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Co-fit

Preservation of short- and long-term physical/mental health and employability of healthcare professionals exposed to Covid-19 crisis working conditions

Practical recommendations based on findings from a rapid review of the literature on the Covid-19 outbreak and similar virus outbreaks and interviews with experts and experience experts.

April 2, 2020

Justification

Background

The global coronavirus outbreak (COVID-19) is creating a new reality in all sectors of society and poses an extraordinary challenge for the healthcare system. Maintaining mental and physical health for the short and long term, and thus the employability of healthcare professionals, is essential in coping with what is expected to be a long-term COVID-19 crisis. Early studies of and experiences with COVID-19 from China and Italy *[Xiao 2020, Liu 2020, Zhu 2020]* and similar outbreaks, such as SARS (2003), MERS (2013-2016) and Ebola, (2014-2016) show that healthcare professionals are pushed to the limits in such situations. The demand for care is increasing rapidly and care must be provided in stressful and uncertain circumstances. Moreover, healthcare professionals run an increased risk of infection. As a result, a substantial part of frontline healthcare professionals suffer from stress, anxiety *[Zhu 2020, Liu]* and lack of sleep *[Xiao 2020]*.

Each outbreak has its own dynamics, but they are all characterized by exposure to high workload, a shift in tasks and responsibilities, risk of infection, more difficult working conditions due to protective clothing and procedures, in addition to intense exposure to emotional events and trauma. Studies after the SARS, MERS and Ebola outbreaks show that, in the short term, persistent exposure to stress, anxiety, trauma/emotional events, sleep deprivation and fatigue lead to errors and decreased employability (absence). Long-term effects include burn-out, depression and anxiety disorders (PTSD) *[Wu J Psychiatry 2009, Koh D Medical care 2005, Maunder CMAJ 2003, McAlonan Can J Psychiatry. 2007, Schreiber Milit Med 2019, Son Disaster Medicine and Public Health Preparedness 2019]*

Triggered by the impact and measures in China (Wuhan), the poignant reports of an overloaded healthcare system in Northern Italy and the RIVM projections for the Netherlands, the resilience of our own healthcare professionals also became a current issue. This prompted a temporary collaboration between nursing scientists, health scientists and epidemiologists from University Medical Center Utrecht (UMCU) and Utrecht University of Applied Sciences (HU) to quickly take stock and synthesize available knowledge, after consulting with some of the members of the UMCU Covid team, that contributes to:

Preservation of short- and long-term physical/mental health and employability of healthcare professionals exposed to Covid-19 crisis working conditions

The starting point was that this knowledge and the resulting recommendations should be practical and quick and easy to implement. In order to optimize the chance of successful implementation, contact was sought at an early stage with the "psychosocial support" steering group to coordinate matters.

Given the urgency of the COVID-19 outbreak in the Netherlands, the recommendations are aimed at the period before and during the crisis. Follow-up care after the crisis is not taken into consideration. However, psychological follow-up care remains necessary in this period given the continued pressure on the healthcare system and in view of the fact that healthcare professionals can still develop physical and psychological complaints in the long term.

Short description of the methodology

Given the short time frame (5 days) a (rapid) mixed-method concurrent triangulation study was conducted by 12 researchers. A comprehensive justification of the methodology is included in an appendix. Briefly, the method covered the following steps:

1. Rapid review of scientific and (leading) gray literature about similar outbreak situations (SARS, MERS, EBOLA) and recently published or preprint literature on COVID-19.
   a. Formulation of the investigation question.
   b. Search in databases Pubmed, Embase, PsycINFO and CINAHL and preprint archives, bioRxiv and medRxiv.
   c. Title / abstract screening in duplicate - (N=3482 studies in database, n=989 in preprint archives).
   d. Simultaneous full text-screening and data extraction (N=158 studies).
   e. Synthesis and formulation of provisional recommendations (N=82).
2. Semi-structured interviews with renowned researchers specializing in the health of professionals in crisis situations and disasters in different settings, namely:
   a. Prof. Dr Miranda Olff. Professor of Neurobiological mechanisms of prevention and treatment in trauma and PTSD - ARQ National Psychotrauma Centre, Amsterdam UMC.
   b. Dr Marit Sijbrandij. Senior researcher Prevention and treatment of mental disorders following trauma and adversities in a global context. Faculty of Behavioural and Movement Sciences, Clinical Psychology, VU, Amsterdam.
   c. Dr Wendy Dorrestijn. Researcher resilience and integrity (performing under pressure and stress) - Dutch National Police Force and Royal Netherlands Military Constabulary, University of Groningen.
   d. Lucy Dijkman. Coordinator of Trauma Assistance, OLVG, Amsterdam. Expertise: Trauma, peer support for professionals.
3. Triangulation of review data and interview data.
4. Elaboration of recommendations.
5. Reflection (through interviews) on the recommendations by experience experts in Dutch hospitals and the 'psychosocial support' steering group.
6. Finalization of recommendations and report.

Organization of the recommendations

The recommendations have been categorized on the basis of 2 elements:

1. Phasing:
   - prior to/in the run-up to the crisis;
   - during the crisis.
2. Measure category:
   - resilience;
   - tasks and responsibilities;
   - work pattern and working conditions.

In addition, it is indicated for each recommendation at which organizational level or for which type of stakeholder the recommendation is relevant, using the following categories of stakeholders:

Senior management Executive Board, Division Management Team, Crisis Policy Team

Department management Department Managers / Team Leaders

PSO steering group Psychosocial support steering group (PSO)

PS support team Operational core psychosocial support team (assistance teams, psychologists, spiritual counselors , social workers, occupational health and safety physicians)

Peer support group Peer support group

Healthcare professionals Healthcare professionals

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Recommendations prior to / in the run-up to the crisis (or peak)

RESILIENCE

Education and training

Senior management

- Provide information and education to (healthcare) professionals about the virus, method of transmission, symptoms and protective measures, and ensure that this information is frequently updated and that this communicated. *(WHO 2019 COVID-19, MSF 2005/2006 Pandemic, Speroni 2015 Ebola)*
- Train healthcare professionals in recognizing symptoms, preventing transmission, the use of protective measures and procedures. *(Belfroid 2018 Ebola, Bell 2017 Ebola, Brooks 2018 Pandemic, Carvalho 2019 Ebola, Chen 2005 SARS, Speroni 2015 Ebola, Von Strauss 2017 Ebola)*

information slides | information bulletins | short lectures | e-learning | referral to reference works (from within and outside the organization)

Resilience training

Senior management   **PSO steering group**

- Provide moral and psychological support to (healthcare) professionals (support from outside and within teams of healthcare professionals), see also elaboration PHASE: Recommendations during the crisis *(Abolfotouh 2017 MERS, Li 2018 Ebola, Maunder 2006 SARS, Wong 2005 SARS)*
- Train healthcare professionals or provide guidance on how to handle isolation, stigmatization, fatigue, stress and feelings of depression. *(Andertun 2017 Ebola, Brooks 2018 Pandemic, Marrs 2019 Ebola, WHO 2019 COVID-19)*
- School managers in mental impact of crisis situations *(expert interviews)*
- Provide training to promote interprofessional teamwork. *(Marrs 2019 Ebola)*

face-to-face training with exercises and simulation | information bulletins | short lectures | e-learning | referral to reference works (from within and outside the organization)

Perception of preparedness

Senior management   **Department management**

- As a hospital / department, ensure that protocols are as up-to-date as possible. The protocols must contain a clear plan and division of tasks based on effective communication strategies. Protocols must be drawn up by a coordinating organization-wide team in which as many different roles as possible from all kinds of levels are represented. *(AlGhobain 2017 MERS, Andertun 2017 Ebola, Belfroid 2018 Ebola, Maunder 2006 SARS, Smith 2017 Ebola, Speroni 2015 Ebola)*
- As a hospital / department, ensure that sufficient staff and materials are available to handle the crisis. Involve staff (with strong existing collaborative relationships) in the preparations for and planning of the upcoming demand for care. *(AlGhobain 2017 MERS, Bell 2017 Ebola, Maunder 2006 SARS)*
- As a hospital / department, ensure that departments and rooms are laid out such that safe working is promoted: minimal movement of heavy material, enough space to work, locks to change clothes between low- and high-risk patients, 2 meters between beds, use of mechanical equipment, transfer of a patient with at least two people). *(WHO 2018)*

written protocols that can be accessed via intranet | sharing protocols or links via bulletins, mailing, newsletters, etc.

Recommendations during the crisis

RESILIENC

Information (receiving information for professionals)

| Senior management | Department management |

- Provide information (based on information from department, organization, RIVM, government) and training for (healthcare) professionals about the virus, method of transmission, symptoms and protective measures, ensure that this information is up to date, is distributed through multiple channels that meet the needs of the recipient (intranet, e-mail, social media), and, where necessary, ends up with the (healthcare) professionals who can take action *(Al-Dorzi 2016 MERS, Bhagavathula 2020 COVID-19, Brooks 2018 Pandemic, Chan 2005 SARS, Chen 2006 SARS, Chen 2020 COVID-19, Chua 2004 SARS, Dai 2020 COVID-19, Hewlett 2005 Ebola, Imai 2005 SARS, Jeong-sin 2018 MERS, Lee 2005 SARS, Lehmann 2016 Ebola, Li 2020 COVID-19, Lin 2007 SARS, Liu 2019 Ebola, Lu 2006 SARS, Maunder 2003 SARS, Maunder 2004, SARS, Maunder 2006 SARS, O'Boyle 2006 Pandemic, Rambaldini 2005 SARS, Speroni 2015 Ebola, Styra 2008 SARS, Tam 2004 SARS, WHO 2018 Public Health)*
- Designate one or more persons within the organization / department / team who is/are responsible for grouping information *(Expertise centrum militaire GGZ 2020 COVID-19, Lehmann, 2016 Ebola, WHO 2018 Public Health)*
- Identify realistic scenarios and past actual scenarios and discuss these as a team, for instance during every shift change *(Expertise centrum militaire GGZ 2020 COVID-19, Lehmann, 2016 Ebola, WHO 2018 Public Health)*
- Pay extra attention to mental and physical aspects of the crisis situation by providing information from the organization. Indicate where, how and what help/support is available and that these facilities are also available for staff that is not in the frontline *(Expert interviews)*

face-to-face training with exercises and simulation | information bulletins distributed through various channels | short lectures | e-learning | referral to reference works (from within and outside the organization) | appoint responsible person with regard to information provision | fixed time at shift change for discussing scenarios

Information (providing information by professionals)

| Senior management | Department management |

- Create a blame-free environment, in which frontline workers are assured of the ability to report incidents of ethical or emergency issues and/or hazards, challenges, and advice to management. *(Al-Dorzi 2016 MERS, WHO WHO, 2018 Public Health, WHO 2019 COVID-19)*
- Offer healthcare professionals a platform on which to share information, experiences and good practices, for communication between frontline workers and between the relevant cooperation parties (e.g. management). Consider, for instance, setting up social media platforms, such as WhatsApp. *(Chan 2005 SARS, Kang 2018 MERS, Raven 2018 Ebola, Styra 2008 SARS)*
- Involve nursing staff in decision-making processes and encourage them to do so at management level as well. Keep the lines between the different (healthcare) professionals short. *(Tolomiczenko, 2005, Son, 2019)*

Attention to safety during shift changes | team meetings | weekly or daily starts | bulletins from heads, managers, Executive Board | possibility to submit (anonymous) reports (to direct supervisor and/or independent party) if there is no room for feedback, admitting mistakes | respect for autonomy of professionals | offer platform for exchange of information within and between teams | involve nursing staff

Psychosocial support and treatment
Create enabling conditions

Senior management	Department management	PSO steering group

- Early on in the crisis, create the enabling conditions for optimal professional psychosocial support for healthcare professionals, both within regular care and in acute situations *(Liu et al 2020 COVID-19; Xiao et al 2020 COVID-19; Lai et al 2020, COVID-19; MGGZ/DEFENSIE 2020, outbreak generic)*. Place the responsibility for this with the most suitable body, that is: responsibility for the enabling conditions for psychosocial support with the PSO steering group, for the enabling conditions for peer support with department management, and for professional diagnostics and treatment with senior management.

Delegating responsibilities

- Free up sufficient resources/capacity to form an operational core; a multidisciplinary psychosocial support team consisting of, among others, assistance teams, peer supporter, psychologists, spiritual counselors, social workers, occupational health and safety physicians *(MGGZ/DEFENSIE 2020, outbreak generic, expert interviews)*. Create a simple and agile organizational structure for the psychosocial support team with a clear functional and hierarchical management (e.g. steering group with chairperson) of and communication towards (and within) the operational core.

Forming a psychosocial support team

- Make a 24/7 telephone number available to offer professionals a sympathetic ear. This service can be staffed by members of the psychosocial support team. *(Maunder et al 2003, SARS; expert interviews)*

24/7 telephone number, staffed by psychosocial support team or, in case of lack of capacity, by trained volunteers

- Organize an efficient referral system for professionals with complaints such as fatigue, insomnia, anxiety, gloom, depression, offering them the possibility of rapid psychological diagnosis, e.g. by means of the Dutch Global Psychotrauma Screen (GPS, 22-item questionnaire), and offer professional treatment if indicated. *(Chen 2005, SARS ; Schreiber et al 2019, EBOLA, expert interviews)*.
- Guarantee sufficient professional capacity (psychology/psychiatry) during the peak of the crisis and ensure financial compensation for these treatment processes. *(Bai 2004 SARS; Chan 2004 SARS; Chen 2020 COVID-19; Kim 2016 MERS; Lee 2005 SARS; Lu 2006 SARS; Marjanovic 2007 SARS; Maunder 2006 SARS; Poon 2004 SARS; Son 2019 MERS)*.
- Consider early identification of professionals with a higher risk of psychosocial problems. Be extra alert to:
  - at-risk groups: Frontline direct patient contact, professionals in quarantine, young/inexperienced and, conversely, older professionals, women *(sources follow)*
  - coping strategies other than: acceptance, active coping and positive framing *(Maunder 2006, SARS; Wong 2005, SARS; Wu et al 2009, SARS)*

Referral system for professionals | professional psychological diagnosis and treatment | ensure reimbursement | psychological first aid | consider screening by means of Dutch Global Psychotrauma Screen | Risk stratification | Tailored support based on risk

- Provide professionals with (digital) access to effective self-care tools to recognize signs of stress and coping mechanisms, normalize stress levels and maintain mental resilience and health *(MSF-B and MSF-OCBA Human resources 2005 Marbourg virus; Expertisecentrum (Militaire Geestelijke Gezondheidszorg, 2020); Raven 2018 EBOLA; Poon 2004 SARS; expert interview)* Consider offering no-obligation digital support to maintain mental resilience and health for all professionals *(expert interviews)*.

  App Support Coach | OLVG self-care assistance | coachesvoormedici.nl | Headspace app (license) | VGZ mindfulness app

Monitoring health status of professionals

Department management	PS support team	Peer support group

- Constantly keep an eye out for / be constantly alert to the mental and physical health of professionals and scale up monitoring as psychosocial/physical problems increase and/or the crisis persists *(Zhu et al. 2020 COVID-19)*.

- Monitor the physical and mental state of professionals frequently and without obligation, aimed at early detection of psychosocial/physical problems. A daily check-in/check-out (e.g. team barometer method) is an excellent method to gauge how someone is doing, whether something is bothering them or if there are concerns (including home and financial situation) *(Zhu et al. 2020 COVID-19; Su et al. 2007 SARS; experts interviews)*.

  Organize daily check-in and daily check-out | shift change | spontaneous inquiry by supervisor (How are you doing? How are things at home? How is your day going?) | consider screening using Dutch Global Psychotrauma Screen (GPS)

- Encourage frequent peer checks in the workplace *(expert interviews)*

  Encourage professionals to check each other (How are you doing? How are things at home? How is your day going?)

Form and content of psychosocial support

Department management	PS support team	Peer support group

- Do not deploy psychological interventions widely during the crisis, but do offer a wide range of accessible psychological support *(expert interviews):*

- Encourage communication between professionals in the workplace (even during busy periods) and create space and time for non-binding discussion of positive and negative aspects of the situation, for example in daily check-ins / check-outs(expert interviews). Create space and time to reduce stress in the team, with room for positive and negative aspects of the situation *(MSF-B and MSF-OCBA Human resources 2005 Marbourg virus; WHO 2018; Chan 2004 SARS; Khalid 2016 MERS; Lin 2007 SARS; Liu 2019 EBOLA; Poon 2004 SARS; Wong 2005 SARS)*

  Encourage peer support in the workplace during team meetings (daily check-ins, check-outs) | humor as intervention | share and celebrate successes | deployment of participation techniques | share negative emotions and difficulties | monitor each other's individual reactions

- Encourage the use of effective self-care instruments and digital support to maintain mental resilience and health. *(expert interviews)*

  App Support Coach | OLVG self-care assistance | coachesvoormedici.nl | Headspace app (license) | VGZ mindfulness app

- Create opportunities to allow professionals to stay in direct or indirect contact with family and friends. *(Kim 2016 MERS; Liu 2019 EBOLA; O'Sullivan 2009 SARS; Tam 2004 SARS)*

Allow sufficient time "out of the box - protected area" for communication with family and friends.

- Especially in the initial phase of the crisis, focus on supporting the use of natural coping strategies (acceptance, active coping, positive framing), but be cautious in this phase with broad use of psychological interventions (such as therapy). *(Maunder 2003; Maunder 2006; SARS; Wong 2005 SARS; Wu 2009 SARS; Lee 2005 SARS; Wu 2008 SARS; O'Sullivan 2009 SARS; Artsen zonder Grenzen 2020; expert interviews)*

Support if indicated | daily round by psychosocial support team | support by means of 24/7 telephone help line | Do not impose tasks | hold personal and open conversations with the healthcare professionals

- If professionals have complaints and in acute situations, DO offer evidence-based interventions based on formal diagnosis and treatment (Cognitive behavioral therapy / MDR etc.) by professionals (not involved in the professional context) *(Bai 2004 SARS; Chan 2004 SARS; Chen 2020 COVID-19; Kim 2016 MERS; Lee 2005 SARS; Lu 2006 SARS; Marjanovic 2007 SARS; Maunder 2006 SARS; Poon 2004 SARS; Son 2019 MERS, (expert interviews)).*

Offer professional psychological diagnosis and treatment

- Offer professionals the opportunity to quickly withdraw from an emotionally stressful situation → see recommendation WORK PATTERN / WORKING CONDITIONS (rooms and facilities) *(WHO 2019 COVID-19).*

Creation of a safe area in every department where professionals can catch their breath or blow off steam | peer support

TASKS AND RESPONSIBILITIES

Tasks / responsibilities / task mix

Senior management **Department management**

- Utilize everyone's abilities, even if the division of work used to be different. *(Al-Dorzi 2006; Maunder, 2003;2006)*

VBUMCU: interns who observe patients in the nursing ward to relieve nurses.

- Make sure that everyone feels comfortable and competent in performing the tasks assigned to them. Give healthcare professionals the autonomy and opportunity to make their own choices. *(Maunder 2004; 2006)*
- Deploy healthcare professionals who do not normally provide direct patient care to support not only patients and family, but also frontline healthcare professionals. Interdisciplinary collaboration 2.0: E.g. evaluation at the end of the day in the presence of a psychologist. *(Gearing, 2007)*
- Provide clarity about the risks of working in such a ward; this takes away most of the unwillingness. Continue to evaluate this throughout the crisis and afterward and offer people the space to air their opinions in this respect. *(Lee, 2005; Tam; 2004)*
- Strive for variety of activities (wherever possible) *(Lee, 2018)*

Also see: open and safe work culture / develop scripts that enable employability of other healthcare professionals / utilize everyone's abilities

Intensity / weight of tasks and responsibilities

Department management PSO steering group Peer support group

- Provide a good care provider-patient ratio, whereby the care-related workload is in proportion to the capacity of the care provider. This helps to guarantee safe and quality care. *(Al-Dorzi 2006)*
- Prior to the crisis, pay attention to potential dilemmas in healthcare and the degree of intensive care that this will entail for healthcare professionals (e.g. not being able to provide good care, feeling obliged to do the job even if it is not possible). Identify these immediately after the current crisis, so that they can be anticipated on time in a next crisis. *(Maunder, 2006; O'Sullivan, 2009; Tomczyck, 2008; Von Strauss, 2017; Wu, 2008;2009)*
- Continue to pay attention to the ethical considerations and dilemmas of patients and family and the quality of care that can be provided, as this is very important to healthcare professionals. *(Al-Dorzi, 2006; O'Boyle, 2006; Smith, 2017)*

Triage by healthcare professionals themselves / planning by group of healthcare professionals / daily debriefing with all healthcare professionals present to evaluate division of tasks and roles

WORK PATTERN / WORKING CONDITIONS

Work pattern

Department management Healthcare professionals

- Limit shifts to a maximum of:
    - twelve hours for shifts with light tasks, followed by enough days off *(WHO, 2018; WHO, 2019 COVID-19; Lehmann, 2016 EBOLA)*
    - eight to ten hours for shifts with intense tasks *(Chen, 2005 SARS)*.
    - eight hours for evening and night shifts *(WHO, 2018, Public Health)*.
- Schedule sufficient breaks and days off *(Dai 2020 COVID-19; WHO 2018; Chen 2006, SARS ; Expert interviews)*
    - After a series of eight- to ten-hour shifts (<5 consecutive shifts), schedule at least one or two days off *(WHO 2018, Public Health)*
    - Also schedule days off and vacations during a crisis. *(MSF-B and MSF-OCBA 2005 Marbourg virus; Chan 2005 SARS; Chen 2006, SARS)*
- Do not approach professionals with work-related information and/or questions if they are not at work (time off is time off, a break is a break) *(Expert interviews)*.
- Deploy managers as role models in terms of work pattern *(Expert interviews; Maunder 2003 SARS)*
- Review and evaluate the division of labor and planning, strictly adhere to your working hours *(Qi 2020 COVID-19; Chan 2005 SARS; Chen 2007, SARS; Kang 2018 MERS; Liu 2019 COVID-19)*
- Limit working on the frontline to six to eight weeks. Alternate frontline shifts with non-frontline shifts to prevent sleeping disorders in the long term *(MSF-B and MSF-OCBA, 2005 Marbourg virus)*

Coordination on planning schedule | Manager as role models | Evaluate the shift schedule every week | Do not accept overtime | Separate private life from work (time off is time off, a break is a break) | For as long as possible, do not rely on people who are free or on a break (so do not call, email and/or ask questions) | Buddy system for breaks in the workplace.

Team composition

Department management **Peer support group** **Healthcare professionals**

- Set up a buddy system in which two professionals are linked together during a shift. Linking colleagues together in the department can take place at their own discretion. *(O'Boyle 2006 Public Health; WHO 2018; Maunder 2004 SARS; Lee 2005 SARS; Maunder 2006 SARS; Belfroid 2018; Styra 2008 SARS; Artsen zonder Grenzen 2020; Expertisecentrum MGGZ 2020; WHO 2019 COVID-19; Expert interviews).*
- Make sure that there is someone (e.g. department manager or team leader) in the department with whom professionals can spar before/during/after their shift and on whom they can unload. *(Chan 2004 SARS; Sin 2004 SARS; Grace 2005 SARS; Kang 2018 MERS; Xiao 2020 COVID-19)*
- Deploy full-time professionals wherever possible to guarantee the continuity of care. *(Bournes 2005 SARS)*
- Appoint professionals who held non-essential positions before the crisis to essential positions, possibly after training. *(Tomczyk 2008 Public Health; WHO 2018 Public Health)*

Buddy system | Training - to deploy professionals in essential positions | standby duty | monodisciplinary and multidisciplinary communication and collaboration between professionals | shift changes | team meetings

Team building

Department management **Peer support group** **Healthcare professionals**

- Improve the atmosphere in the department by creating a sense of togetherness and positivity. Involve colleagues and make sure that everyone feels their voice is heard. *(Maunder 2003, SARS; Bournes 2005, SARS; Grace 2005, SARS; Gearing 2007, SARS; von Strauss 2017, Ebola; Brooks 2018, Public Health; Kim 2018, MERS; Kang 2018, MERS; Smith 2019, Ebola; Son 2019, MERS; Dai 2020, COVID-19; Huang 2020, COVID-19)*
- Ensure that professionals are offered professional peer support and encourage its use. *(Maunder 2003, SARS; Khee 2004, SARS; Raven 2018, Ebola; Expert interviews)* This can take place in an individual or group context. Professional peer support is preferably offered by natural, trained counselors.
- Ensure that the department manager / team leader sets the example in terms of implementation of measures and communicates this to the rest of the team. *(Maunder 2003 SARS)*

Professional peer support | involve the team, boost them, contribute positivity | team leaders set the example.

Open and safe work culture

Senior management **Department management**

- Respect the autonomy of healthcare professionals. They should have the choice of whether or not to work in a department with COVID-19 patients and should not be judged on their choice. *(Tam 2004, SARS; Lee 2005, SARS; O'Sullivan 2009, Ebola; Speroni 2015, Ebola; Lehmann 2016, Ebola; Jeong 2018, MERS)*
- If the healthcare professional develops complaints while working in a COVID-19 department, they should be given the choice to perform other activities elsewhere (for example, in another department). *(expert interviews)*
- As a hospital / department, ensure an open and safe work culture with room for feedback, expressing and sharing (negative) emotions and making and owning up to mistakes. *(Maunder 2006 SARS, MSF 2005 Pandemic, WHO 2019 COVID-19)*

Attention to safety during shift changes | team meetings | weekly or daily starts | bulletins from heads, managers, Executive Board | possibility to report (anonymously) (to direct supervisor and/or independent party in the organization) if there is no room for feedback, admitting errors | respect for professionals' autonomy | professionals should have the choice of whether or not to work in a department with COVID-19 patients and should not be judged on their choice

Rooms and facilities

Senior management   **Department management**

- Ensure that each department has a separate room available for professionals to retire to, rest, or sleep. *(WHO 2018 Public Health; O'Boyle 2006 Public Health; MSF-B and MSF-OCBA 2005 Marbourg virus; Tomczyk 2008 Public Health; Maunder 2003 SARS; Expertisecentrum MGGZ; Lin 2007 SARS; Chen 2020 COVID-19; Liu 2019 EBOLA; Qi 2020 COVID-19; Interview 2020)*
- Offer time, space and opportunities to let professionals exercise individually or jointly and/or perform (relaxing) activities. Exercise can serve as an outlet to reduce stress *(Xi, 2015 EBOLA; MSF-B and MSF-OCBA Human resources 2005 Marbourg virus; WHO 2018, Public Health; Chen 2020 COVID-19)*

Relaxation area per department | Sports room | Healthcare professionals are given 2-3 times a day to retreat to a non-clinical space (comfortable chair, plant, music, relaxation) - ideally 20 minutes (empty their head) | Keep in touch with your subordinates (know what's going on).

Availability of materials

Senior management   **Department management**

- Provide healthcare professionals, especially those on the frontline, with adequate materials. *(Dai 2020 COVID-19; Speroni 2015 Ebola; Lee 2005 SARS; O'Sullivan 2009 SARS; Maunder 2004 SARS; Maunder 2003 SARS; Son 2019 COVID-19; Son (Heejung) 2019 COVID-19; O'Boyle 2006 Public Health)*
- Ensure sufficient availability of personal protective equipment. Also ensure training in and supervision of correct use of this PPE. *(Khee 2004 SARS; Poon 2004 SARS; O'Boyle 2006 Public Health; Su 2007 SARS; Jeong 2018 MERS; Son 2019 MERS; Huang 2020 COVID-19; WHO 2019 COVID-19)*
- Try not to share concerns about lack of materials with all professionals in the department, do not burden them with it. *(Tam 2004 SARS; Chen 2020 COVID-19; O'Boyle 2006 Public Health)*
- Assign responsibility for inventorying available materials to one person, and also have that person take any action to resolve shortages. *(expert interviews)*

Two or three coordinators for each department (in addition to management) | during the day at least 1 coordinator present | actions are only performed by coordinators.

Compensation

Senior management

- Offer (frontline) professionals compensation for practical support (in relation to tasks, responsibilities and risks). *(Lee 2005 SARS; O'Boyle 2006 Public Health; Raven 2018 EBOLA; Tam 2004 SARS; Chen 2005 SARS; Kim 2018 MERS; Shih 2009 SARS)*
- Provide social services (such as child or animal care or care for the elderly) to the next of kin/family of the (frontline) professionals. *(Tomczyk 2008 Public Health; Maunder 2004 SARS)*
- Ensure that staff have a good living environment at home, so that sufficient relaxation and sleep can be achieved. *(Tomczyk 2008 Public Health; WHO 2018; MSF-B and MSF-OCBA 2005 Marbourg virus; Bai 2004 SARS)*

Provide social services (such as child or animal care or care for the elderly) / Offer compensation (in money or days off)

Possibility to eat and drink

Senior management **Department management**

- Offer professionals (especially those on the frontline) easy access to food with a high nutritional value. *(Lee 2005 SARS; Chen 2005 SARS; Chen 2020 COVID-19; WHO 2018 Public Health; MSF-B and MSF-OCBA 2005 Marbourg virus; O'Boyle 2006 Public Health)*
- As a hospital, provide good and sufficient food and drinks during every shift. Working in protective clothing considerably reduces the possibility of eating, which means that there is a high risk of adverse health effects. In addition, frontline workers should take as much rest as possible during their time off. Preparing a balanced diet for at home and to take to work takes extra energy. *(Chen 2005 SARS; Maunder 2003 SARS; Tomczyk 2008 Public Health; Liu 2019 COVID-19)*

Provide good and sufficient food and drinks during every shift

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Carvalho,E. and Castro,P. and Leon,E. and Del,Rio A. and Crespo,F. and Trigo,L. and Fernandez,S. and Trilla,A. and Varela,P. and Nicolas,J.M.	Multi-professional simulation and risk perception of health care workers caring for Ebola-infected patients	2019
Chan,A.O. and Huak,C.Y.	Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health care workers in a medium size regional general hospital in Singapore	2004
Chan,S.S.C. and Leung,G.M. and Tiwari,A.F.Y. and Salili,F. and Leung,S.S.K. and Wong,D.G.N. and Wong,A.S.F. and Lai,A.S.F. and Lam,T.H.	The Impact of Work-related Risk on Nurses During the SARS Outbreak in Hong Kong	2005
Chen,C.S. and Wu,H.Y. and Yang,P. and Yen,C.F.	Psychological Distress of Nurses in Taiwan Who Worked During the Outbreak of SARS	2005
Chen,N. and Wang,P. and Hsieh,M. and Huang,C. and Kao,K. and Chen,Y. and Tsai,Y.	Impact of severe acute respiratory syndrome care on the general health status of healthcare workers in Taiwan	2007
Chen,Q. and Liang,M. and Li,Y. and Guo,J. and Fei,D. and Wang,L. and He,L. and Sheng,C. and Cai,Y. and Li,X. and Wang,J. and Zhang,Z.	Mental health care for medical staff in China during the COVID-19 outbreak	2020

Chen,R. and Chou,K.R. and Huang,Y.J. and Wang,T.S. and Liu,S.Y. and Ho,L.Y.	Effects of a SARS prevention programme in Taiwan on nursing staff's anxiety, depression and sleep quality: A longitudinal survey	2006
Chua,S.E. and Cheung,V. and Cheung,C. and McAlonan,G.M. and Wong,J.W.S. and Cheung,E.P.T. and Chan,M.T.Y. and Wong,M.M.C. and Tang,S.W. and Choy,K.M. and Wong,M.K. and Chu,C.M. and Tsang,K.W.T.	Psychological Effects of the SARS Outbreak in Hong Kong on High-Risk Health Care Workers	2004
Dai,Y. and Hu,G. and Xiong,H. and Qiu,H. and Yuan,X.	Psychological impact of the coronavirus disease 2019 (COVID-19) outbreak on healthcare workers in China	2020
Fiksenbaum,L. and Marjanovic,Z.o and Greenglass,E.R. and Coffey,S.	Emotional exhaustion and state anger in nurses who worked during the SARS outbreak: The role of perceived threat and organizational support	2006
Gearing,R.E. and Saini,M. and McNeill,T.	Experiences and implications of social workers practicing in a pediatric hospital environment affected by SARS	2007
Hewlett,B.L. and Hewlett,B. S.	Providing Care and Facing Death: Nursing During Ebola Outbreaks in Central Africa	2005
Grace,S.L. and Hershenfield,K. and Robertson,E. and Stewart,D.E.	The Occupational and Psychosocial Impact of SARS on Academic Physicians in Three Affected Hospitals	2005
Huang,L. and Xu,F.. and Liu,H.	Emotional responses and coping strategies of nurses and nursing college students during COVID-19 outbreak	2020
Imai,T. and Takahashi,K. and Hasegawa,N. and Lim,M.K. and Koh,D.	SARS risk perceptions in healthcare workers, Japan	2005
Jeong-Sil,C. and Ji-Soo,K.	Factors influencing emergency nurse's ethical problems during the outbreak of MERS-CoV	2018
Kang,H.S. and Son,Y.D. and Chae,S.M. and Corte,C.	Working experiences of nurses during the Middle East respiratory syndrome outbreak	2018
Khalid,I. and Khalid,T.J. and Qabajah,M.R. and Barnard,A.G. and Qushmaq,I.A.	Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak	2016
Khee,K.S. and Lee,L.B. and Chai,O.T. and Loong,C.K. and Ming,C.W. and Kheng,T.H.	The Psychological impact of SARS on health care providers	2004
Kim,J.S. and Choi,J.S.	Factors Influencing Emergency Nurses' Burnout During an Outbreak of Middle East Respiratory Syndrome Coronavirus in Korea	2016
Kim,Y.	Nurses' experiences of care for patients with Middle East respiratory syndrome-coronavirus in South Korea	2018
Koh,D. and Lim,M.K. and Chia,S.E. and Ko,S.M. and Qian,F. and Ng,V. and Tan,B.H. and Wong,K.S. and Chew,W.M. and Tang,H.K. and Ng,W. and Muttakin,Z. and Emmanuel,S. and Fong,N.P. and Koh,G. and Kwa,C.T. and Tan,K.B.C. and Fones,C.	Risk Perception and Impact of Severe Acute Respiratory Syndrome (SARS) on Work and Personal Lives of Healthcare Workers in Singapore: What Can We Learn?	2005
Koh,Y. and Hegney,D. and Drury,V.	A comprehensive systematic review of healthcare workers' perceptions of risk from exposure to emerging acute respiratory infectious diseases and the perceived effectiveness of strategies used to facilitate healthy coping in acute hospital and community healthcare settings	2010
Lai,J. and Ma,S. and Wang,Y. and Cai,Z. and Hu,J. and Wei,N. and Wu,J. and Du,H. and Chen,T. and Li,R. and Tan,H. and Kang,L. and Yao,L. and Huang,M. and Wang,H. and Wang,G. and Liu,Z. and Hu,S.	Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019	2020

Lee,S.H. and Juang,Y.Y.and Su,.J. and Lee,H.L. and Lin,Y.H. and Chao,C.C.	Facing SARS: Psychological impacts on SARS team nurses and psychiatric services in a Taiwan general hospital	2005
Lehmann,M. and Bruenahl,C.A. and Addo,M.M. and Becker,S. and Schmiedel,S. and Lohse,A.W. and Schramm,C. and Lowe,B.	Acute Ebola virus disease patient treatment and health-related quality of life in health care professionals: A controlled study	2016
Li,Y. and Wang,H. and Jin,X.R. and Li,X. and Pender,M. and Song,C.P. and Tang,S.L. and Cao,J. and Wu,H. and Wang,Y.G.	Experiences and challenges in the health protection of medical teams in the Chinese Ebola treatment center, Liberia: a qualitative study	2018
Li,Z. and Ge,J. and Yang,M. and Feng,J. and Qiao,M. and Jiang,R. and Bi,J. and Zhan,G. and Xu,X. and Wang,L. and Zhou,Q. and Zhou,C. and Pan,Y. and Liu,S. and Zhang,H. and Yang,J. and Zhu,B. and Hu,Y. and Hashimoto,K. and Jia,Y. and Wang,H. and Wang,R. and Liu,C. and Yang,C.	Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control	2020
Lin,C. and Peng,Y. and Wu,Y. and Chang,J. and Chan,C. and Yang,D.	The psychological effect of severe acute respiratory syndrome on emergency department staff	2007
Liu,C. and Yang,Y.i and Zhang,X.M. and Xu,X. and Dou,Q.L. and Zhang,W.W.	The prevalence and influencing factors for anxiety in medical workers fighting COVID-19 in China: A cross-sectional survey	2020
Liu,C. and Wang,H. and Zhou,L. and Xie,H. and Yang,H. and Yu,Y. and Sha,H. and Yang,Y. and Zhang,X.	Sources and symptoms of stress among nurses in the first Chinese anti-Ebola medical team during the Sierra Leone aid mission: A qualitative study	2019
Liu,X. and Kakade,M. and Fuller,C.J. and Fan,B. and Fang,Y. and Kong,J.and Guan,Z.and Wu,P.	Depression after exposure to stressful events: Lessons learned from the severe acute respiratory syndrome epidemic	2012
Lu,Y.C. and Shu,B.C. and Chang,Y.Y. and Lung,F.W.	The Mental Health of Hospital Workers Dealing with Severe Acute Respiratory Syndrome	2006
Marjanovic,Z. and Greenglass,E.R. and Coffey,S.	The relevance of psychosocial variables and working conditions in predicting nurses' coping strategies during the SARS crisis: An online questionnaire survey	2007
Marrs,R. and Horsley,T.L. and Hackbarth,D. and Landon,E.	High consequence infectious diseases training using interprofessional simulation and TeamSTEPPS	2019
Maunder,R.	The experience of the 2003 SARS outbreak as a traumatic stress among frontline healthcare workers in Toronto: lessons learned	2004
Maunder,R.G. and Lancee,W.J. and Balderson,K.E. and Bennett,J.P. and Borgundvaag,B. and Evans,S. and Fernandes,C.M. and Goldbloom,D.S. and Gupta,M. and Hunter,J.J. and McGillis,Hall L. and Nagle,L.M. and Pain,C. and Peczeniuk,S.S. and Raymond,G. and Read,N. and Rourke,S.B. and Steinberg,R.J. and Stewart,T.E. and VanDeVelde-Coke,S. and Veldhorst,G.G. and Wasylenki,D.A.	Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak	2006
Maunder,R. and Hunter,J. and Vincent,L. and Bennett,J. and Peladeau,N. and Leszcz,M.and Sadavoy,J. and Verhaeghe,L.M. and Steinberg,R. and Mazzulli,T.	The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital	2003
Maunder,R.G. and Lancee,W.J. and Rourke,S. and Hunter,J.J. and Goldbloom,D. and Balderson,K. and Petryshen,P. and Steinberg,R. and Wasylenki,D. and Koh,D. and Fones,C.S.L.	Factors Associated with the Psychological Impact of Severe Acute Respiratory Syndrome on Nurses and Other Hospital Workers in Toronto	2004
O'Boyle,C. and Robertson,C. and Secor-Turner,M.	Public health emergencies: nurses' recommendations for effective actions	2006

O'Sullivan,T.L. and Amaratunga,C. and Phillips,K.P. and Corneil,W. and O'Connor,E. and Lemyre,L. and Dow,D.	If schools are closed, who will watch our kids? Family caregiving and other sources of role conflict among nurses during large-scale outbreaks	2009
Poon,E. and Liu,K.S. and Cheong,D.L. and Lee,C.K. and Yam,L.Y. and Tang,W.N.	Impact of severe respiratory syndrome on anxiety levels of front-line health care workers	2004
Qi,J. and Xu,J. and Li,B. and Huang,J. and Yang,Y. and Zhang,Z. and Yao,D. and Liu,Q. and Jia,M. and Gong,D. and Ni,X. and Zhang,Q. and Shang,F. and Xiong,N. and Zhu,C. and Wang,T. and Zhang,X.	The Evaluation of Sleep Disturbances for Chinese Frontline Medical Workers under the Outbreak of COVID-19	2020
Rambaldini,G. and Wilson,K. and Rath,D. and Lin,Y. and Gold,W.L. and Kapral,M.K. and Straus,S.E.	The impact of severe acute respiratory syndrome on medical house staff: a qualitative study	2005
Raven,J. and Wurie,H. and Witter,S.	Health workers' experiences of coping with the Ebola epidemic in Sierra Leone's health system: a qualitative study	2018
Schreiber,M. and Cates,D.S. and Formanski,S. and King,M.	Maximizing the resilience of healthcare workers in multi-hazard events: Lessons from the 2014-2015 Ebola response in Africa	2019
Shih,F.J. and Gau,M.L. and Kao,C.C. and Yang,C.Y. and Lin,Y.S. and Liao,Y.C. and Sheu,S.J.	Dying and caring on the edge: Taiwan's surviving nurses' reflections on taking care of patients with severe acute respiratory syndrome	2007
Shih,F.J. and Turale,S. and Lin,Y.S. and Gau,M.L. and Kao,C.C. and Yang,C.Y. and Liao,Y.C.	Surviving a life-threatening crisis: Taiwan s nurse leaders reflections and difficulties fighting the sars epidemic	2009
Sin,S.S. and Huak,C.Y.	Psychological impact of the SARS outbreak on a Singaporean rehabilitation department...including commentary by Leong I, Thompson DR	2004
Smith,M.W. and Smith,P.W. and Kratochvil,C.J. and Schwedhelm,S.	The Psychosocial Challenges of Caring for Patients with Ebola Virus Disease	2017
Son,H. and Lee,W.J. and Kim,H.S. and Lee,K.S. and You,M.	Examination of Hospital Workers' Emotional Responses to an Infectious Disease Outbreak: Lessons From the 2015 MERS Co-V Outbreak in South Korea	2019
Son,H. and Lee,W.J. and Kim,H.S. and Lee,K.S. and You,M.	Hospital workersÂƒ_T psychological resilience after the 2015 Middle East respiratory syndrome outbreak	2019
Speroni,K.G. and Seibert,D.J. and Mallinson,R.K.	US Nurses' Perceptions Regarding Caring for Suspected, Probable, and Confirmed Ebola Virus Disease Patients, Part 1: A Quantitative Analysis	2015
Speroni,K.G. and Seibert,D.J. and Mallinson,R.K.	Nurses' Perceptions on Ebola Care in the United States, Part 2	2015
Styra,R. and Hawryluck,L. and Robinson,S. and Kasapinovic,S. and Fones,C. and Gold,W.L.	Impact on health care workers employed in high-risk areas during the Toronto SARS outbreak	2008
Su,T.P. and Lien,T.C. and Yang,C.Y.and Su,Y.L. and Wang,J.H. and Tsai,S.L. and Yin,J.C.	Prevalence of psychiatric morbidity and psychological adaptation of the nurses in a structured SARS caring unit during outbreak: A prospective and periodic assessment study in Taiwan	2007
Tam,C.W.C. and Pang,E.P.F. and Lam,L.C.W. and Chiu,H.F.K.	Severe acute respiratory syndrome (SARS) in Hong Kong in 2003: Stress and psychological impact among frontline healthcare workers	2004
Tolomiczenko,G.S. and Kahan,M. and Ricci,M. and Strathern,L. and Jeney,C. and Patterson,K. and Wilson,L.	SARS: coping with the impact at a community hospital	2005
Tomczyk,D. and Alvarez,D. and Borgman,P. and Cartier,M.J. and Caulum,L. and Galloway,C. and Groves,C. and Faust,N. and Meske,D.	Caring for those who care: the role of the occupational health nurse in disasters	2008

von Strauss,E. and Paillard-Borg,S. and Holmgren,J. and Saaristo,P.	Global nursing in an Ebola viral haemorrhagic fever outbreak: before, during and after deployment	2017
Wong,T.W. and Yau,J.K. and Chan,C.L. and Kwong,R.S. and Ho,S.M. and Lau,C.C. and Lau,F.L. and Lit,C.H.	The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope	2005
Wu,P. and Liu,X. and Fang,Y. and Fan,B. and Fuller,C.J. and Guan,Z. and Yao,Z. and Kong,J.and Lu,J. and Litvak,I.J.	Alcohol abuse/dependence symptoms among hospital employees exposed to a SARS outbreak	2008
Wu,P.and Fang,Y. and Guan,Z. and Fan,B. and Kong,J. and Yao,Z. and Liu,X. and Fuller,C.J. and Susser,E. and Lu,J. and Hoven,C.W.	The psychological impact of the SARS epidemic on hospital employees in China: Exposure, risk perception, and altruistic acceptance of risk	2009
Xi,H.J. and Chu,D.F. and Chen,J. and Xie,M.H. and Hu,P. and Cao,J.	Multiple physical exercises improving the physical and mental health of PLA medical staffs in Chinese Ebola treatment unit in liberia	2015
Xiao,H. and Zhang,Y. and Kong,D. and Li,S. and Yang,N.	The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China	2020
Zhu,Z. and Xu,S. and Wang,H. and Liu,Z. and Wu,J. and Li,G. and Miao,J. and Zhang,C. and Yang,Y, and Sun,W. and Zhu,S. and Fan,Y. and Hu,J. and Liu,J. and Wang,W.	COVID-19 in Wuhan: Immediate Psychological Impact on 5062 Health Workers	2020

Other documentation

Expertise center (Military Mental Healthcare) MGGZ	Defense tips and recommendations for the mental health of and healthcare professionals	2020
Artsen zonder Grenzen (Stress Management Support BF material for Marbourg outbreak MSF-B and MSF-OCBA Human resources Psychosocial care units: MSF OCBA Uige Marburg project final report; MSF-B BF sheet for pandemic: influenza preparedness; MSF-H Stress in the field (2005) and MSF-B I feel good (2006))	Stress Management Support BF material for Marbourg outbreak	2005
United nations	Social support	2015
World Health Organization	WHO Coronavirus disease (COVID-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health	2019
World Health Organization	Occupational safety and health in public health emergencies: a manual for protecting health workers and responders	2018

APPENDIX A: METHODS

This study combines a rapid review of the literature with expert interviews.

Rapid review of the literature

Identification of articles
PubMed, Embase, PsycINFO, CINAHL, bioRxiv and medRxiv were searched for literature about interventions and measures for the preservation of short- and long-term physical/mental health and employability of healthcare professionals exposed to Covid-19 crisis working conditions. In addition, the gray literature was also searched with a focus on leading organizations with expertise in crisis situations, including the World Health Organization, Médecins Sans Frontières and the Netherlands Ministry of Defense. Databases PubMed, Embase, PsycINFO and CINAHL were searched for relevant literature about Covid-19 and similar pandemics such as SARS, MERS and EBOLA for the period from January 1, 2003 through March 26, 2020. The search strategy was based on a combination of healthcare professional-related terms, pandemic-related terms, (incl. Covid-19, SARS, MERS and Ebola) and terms related to physical and mental health. Preprint archives bioRxiv and medRxiv were searched for relevant literature on COVID-19 for the period from January 3, 2020 through March 26, 2020. The search strategy for bioRxiv and medRxiv was based on a Covid-19 Living Systematic Review https://ispmbern.github.io/covid-19/living-review/collectingdata.html and focused specifically on preprints related to COVID-19. The full search strategies are described in Appendix B.

Selection of articles
All identified articles were eligible for inclusion regardless of publication status (i.e. preprint or peer-reviewed articles). Articles were included when they concerned empirical research, both original and reviews, focused on the impact of Covid-19- like working conditions on the (short- and long-term) physical and/or mental health of healthcare professionals in a hospital setting. Research into determinants or causes of physical and/or mental health as well as research into interventions, measures and policies to preserve physical and/or mental health was included. Articles written in a language other than Dutch or English were excluded. Articles were screened for title and abstract by pairs of independent researchers (AR, DS, DtC, EM, ES, JT, JV, LS, NB, WdL) and discrepancies were resolved by a third researcher (LS, WdL).

Data extraction
Full-text screening and data extraction were combined in a single phase. This was performed by one researcher (AR, DS, DtC, EM, JdM, JV, LS, NB, JT, WdL) and subsequently checked by a second researcher. Data extraction was performed using a fixed data extraction form with which information was collected regarding target population, location, crisis situation, type of study, study design, mental and physical outcomes, intervention/measure, recommendation regarding the use of the intervention/measure, timing of the intervention/measure (before, during or after the crisis) and purpose of the intervention/measure.

Data synthesis
A matrix was drawn up for data synthesis, in which a distinction was made between the timing of the intervention/measure (before, during or after the crisis situation) and the following specific topics: resilience, tasks and responsibilities, and working conditions. Within each topic, one researcher synthesized data regarding interventions/measures before and during the crisis. Data synthesis was checked by a second researcher. Subsequently, after triangulation with the findings of the expert interviews, recommendations were drawn up with regard to the preservation of short- and long-term physical/mental health and the employability of healthcare professionals exposed to Covid-19 crisis working conditions. These recommendations were assessed by at least two researchers, where necessary supplemented by the coordinators (JT, LS). Also, these recommendations were presented to a number of experts who were not directly involved in this project.

Expert interviews

Using a targeted sample method, four experts were recruited for participation in a semi-structured interview. The interview guide was drawn up by an experienced qualitative researcher (WdL) and provided with feedback by two other researchers with qualitative research experience (JM, EM). The experts interviewed were asked to respond to the data synthesis matrix (see previous paragraph). This mainly concerned the timing of the interventions/measures (before, during and after the crisis) and the specific topics: resilience, tasks and responsibilities, and working conditions. The questions asked concerned the completeness of the above and any additions, priorities with regard to the topics and other advice in this crisis situation. The interviews were conducted by telephone and lasted 38 minutes on average (34 - 42 minutes). The interviews were recorded and subsequently summarized. After the synthesis of the quantitative data from the systematic literature search was completed, the findings of the interviews were added and triangulated. The triangulation process was checked by two researchers (JM, EM). The experts received the draft advice and were given the opportunity to respond to the contents. Some content-related additions were made.

APPENDIX B: SEARCH STRATEGIES

PubMed (January 1, 2003 through March 26, 2020)

#	Search terms
1	Medical Staff [MeSH] OR Physicians [MeSH] OR Nursing Staff [MeSH] OR Nurses [MeSH] OR Medical Staff [tiab] OR Physician* [tiab] OR Doctor* [tiab] OR Clinician* [tiab] OR Nursing Staff [tiab] OR Nurse* [tiab] OR Healthcare Worker* [tiab] OR Health Care Worker* [tiab] OR Health Worker* [tiab] OR Healthcare Professional* [tiab] OR Health Care Professional* [tiab] OR Health Professional* [tiab] OR Healthcare Provider* [tiab] OR Health Care Provider* [tiab] OR Health Provider* [tiab] OR Hospital worker* [tiab] OR Hospital Employee* [tiab] OR Medical House Staff [tiab]
2	Disease Outbreaks [MeSH] OR Communicable Diseases, Emerging [MeSH] OR Severe Acute Respiratory Syndrome [MeSH] OR SARS Virus [MeSH] OR Middle East Respiratory Syndrome Coronavirus [MeSH] OR Ebolavirus [MeSH] OR Disease Outbreak* [tiab] OR Pandemic [tiab] OR Epidemic [tiab] OR Emerging Communicable Disease* [tiab] OR Emerging Infectious Disease* [tiab] OR Severe Acute Respiratory Syndrome [tiab] OR SARS [tiab] OR Middle East Respiratory Syndrome [tiab] OR MERS [tiab] OR Ebola* [tiab] OR Corona [tiab] OR Coronavirus [tiab] OR COVID-19 [tiab] OR 2019-nCoV [tiab] OR SARS-CoV [tiab] OR MERS-CoV [tiab] OR Sars-Cov-2 [tiab]
3	Resilience, Psychological [MeSH] OR Fatigue [MeSH] OR Workload [MeSH] OR Mental Health [MeSH] OR Burnout, Professional [MesH] OR Occupational Health [MeSH] OR Occupational Stress [MeSH] OR Professionalism [MeSH] OR Psychological Trauma [MeSH] OR Fear [MeSH] OR Anxiety [MeSH] OR Adaptation, Psychological [MeSH] OR Resilience [tiab] OR Persever* [tiab] OR Physical Health [tiab] OR Physical Impact [tiab] OR Physical Effect* [tiab] OR Physical Outcome* [tiab] OR Physical Workload [tiab] OR Fatigue [tiab] OR Mental Health [tiab] OR Psychological Health [tiab] OR Emotional Health [tiab] OR Mental Impact [tiab] OR Psychological Impact [tiab] OR Emotional Impact [tiab] OR Mental Effect* [tiab] OR Psychological Effect* [tiab] OR Emotional Effect* [tiab] OR Mental Outcome* [tiab] OR Psychological Outcome* [tiab] OR Emotional Outcome* [tiab] OR Mental Workload [tiab] OR Psychological Workload [tiab] OR Emotional Workload [tiab] OR Wellbeing [tiab] OR Burnout [tiab] OR Burn-out [tiab] OR Occupational Health [tiab] OR Occupational Stress [tiab] OR Occupational Injury [tiab] OR Occupational Disability [tiab] OR Occupational Effect* [tiab] OR Professionalism [tiab] OR Trauma [tiab] OR Traumatic [tiab] OR Fear [tiab] OR Anxiety [tiab] OR Anxious [tiab] OR Stress [tiab] OR Distress [tiab] OR Adaptation [tiab] OR Coping [tiab] OR Stigma [tiab]
4	#1 AND #2 AND #3

Embase (January 1, 2003 through March 26, 2020)

#	Search terms
1	'medical personnel'/exp OR 'medical staff'/exp OR 'hospital physician'/exp OR 'resident'/exp OR 'nurse'/exp OR 'medical staff':ab,ti OR Physician*:ab,ti OR Doctor*:ab,ti OR Clinician*:ab,ti OR 'Nursing Staff':ab,ti OR Nurse*:ab,ti OR 'Healthcare Worker*':ab,ti OR 'Health Care Worker*':ab,ti OR 'Health Worker*':ab,ti OR 'Healthcare Professional*':ab,ti OR 'Health Care Professional*':ab,ti OR 'Health Professional*':ab,ti OR 'Healthcare Provider*':ab,ti OR 'Health Care Provider*':ab,ti OR 'Health Provider*':ab,ti OR 'Hospital worker*':ab,ti OR 'Hospital Employee*':ab,ti OR 'Medical House Staff':ab,ti
2	'epidemic'/exp OR 'pandemic'/exp OR 'emerging infectious disease'/exp OR 'severe acute respiratory syndrome'/exp OR 'SARS-related coronavirus'/exp OR 'Middle East respiratory syndrome coronavirus'/exp OR 'Ebolavirus'/exp OR 'Disease Outbreak*':ab,ti OR Pandemic:ab,ti OR Epidemic:ab,ti OR 'Emerging Communicable Disease*':ab,ti OR 'Emerging Infectious Disease*':ab,ti OR 'Severe Acute Respiratory Syndrome':ab,ti OR SARS:ab,ti OR 'Middle East Respiratory Syndrome':ab,ti OR MERS:ab,ti OR Ebola*:ab,ti OR Corona:ab,ti OR Coronavirus:ab,ti OR 'COVID-19':ab,ti OR '2019-nCoV':ab,ti OR 'SARS-CoV':ab,ti OR 'MERS-CoV':ab,ti OR 'Sars-Cov-2':ab,ti
3	'resilience'/exp OR 'fatigue'/exp OR 'workload'/exp OR 'mental health'/exp OR 'psychological health'/exp OR 'emotional stability'/exp OR 'professional burnout'/exp OR 'occupational health'/exp OR 'job stress'/exp OR 'work capacity'/exp OR 'professionalism'/exp OR 'psychotrauma'/exp OR 'fear'/exp OR 'anxiety'/exp OR Resilience:ab,ti OR Persever*:ab,ti OR 'Physical Health':ab,ti OR 'Physical Impact':ab,ti OR 'Physical Effect*':ab,ti OR 'Physical Outcome*': ab,ti OR 'Physical Workload':ab,ti OR Fatigue:ab,ti OR 'Mental Health':ab,ti OR 'Psychological Health':ab,ti OR 'Emotional Health':ab,ti OR 'Mental Impact':ab,ti OR 'Psychological Impact':ab,ti OR 'Emotional Impact':ab,ti OR 'Mental Effect*':ab,ti OR 'Psychological Effect*':ab,ti OR 'Emotional Effect*':ab,ti OR 'Mental Outcome*':ab,ti OR 'Psychological Outcome*':ab,ti OR 'Emotional Outcome*':ab,ti OR 'Mental Workload':ab,ti OR 'Psychological Workload':ab,ti OR 'Emotional Workload':ab,ti OR Wellbeing:ab,ti OR Burnout:ab,ti OR Burn-out:ab,ti OR 'Occupational Health':ab,ti OR 'Occupational Stress':ab,ti OR 'Occupational Injury':ab,ti OR 'Occupational Disability':ab,ti OR 'Occupational Effect*':ab,ti OR Professionalism:ab,ti OR Trauma:ab,ti OR Traumatic:ab,ti OR Fear:ab,ti OR Anxiety:ab,ti OR Anxious:ab,ti OR Stress:ab,ti OR Distress:ab,ti OR Adaptation:ab,ti OR Coping:ab,ti OR Stigma:ab,ti
4	#1 AND #2 AND #3

PsycINFO (January 1, 2003 through March 26, 2020)

#	Search terms
1	DE "Medical Personnel" OR DE "Nurses" OR DE "Physicians" OR DE "Psychiatric Hospital Staff" OR DE "Clinicians" OR TI "medical staff" OR TI "Physician" OR TI "Doctors" OR TI "Doctor" OR TI "Clinicians" OR TI "Clinician" OR TI "Nursing Staff" OR TI "Nurses" OR TI "Nurse" OR TI "Healthcare Workers" OR TI "Healthcare Worker" OR TI "Health Care Workers" OR TI "Health Care Worker" OR TI "Health Workers" OR TI "Health Worker" OR TI "Healthcare Professionals" OR TI "Healthcare Professional" OR TI "Health Care Professionals" OR TI "Health Care Professional" OR TI "Health Professionals" OR TI "Health Professional" OR TI "Healthcare Providers" OR TI "Healthcare Provider" OR TI "Health Care Providers" OR TI "Health Care Provider" OR TI "Health Providers" OR TI "Health Provider" OR TI "Hospital workers" OR TI "Hospital worker" OR TI "Hospital Employees" OR TI "Hospital Employee" OR TI "Medical House Staff" OR AB "medical staff" OR AB "Physician" OR AB "Doctors" OR AB "Doctor" OR AB "Clinicians" OR AB "Clinician" OR AB "Nursing Staff" OR AB "Nurses" OR AB "Nurse" OR AB "Healthcare Workers" OR AB "Healthcare Worker" OR AB "Health Care Workers" OR AB "Health Care Worker" OR AB "Health Workers" OR AB "Health Worker" OR AB "Healthcare Professionals" OR AB "Healthcare Professional" OR AB "Health Care Professionals" OR AB "Health Care Professional" OR AB "Health Professionals" OR AB "Health Professional" OR AB "Healthcare Providers" OR AB "Healthcare Provider" OR AB "Health Care Providers" OR AB "Health Care Provider" OR AB "Health Providers" OR AB "Health Provider" OR AB "Hospital workers" OR AB "Hospital worker" OR AB "Hospital Employees" OR AB "Hospital Employee" OR AB "Medical House Staff"
2	DE "Epidemics" OR DE "Pandemics" OR TI "Disease Outbreaks" OR TI "Pandemic" OR TI "Epidemic" OR TI "Emerging Communicable Diseases" OR TI "Emerging Infectious Diseases" OR TI "Severe Acute Respiratory Syndrome" OR TI "SARS" OR TI "Middle East Respiratory Syndrome" OR TI "MERS" OR TI "Ebola*" OR TI "Corona" OR TI "Coronavirus" OR TI "COVID-19" OR TI "2019-nCoV" OR TI "SARS-CoV" OR TI "MERS-CoV" OR TI "Sars-Cov-2" OR AB "Disease Outbreaks" OR AB "Pandemic" OR AB "Epidemic" OR AB "Emerging Communicable Diseases" OR AB "Emerging Infectious Diseases" OR AB "Severe Acute Respiratory Syndrome" OR AB "SARS" OR AB "Middle East Respiratory Syndrome" OR AB "MERS" OR AB "Ebola*" OR AB "Corona" OR AB "Coronavirus" OR AB "COVID-19" OR AB "2019-nCoV" OR AB "SARS-CoV" OR AB "MERS-CoV" OR AB "Sars-Cov-2"
3	DE "Resilience (Psychological)" OR DE "Health Anxiety" OR DE "Mental Health" OR DE "Mental Status" OR DE "Occupational Health" OR DE "Work Related Illnesses" OR DE "Physical Health" OR DE "Well Being" OR DE "Compassion Fatigue" OR DE "Fatigue" DE "Health Outcomes" OR DE "Psychological Needs" OR DE "Physical Health" OR DE "Physical Strength" OR DE "Professionalism" OR DE "Trauma" OR DE "Emotional Trauma" OR DE "Injuries" OR DE "Post-Traumatic Stress" OR DE "Traumatic Loss" OR DE "Fear" OR DE "Anxiety" OR DE "Stress" OR DE "Environmental Stress" OR DE "Occupational Stress" OR DE "Physiological Stress" OR DE "Post-Traumatic Stress" OR DE "Psychological Stress" OR DE "Distress" OR DE "Coping Behavior" OR DE "Adaptive Behavior" OR DE "Stigma" OR DE "Self-Stigma" OR TI "Resilience" OR TI "Persever*" OR TI "Physical Health" OR TI "Physical Impact" OR TI "Physical Effects" OR TI "Physical Outcomes" OR TI "Physical Workload" OR TI "Fatigue" OR TI "Mental Health" OR TI "Psychological Health" OR TI "Emotional Health" OR TI "Mental Impact" OR TI "Psychological Impact" OR TI "Emotional Impact" OR TI "Mental Effects" OR TI "Psychological Effects" OR TI "Emotional Effects" OR TI "Mental Outcomes" OR TI "Psychological Outcomes" OR TI "Emotional Outcomes" OR TI "Mental Workload" OR TI "Psychological Workload" OR TI "Emotional Workload" OR TI "Wellbeing" OR TI "Burnout" OR TI "Burn-out" OR TI "Occupational Health" OR TI "Occupational Injury" OR TI "Occupational Disability" OR TI "Occupational Effects" OR TI "Professionalism" OR TI "Trauma" OR TI "Traumatic" OR TI "Fear*" OR TI "Anxi*" OR TI "Stress" OR TI "Distress" OR TI "Adaptation" OR TI "Coping" OR TI "Stigma" OR AB "Resilience" OR AB "Persever*" OR AB "Physical Health" OR AB "Physical Impact" OR AB "Physical Effects" OR AB "Physical Outcomes" OR AB "Physical Workload" OR AB "Fatigue" OR AB "Mental Health" OR AB "Psychological Health" OR AB "Emotional Health" OR AB "Mental Impact" OR AB "Psychological Impact" OR AB "Emotional Impact" OR AB "Mental Effects" OR AB "Psychological Effects" OR AB "Emotional Effects" OR AB "Mental Outcomes" OR AB "Psychological Outcomes" OR AB "Emotional Outcomes" OR AB "Mental Workload" OR AB "Psychological Workload" OR AB "Emotional Workload" OR AB "Wellbeing" OR AB "Burnout" OR AB "Burn-out" OR AB "Occupational Health" OR AB "Occupational Injury" OR AB "Occupational Disability" OR AB "Occupational Effects" OR AB "Professionalism" OR AB "Trauma" OR AB "Traumatic" OR AB "Fear*" OR AB "Anxi*" OR AB "Stress" OR AB "Distress" OR AB "Adaptation" OR AB "Coping" OR AB "Stigma"
4	#1 AND #2 AND #3

CINAHL (January 1, 2003 through March 26, 2020)

#	Search terms
1	MH "Medical Staff+" OR MH "Medical Staff, Hospital+" OR MH "Nursing Staff, Hospital" OR MH "Nurses+" OR MH "Physicians+" OR MH "Health Personnel" OR TI "medical staff" OR TI "Physician" OR TI "Doctors" OR TI "Doctor" OR TI "Clinicians" OR TI "Clinician" OR TI "Nursing Staff" OR TI "Nurses" OR TI "Nurse" OR TI "Healthcare Workers" OR TI "Healthcare Worker" OR TI "Health Care Workers" OR TI "Health Care Worker" OR TI "Health Workers" OR TI "Health Worker" OR TI "Healthcare Professionals" OR TI "Healthcare Professional" OR TI "Health Care Professionals" OR TI "Health Care Professional" OR TI "Health Professionals" OR TI "Health Professional" OR TI "Healthcare Providers" OR TI "Healthcare Provider" OR TI "Health Care Providers" OR TI "Health Care Provider" OR TI "Health Providers" OR TI "Health Provider" OR TI "Hospital workers" OR TI "Hospital worker" OR TI "Hospital Employees" OR TI "Hospital Employee" OR TI "Medical House Staff" OR AB "medical staff" OR AB "Physician" OR AB "Doctors" OR AB "Doctor" OR AB "Clinicians" OR AB "Clinician" OR AB "Nursing Staff" OR AB "Nurses" OR AB "Nurse" OR AB "Healthcare Workers" OR AB "Healthcare Worker" OR AB "Health Care Workers" OR AB "Health Care Worker" OR AB "Health Workers" OR AB "Health Worker" OR AB "Healthcare Professionals" OR AB "Healthcare Professional" OR AB "Health Care Professionals" OR AB "Health Care Professional" OR AB "Health Professionals" OR AB "Health Professional" OR AB "Healthcare Providers" OR AB "Healthcare Provider" OR AB "Health Care Providers" OR AB "Health Care Provider" OR AB "Health Providers" OR AB "Health Provider" OR AB "Hospital workers" OR AB "Hospital worker" OR AB "Hospital Employees" OR AB "Hospital Employee" OR AB "Medical House Staff"
2	MH "Disease Outbreaks" OR MH "Severe Acute Respiratory Syndrome" OR MH "SARS Virus" OR MH "Middle East Respiratory Syndrome" OR MH "Middle East Respiratory Syndrome Coronavirus" OR MH "Ebola Virus" OR TI "Disease Outbreaks" OR TI "Pandemic" OR TI "Epidemic" OR TI "Emerging Communicable Disease*" OR TI "Emerging Infectious Disease*" OR TI "Severe Acute Respiratory Syndrome" OR TI "SARS" OR TI "Middle East Respiratory Syndrome" OR TI "MERS" OR TI "Ebola*" OR TI "Corona" OR TI "Coronavirus" OR TI "COVID-19" OR TI "2019-nCoV" OR TI "SARS-CoV" OR TI "MERS-CoV" OR TI "Sars-Cov-2" OR AB "Disease Outbreak*" OR AB "Pandemic" OR AB "Epidemic" OR AB "Emerging Communicable Disease*" OR AB "Emerging Infectious Disease*" OR AB "Severe Acute Respiratory Syndrome" OR AB "SARS" OR AB "Middle East Respiratory Syndrome" OR AB "MERS" OR AB "Ebola*" OR AB "Corona" OR AB "Coronavirus" OR AB "COVID-19" OR AB "2019-nCoV" OR AB "SARS-CoV" OR AB "MERS-CoV" OR AB "Sars-Cov-2"
3	MH "Fatigue+" OR MH "Burnout, Professional+" OR MH "Mental Health" OR MH "Occupational Health+" OR MH "Mental Status" OR MH "Occupational-Related Injuries" OR MH "Psychological Well-Being" OR MH "Stress, Occupational+" OR MH "Professionalism" OR MH "Trauma+" OR MH "Stress Disorders, Post-Traumatic+" OR MH "Anxiety+" OR MH "Stress" OR MH "Adaptation, Occupational" OR MH "Adaptation, Physiological+" OR MH "Coping+" OR MH "Stigma" OR TI "Resilience" OR TI "Persever*" OR TI "Physical Health" OR TI "Physical Impact" OR TI "Physical Effect*" OR TI "Physical Outcome*" OR TI "Physical Workload" OR TI "Fatigue" OR TI "Mental Health" OR TI "Psychological Health" OR TI "Emotional Health" OR TI "Mental Impact" OR TI "Psychological Impact" OR TI "Emotional Impact" OR TI "Mental Effect*" OR TI "Psychological Effect*" OR TI "Emotional Effect*" OR TI "Mental Outcome*" OR TI "Psychological Outcome*" OR TI "Emotional Outcome*" OR TI "Mental Workload" OR TI "Psychological Workload" OR TI "Emotional Workload" OR TI "Wellbeing" OR TI "Burnout" OR TI "Burn-out" OR TI "Occupational Health" OR TI "Occupational Injury" OR TI "Occupational Disability" OR TI "Occupational Effect*" OR TI "Professionalism" OR TI "Trauma" OR TI "Traumatic" OR TI "Fear*" OR TI "Anxiety" OR TI "Anxious" OR TI "Stress" OR TI "Distress" OR TI "Adaptation" OR TI "Coping" OR TI "Stigma" OR AB "Resilience" OR AB "Persever*" OR AB "Physical Health" OR AB "Physical Impact" OR AB "Physical Effect*" OR AB "Physical Outcome*" OR AB "Physical Workload" OR AB "Fatigue" OR AB "Mental Health" OR AB "Psychological Health" OR AB "Emotional Health" OR AB "Mental Impact" OR AB "Psychological Impact" OR AB "Emotional Impact" OR AB "Mental Effect*" OR AB "Psychological Effect*" OR AB "Emotional Effect*" OR AB "Mental Outcome*" OR AB "Psychological Outcome*" OR AB "Emotional Outcome*" OR AB "Mental Workload" OR AB "Psychological Workload" OR AB "Emotional Workload" OR AB "Wellbeing" OR AB "Burnout" OR AB "Burn-out" OR AB "Occupational Health" OR AB "Occupational Injury" OR AB "Occupational Disability" OR AB "Occupational Effect*" OR AB "Professionalism" OR AB "Trauma" OR AB "Traumatic" OR AB "Fear*" OR AB "Anxiety" OR AB "Anxious" OR AB "Stress" OR AB "Distress" OR AB "Adaptation" OR AB "Coping" OR AB "Stigma"
4	#1 AND #2 AND #3

bioRxiv & medRxiv (January 3, 2020 through March 26, 2020)
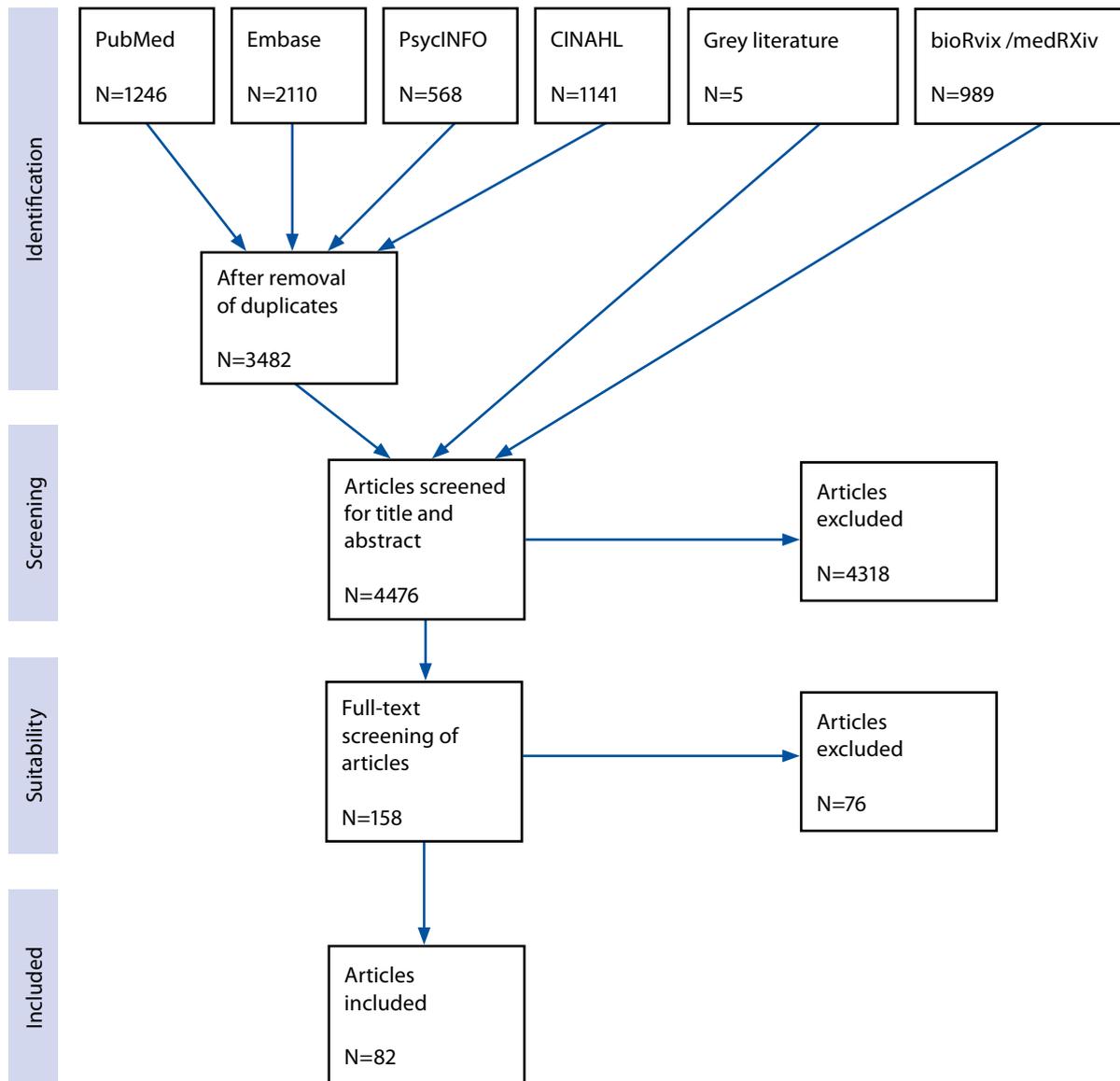
The possibilities of using search terms in bioRxiv and medRxiv are limited. For now, focus was on COVID-19-related terms in line with a COVID-19 Living Systematic Review (https://ispmbern.github.io/covid-19/living-review/collectingdata.html):

ncov OR corona OR wuhan OR COVID OR SARS-CoV-2

A direct link to the search strategy and results (Note: as a result of publication in peer-reviewed journals, studies will disappear from the archive, so the numbers found may differ from the numbers presented in the current project):
https://www.biorxiv.org/search/ncov%252Bor%252Bcorona%252Bor%252Bwuhan%252Bor%252BCOVID%-252Bor%252BSARS-CoV-2%20jcode%3Amedrxiv%7C%7Cbiorxiv%20limit_from%3A2020-01-03%20limit_to%3A2020-03-26%20numresults%3A75%20sort%3Apublication-date%20direction%3Adescending%20format_result%3Astandar

Appendix C: Stroomdiagram

PubMed
N=1246

Embase
N=2110

PsycINFO
N=568

CINAHL
N=1141

Grey literature
N=5

bioRvix /medRXiv
N=989

After removal
of duplicates
N=3482

Articles screened
for title and
abstract
N=4476

Articles
excluded
N=4318

Full-text
screening of
articles
N=158

Articles
excluded
N=76

Articles
included
N=82

Identification

Screening

Suitability

Included

Colofon