. Use a correctly fitted mask. Drink water and use the restroom before donning

				Donning and doffing PPE presents a considerable risk of infection, particularly in less experienced staff, self-assessment of ability to do this tends to be poor. Strategies to improve donning and doffing of personal protective equipment should be implemented before the need for use. Clear, detailed instructions and the use of visual cognitive aids can help and consideration of workspace. Workspace design should include mirrors (to allow the clinician to see possible contamination sites), handrails, prominent disposal bins, readily available gloves and hand sanitizer, and clear demarcation of "clean" and "dirty" zones. A trained safety coach is useful to decrease anxiety and reduce errors. Beneficial to train workers in their space and train in procedures while wearing PPI. Clinicians who are required to wear personal protective equipment may benefit from counselling as to its safety and the fact that some amount of discomfort is normal, use of counselling can be beneficial to help resilience.	personal protective equipment Plan ahead to eat nutrient-dense foods for meals and snacks Divide physically strenuous tasks into smaller chunks Consider more comfortable equipment if available. Safety officers should monitor personnel for heat stress. Cool the room if feasible. Wear personal protective equipment during training exercises.

				Specific countermeasures to mitigate physical and mental stress include adequate hydration and personal protective equipment that minimizes heat accumulation and enables physiologic regulation of body temperature. Team leaders should ensure that clinicians receive adequate breaks, nutrition, and sleep whenever feasible. Clinicians should consider measuring their temperature regularly and ensure that they are well hydrated.	
Shearer 2020[44] US	Personnel 11 New York City hospitals and treatment centres. Unclear exact sample - mentions representatives from six centres, varying roles.	Qualitative interviews + analysis of operational stress reports from staff at briefings on a four point scale normal to severe (ED operations, facility operations, supplies, staffing)	Gather experiences of the 2017-2018 influenza pandemic	Stresses within a system can vary greatly, with most load on ED departments. Personnel shortages stem from both increased patient influx and also staff absenteeism (due to personal or family illness). Centres struggled to achieve adequate levels of staff vaccination which contributed to staff shortages. Interviewees noted challenges using agency staff with a need for verification of credentials and training. The system did not allow replacement of staff until shortages were apparent, and staff reported that they could not predict in advance when they would have shortages.	Plans to use additional personnel need to be negotiated in advance. Challenges of procurement and supply need to be addressed.

				Multiple hospitals in the same city were drawing from the same pool of staff. Shortages of equipment led to issues with the procurement system as they were unable to source via their usual suppliers and setting up new suppliers took time and resources.	
Tengilimoglu 2020[27] Turkey	N=2076 healthcare employees Half from nursing profession, 71% female. During Covid pandemic	Online survey	To determine the levels of anxiety, depression, and stress of healthcare employees	Percentage of respondents reporting problems in their working environment - lack of protective equipment (50%), administrative problems (34.3%), insufficient ventilation (25%), problems arising from nutrition and housing (24.5%), and long working hours (23.1%). 20% reported an inability to report to managers easily about lack of protective equipment etc. Major cause of the anxiety or stress was fear of contaminating their families and immediate surroundings (86.9%) followed by the fear to catch the virus (54.7%).	Personal protection equipment and other materials (medication, ventilator, etc.) must be sufficient to minimize the risk of infection for the health employees. Leave, resting hours, and frequency of shifts should be considered. Food for health employees must be provided sufficiently and in a timely manner. The needs and demands of the health employees must be learned directly by meetings and feedback sessions. Suggestions and complaints must be taken into consideration and good communication methods must be provided.

					Individuals who have at risk family members should be provided with alternative accommodation.
Vindrola-Padros 2020[45] UK	N=30 interviews mostly carried out in London Covid-19 pandemic	Content analysis of policies and social media, qualitative interviews	To investigate the experiences of frontline workers	Incorrect size of PPE and overheating complicated routine work, PPE not available. Lack of training for redeployed staff and failure to consider the skills of redeployed staff. Concerns about changing and inconsistent guidelines. Lack of streamlined and inconsistent testing of NHS staff. Well-being support was variable across hospitals, increased availability of psychological support and having a physical space they could use for breaks (eg, 'wobble rooms', sofas, health hubs) was perceived as helpful, but accessibility of support at times which workers could access could be problematic. Suggestion made of better celebration of successes by sharing good news stories and figures about patients recovering and being discharged.	Need for acknowledgement of the effects of PPE on routine practice. Need to carry out detailed skills assessments of redeployed staff to ensure their expertise are used proactively to address patient needs Importance of taking into consideration the experiences and concerns of front-line staff during a pandemic.

Walton 2020[39] UK	N/A	Overview of literature and description	To outline considerations for supporting staff during Covid-19 pandemic	A shift in focus is needed from the individual to the organisation, and prevention and mitigation rather than support after mental health problems have developed. Includes a Table (Table 3) outlining a list of ways of supporting staff. Also provides a table listing support measures that can be taken to support staff in quarantine (Table 4). Psychological support related to the primary stressor (dealing with the pandemic at work) as well as support to mitigate secondary stressors (related to the basic needs of life such as childcare, grocery shopping and other basic life activities) are needed. Attention to the return to work phase is important. Key importance of good leadership. Table provided of strategies and tactics for team leaders (Table 5) – communication, empowerment, humanity and humility are key. Peer support also of crucial importance.	
Wei 2020[52] US	New York City hospitals	Descriptive	To describe emotional and psychological support provided to families and staff	Used existing services established before the pandemic which included 230 psychiatrists, psychologists and social workers and 1000 trained peer support	Plans to recruit more behavioural health staff who are available to all staff, also to recruit additional peer support

			during the covid-19 pandemic	specialists. Provided individual and group counselling sessions, which employees could schedule through email, via the staff intranet, or during informal conversations with colleagues. Also launched a behavioural health hotline; an intranet page with links to internal and external resources; and a series of webinars on resilience, wellness topics, grief, and mourning. Respite rooms were set up with scenic landscape murals, soft lighting and quiet music. Wellness rounds were established where staff from the services walked through units and distributed information to staff on how to seek help. Arrangement with local hotels for staff to book free accommodation to alleviate worries about infecting families. In conjunction with the city education department free childcare was provided. Also pre-screened providers offered free in-home childcare. A childcare hotline was set up by the HR team. A call was made for donations which were used to provide free meals for workers during their shifts, groceries to take home for families,	volunteers, and to develop new workforce training and support initiatives.

				transportation vouchers, and replacement scrubs so that medical teams would not have to worry about taking home clothing contaminated with the virus. New rituals to celebrate patients being weaned off ventilators or were being sent off were encouraged including text messaging, group chats, playing music and singing and dancing. Staff returning from covid illness were welcomed back by staff lining halls and cheering and applauding. A public-facing website was created that displayed daily updates, as well as scorecards for each hospital and this was shared via e-newsletters, social media, email, and daily staff meetings. Mourning rooms created in hospitals for staff to mourn colleagues and patients, memorials being established in each.	
Wong et al. 2012[46] Hong Kong	10 healthcare workers, isolation wards, during H1N1 (swine flu) pandemic	Qualitative interviews	To explore willingness to work of healthcare staff during a pandemic	One day off reward after 14 days of working was appreciated but the implementation was seen as inflexible, for example if sick leave was taken the day off was cancelled. Staff reported the importance of appreciation from	It is important for mangers to provide support to healthcare workers during influenza pandemic by providing clear guidelines/policy for case management and demonstrating

				the employers for example fruit provided or free vitamin tablets. There were reported concerns regarding efficacy and side effects of vaccination, which would persuade some not to take it. Participants appreciated having updated and concise information on swine flu and the use of guidelines for infection control through different communication channels including notice board, email, intranet common room, an infection control seminar and shift report meetings. The importance of channels for accurate information was highlighted to avoid incorrect messages being passed between staff. Staff reported being overwhelmed by frequent policy changes such as diagnostic testing procedures and criteria for patient admission. Staff appreciated not having a quota for PPE so they felt safer to work and keep be comfortable and keep clean but facilities such as showers were inadequate and staff changing rooms were very small.	appreciation for frontline workers. Improved management style with more autonomy of infection control procedure, more flexible scheduling of rest periods, more appropriate reward system and more supporting of staff would have a positive impact on the emotional climate for workers.

Appendix 5. Completed quality appraisals

Table 5 Quality appraisal of reviews

	Did the research questions and inclusion criteria for the review include the components of PICO?	Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations fom the protocol?	Did the review authors explain their selection of the study designs for inclusion in the review?	Did the review authors use a comprehensive literature search strategy?	Did the review authors perform study selection in duplicate?	Did the review authors perform data extraction in duplicate?	Did the review authors provide a list of excluded studies and justify the exclusions?	Did the review authors describe the included studies in adequate detail?	Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	Did the review authors report on the sources of funding for the studies included in the review?	If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?	If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	Did the review authors account for RoB in individual studies when interpreting/ discussing the results of thereview?	Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?
Barello 2020[28]	Y	N	N	U	Y	Y	N	Y	N	N	NA	NA	N	NA	N/A	Y
Chew 2020[29]	N	N	N	U	U	U	N	Y	Y	N	NA	NA	N	NA	NA	Y
De Brier 2020[30]	Y	Y	Y	Y	Y	U	N	Y	N	N	Y	NA	NA	Y	N	Y
Demartini 2020[31]	Y	N	N	U	U	U	N	N	N	N	NA	NA	N	N	NA	N
Gómez-Durán 2020[32]	Y	Y	Y	Y	Y	U	Y	Y	Y	N	NA	NA	Y	Y	NA	Y

Heath 2020[33]	Y	N	N	N	U	U	N	Y	NA	N	NA	NA	NA	NA	N	Y
Magill 2020[34]	N	U	U	N	U	U	N	N	N	N	NA	NA	U	NA	NA	Y
Muller 2020[35]	Y	Y	Y	Y	U	U	Y	Y	U	N	NA	NA	NA	NA	U	Y
Pandemic Influenza Preparedness Team 2011[38]	Y	N	N	Y	U	U	N	N	N	N	NA	NA	NA	NA	NA	N
Preti 2020[37]	Y	Y	N	Y	Y	U	N	Y	NA	N	NA	NA	NA	NA	NA	N
Pollock 2020[36]	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	NA	NA	NA	NA	Y	Y

Yes (Y), No (N), Unclear (U), Not Applicable (NA)

Table 6 Quality appraisal of qualitative research

	Was there a clear statement of the aims of the research?	Is a qualitative methodology appropriate?	Was the research design appropriate to address the aims of the research?	Was the recruitment strategy appropriate to the aims of the research?	Was the data collected in a way that addressed the research issue?	Has the relationship between researcher and participants been adequately considered?	Have ethical issues been taken into consideration?	Was the data analysis sufficiently rigorous?	Will the results help locally?
Arnetz 2020[19]	Y	Y	Y	Y	Y	N	NA	Y	Y
Bennett 2020[41]	Y	Y	Y	Y	Y	N	Y	Y	Y
Draper/Ives 2009[42 50]	Y	Y	Y	Y	Y	N	Y	Y	Y
Halcomb 2020[24]	Y	Y	Y	Y	Y	N	Y	Y	Y
Shearer 2020[44]	Y	Y	Y	U	Y	N	N	N	Y
Wong 2020[46]	Y	Y	Y	Y	Y	N	Y	Y	Y
Vindrola-Padros 2020[45]	Y	Y	Y	Y	Y	N	Y	Y	Y

Yes (Y), No (N), Unclear (U), Not Applicable (NA)

Table 7 Quality appraisal of cross-sectional and longitudinal studies

	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and the setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?
Alanezi 2021[19]	Y	Y	NA	NA	N	N	Y	Y
Blake 2020[21]	Y	Y	Y	NA	NA	NA	Y	Y
Chen 2006[40]	U	Y	NA	NA	Y	Y	Y	Y
Cowden 2010[23]	Y	Y	NA	NA	Y	Y	NA	Y
Hines 2014[25]	Y	Y	N	N	N	N	N	NA
Tengilimoglu 2020[27]	Y	Y	Y	Y	Y	N	Y	Y

Yes (Y), No (N), Unclear (U), Not Applicable (NA