

Interventions for Improving Health Care Workers' Retention in Epidemics – a Scoping Review

Zahra Zarei Jelyani

Fasa University of Medical Science

Sadra Valiee

Shiraz University of Medical Sciences

Mohammad Kia

Shiraz University of Medical Sciences

Ali jajarmizadeh (✉ alijajarmi98@gmail.com)

TUMS: Tehran University of Medical Sciences <https://orcid.org/0000-0002-5690-3845>

Sajad Delavari

Shiraz University of Medical Sciences

Research

Keywords: Sustainability, Retention, Human Resources, Health care workers, Epidemic, scoping review

Posted Date: October 5th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-951428/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Introduction: Generally, in Epidemics, such as COVID-19, health care workers (HCWs) faces many problems which lead to a shortage and weakening of human resources in the health system. Therefore, using effective strategies to retain human resources is one of the most important issues during outbreaks. This study aims to collect and classify the proposed interventions to strengthen human health resources and their sustainability during epidemics through scoping review.

Methods: In this scoping review study, 2300 studies were retrieved through searching international databases – PubMed, Embase, Scopus and Web of Science. The retrieved studies were screened, and finally, 50 studies were included for analysis. The strategies were classified using inductive qualitative content analysis.

Results: Most of the studies were conducted in the United States and the United Kingdom. The target population in 39 studies was all health workers; five studies were on physicians, five studies on nurses, and only one study on dentists. The proposed interventions were classified into five categories: preparation, protection, support, treatment, and feedback.

Discussion: Most studies focused on providing interventions in one or two dimensions of human resources, but these interventions were summarized and categorized in this review. Therefore, this study has a holistic view of various dimensions of strengthening and maintaining human health resources during epidemics by providing a thematic map. Considering that human beings are multidimensional, policymakers and managers of the health system should use a set of interventions that simultaneously cover different aspects of their needs to strengthen and maintain HCWs.

Introduction

During the spread of epidemic diseases, many physical and psychological stress affect healthcare workers (HCWs) (1). Stress, anxiety, depression, insomnia, anger, and fear are just a small number of reported injuries among HCWs worldwide(2, 3). According to published reports, nearly 7,000 HCWs have died from the Covid-19 pandemic (4). Although that HCWs account for about 1-3% of the population in different countries, about 14% of the Covid-19 cases reported to the World Health Organization were HCWs. Also, in some countries, this ratio can be up to 35% (5). On the other hand, human resources play a vital role in creating resistance and resilience of communities and health systems in response to various natural and human crises. Typically, the aftermath of such events is an increase in HCWs' mortality, injury, disease, and the overall weakening of human health resources (6). Besides, work challenges and psychological stress due to increased workload, lack of personal protective equipment, observation of death of colleagues and patients, fear of contracting and transmission of disease to the family, tolerating quarantine and social isolation, moral dilemmas of prioritizing the allocation of drugs and hospital equipment and making decisions for patients in the absence of their family members put double pressure on the medical staff (3, 7-16).

In this situation, many HCWs decide to leave their job. This problem has been reported in the United States (17) and is expected to worsen in low-income countries (18). HCWs' death, infection, or their decision to leave their job leads to a shortage of service providers. This vicious cycle puts renewed pressure on the present human resources, leading to the organization's collapse (19, 20).

Therefore, one of the most critical interventions during epidemic diseases is to try to maintain and strengthen the human health resources; so that the health systems do not face a shortage of health service providers (21). Although many scattered suggested or experienced interventions - to strengthen and sustain human resources in the outbreak of epidemic diseases – have been recommended, it seems that a comprehensive study has not been done in this regard. This study aims to collect and classify the proposed intervention to strengthen human health resources and their sustainability in the face of epidemics using the scoping review method.

Method

In this scoping review study, we aim to determine the extent, range, nature of research activities, summarizing and presenting their results in strategies to strengthen and sustain the HCWs during the outbreak of epidemic diseases (22). Scoping review was chosen as a preferred method because of the lack of comprehensive studies in this field and the extended domain of the research question. For this purpose, the 5-step framework proposed by Arksey and O'Malley in 2005 has been used. These steps are as follows: 1) identifying the research question and the purpose of the study, 2) searching for related studies, 3) selecting studies, 4) charting data, and 5) collating, summarizing, and reporting the results (22).

Search strategy

The research question was "What are the strategies to strengthen and sustain HCWs during the outbreaks?". To find the answer, the search was conducted on the international databases including PubMed, Embase, Scopus, and Web of Science. The research question was divided into three areas of strengthening and sustainability, health workforce, and epidemics. After initial searches, related studies were reviewed to select the final keywords for search. The *details of search strategy and keywords are as shown* in *Table 1*, which resulted in retrieving 2386 papers.

Table 1. Search strategy on international databases

No.	Database	Search strategy	Result	Date
1	PubMed	("retention"[Title/Abstract] OR "sustain"[Title/Abstract] OR "maintain"[Title/Abstract] OR "burnout, professional"[MeSH Terms] OR "burnout"[Title/Abstract] OR "resil*"[Title/Abstract]) AND ("Health Personnel"[MeSH Terms] OR "Health Workforce"[MeSH Terms] OR "healthcare professional"[Title/Abstract] OR "healthcare provider"[Title/Abstract] OR "medical staff"[Title/Abstract] OR "nurse"[Title/Abstract] OR "physician"[Title/Abstract]) AND ("Endemic Diseases"[MeSH Terms] OR "Disease Outbreaks"[MeSH Terms] OR "endemic"[Title/Abstract] OR "epidemic"[Title/Abstract] OR "pandemic"[Title/Abstract])	470	8/10/2020
2	Scopus	((TITLE-ABS-KEY (retention) OR TITLE-ABS-KEY (sustain) OR TITLE-ABS-KEY (maintain) OR TITLE-ABS-KEY (resil*) OR TITLE-ABS-KEY (burnout))) AND ((TITLE-ABS-KEY (physician) OR TITLE-ABS-KEY (nurse) OR TITLE-ABS-KEY (healthcare AND provider) OR TITLE-ABS-KEY (healthcare AND professional) OR TITLE-ABS-KEY (medical AND staff) OR KEY (health AND personnel jjk) OR KEY (health AND workforce))) AND ((TITLE-ABS-KEY (endemic) OR TITLE-ABS-KEY (epidemic) OR TITLE-ABS-KEY (pandemic) OR KEY (disease AND outbreak))))	1107	8/10/2020
3	Web Of Science	((TI=(retention OR sustain OR maintain OR resil* OR Burnout) OR AB=(retention OR sustain OR maintain OR resil* OR Burnout)) AND (TI=(Healthcare professional OR Healthcare provider OR medical staff OR nurse OR physician) OR AB=(Healthcare professional OR Healthcare provider OR medical staff OR nurse OR physician) OR AK=(Health workforce OR Health personnel)) AND (TI=(endemic OR epidemic OR pandemic) OR AB=(endemic OR epidemic OR pandemic) OR AK=(Disease outbreak)))	596	8/10/2020
4	Embase	('health care personnel':kw OR 'health provider':ti,ab,kw OR 'medical staff':ti,ab,kw OR 'health practitioner':ti,ab,kw OR 'health workforce':kw OR physician:ti,ab,kw OR nurse:ti,ab,kw) AND ('endemic disease':kw OR endemic:ti,ab OR epidemic:ti,ab,kw OR pandemic:ti,ab,kw) AND (burnout:ti,ab OR 'professional burnout':kw OR 'resil*':ti,ab,kw OR retention:ti,ab,kw OR sustain:ti,ab,kw OR maintain:ti,ab,kw)	213	8/10/2020

Selection process

In this study, English studies published after 2000 were included, which were 2201 papers. From these studies, 679 duplicates were eliminated. Finally, the title and abstract of 1522 studies in terms of two criteria were reviewed:

1) The simultaneous presence of three areas of strengthening and sustainability, epidemics, and human health resources

2) Suggesting intervention(s) or recommendation(s)

At this stage, to reduce the possibility of error, all the titles and abstracts of the studies were reviewed by two researchers independently (A.J. and Z.Z.). In case of disagreements, the final decision were made according to the third researcher's (S.V.) opinion. Out of 59 selected studies, three were excluded due to inaccessibility of the full text and eight due to being unrelated to the research question. Finally, by adding two studies from hand searches, the final 50 studies were included. A summary of this process is shown in Figure 1.

Data extraction and analysis

After reviewing the final selected studies, their related findings were summarized in a table available in the appendix. The table includes the title of the research, country, type of study, focus/purpose, and related findings in the studies. Thematic analysis method had been used to categorize and integrate the obtained results (23).

Results

In this study, the results of articles that provided interventions to retain and sustain human resources in epidemics were reviewed. Most of the studies were conducted in the late second decade and the era of the Covid-19 pandemic. As well, most studies were conducted in the United States and the United Kingdom. Among them, the study population in 39 studies were general HCWs, five studies of physicians, five studies are dedicated to nurses, and only one study is about dentists. This data, with other features of included studies, can be seen in Table 2.

Table 2. Characteristics of included literature

Characteristics	Type	Number of References/study
Countries' economic status	High-income	21
	Upper-middle income	1
	Lower-middle income	5
	Low income	0
	Not mentioned country	23
Total		50
Study Population	HCWs	39
	Physicians	5
	Nurses	5
	Dentist	1
Total		50

The suggested interventions were categorized by thematic analysis into 15 sub-themes from five themes of preparation, protection, support, care, and feedback (Table 3). Also, in some reviewed articles, the proposed interventions were presented in the form of a model. The Witness to Witness (W2W) model in the United States during the Covid-19 pandemic (24) and the The Anticipate, Plan and Deter (APD) model in Africa and China (25) during the Ebola and Covid-19 pandemics simultaneously cover training and psychological support sub-themes. Therefore, the models do not require extensive infrastructure to implement.

Table 3 Themes, subthemes and interventions

1. Prepare

1.1. Creating communication networks

Establishing communication networks at the local, national, and international levels to share successful experiences and updated knowledge about spreading the disease, prevention, protection, and therapeutic measures can be a valuable intervention (8, 26-30).

1.2. Providing education programs

Providing the educational needs of medical staff in various fields such as lifestyle (31), mental health (1, 7, 9, 10, 13, 25, 27, 29, 31, 33-41) mental exercises including meditation (35), clinical skills (9, 17) and

Theme	Subthemes	Interventions
Prepare	Creating communication networks	<ul style="list-style-type: none"> • Creating communication networks to share successful experiences and the most up-to-date information about the disease, ways of prevention, protection, and treatment measures (8, 26-30)
	Providing education programs	<ul style="list-style-type: none"> • Meeting the educational needs of HCWs in various aspects, including lifestyle(31), mental health(1, 7, 9, 10, 13, 25, 27, 29, 31-41), mental exercises such as meditation(35), clinical skills (9, 17) and infection control methods (1, 3, 10, 28) • Use of webinars (24), software (40), QR codes (29), and digital packages (42) to facilitate staff educating • Using the presented websites to provide preparedness plans to deal with emergencies (43)
Protect	Telemedicine	<ul style="list-style-type: none"> • Use of telemedicine for in-home screening (9, 12, 44, 45) • Refer service kiosks for physical examination through video communication with the medical staff (44, 45) • Using Tele-ICU (46)
	Protective measures and equipment supply	<ul style="list-style-type: none"> • Supplying personal protective equipment(1, 13, 17, 28, 31, 32, 40-43, 47-49) • Providing vaccines and diagnostic tests for medical staff and their families (17, 28) • Providing a suitable place to quarantine sick and suspicious HCWs(28) • Disinfection of surfaces regularly (28, 36) • Considering transportation facilities for HCWs to prevent disease transmission (17, 36, 47)
	Revising and adjusting work shifts	<ul style="list-style-type: none"> • Using special staffing models(1) • Not using vulnerable people (elderly, physically weak, etc.) in the front line (32, 37) • Reorganizing work shifts to reduce the spread of disease among HCWs (1, 28)
	Early detection	<ul style="list-style-type: none"> • Continuous monitoring of the condition of the HCWs for early detection(1, 21, 48) • Quarantining the suspicious or sick staff (21)

Theme	Subthemes	Interventions
Support	Organizational psychological support	<ul style="list-style-type: none"> • Organizing a specialized psychological team to provide counseling (24-27, 36, 50, 51) • Establishing hot-lines and telemedicine platform to provide counseling (13, 31, 36, 38, 41, 52) • Celebrating patients' recovery to boost positive energy (36) • Allocating space to keep alive the memory of deceased HCWs (36) • Allocating centers for child care staff (36, 47) • Holding breathing sessions to relieve work pressure (3)
	Peer support	<ul style="list-style-type: none"> • Creating a culture of support and a sincere atmosphere among HCWs to support each other (3, 10, 12, 14, 15, 27-31, 34, 35, 37, 39, 52-54) • Holding Schwartz rounds (39)
	Welfare support	<ul style="list-style-type: none"> • Considering the appropriate space and time for HCWs to rest(13, 14, 26, 29, 35, 39, 54) • Providing easy access to healthy water and food for HCWs(13, 29, 36, 39, 47, 54)
	Professional support	<ul style="list-style-type: none"> • Establishing explicit, effective, and honest communication from the manager with the staff (9, 10, 27, 39) • Delegation of powers for decentralized decision-making (7) • Involvement of HCWs in the decision-making process (9) • Sending supportive and motivational messages to patients, managers, and prominent social activists(29, 30, 50) • Establishing organizational justice and creating a flexible organizational culture (10, 11) • Rewards and financial support (10, 11) • HCW support during disputes with patients' families (17) • Facilitating communication between the patient and his family to reduce the workload caused by the supportive role of the treatment staff (34)

Theme	Subthemes	Interventions
	Smart human resource utilization	<ul style="list-style-type: none"> • Developing a clear and realistic plan to reduce workload (7, 15, 27, 30) • Organizing volunteer forces to compensate for labor shortages (13, 28) • Strategic distribution of human resources by reviewing the work shift program (13, 37, 39) • Using a support team consisting of specialists ready to work in various fields, including palliative medicine and dental team (1, 17, 26, 55)
Care	Providing psychological care services	<ul style="list-style-type: none"> • Using health applications to provide medical services(38, 56) • Holding group therapy sessions and using special treatment techniques such as CBT(9, 29) • Retraining counselors and psychologists and teach them treatment techniques to provide adequate human resources(9)
	Providing non-psychological care services	<ul style="list-style-type: none"> • Prioritizing HCWs and their families in treatment and drug allocation(17) • Providing services through narrative medicine(9)
Feedback	Getting Active feedback	<ul style="list-style-type: none"> • Creating an Environment of Trust, Psychological Safety, and aware of HCWs concerns(17, 21, 32, 51, 57) • Managers' personal visits to the departments to check and compensate for the shortcomings various areas(29, 34)
	Getting Passive feedback	<ul style="list-style-type: none"> • Creating a communication network to receive feedback (24, 47) • Setting up hotlines to hear the HCWs' needs(2, 8, 32)

infection control methods (1, 3, 10, 28) in the form of webinars (24), software (40), QR code-based information (29) and digital package (42) are other suggested interventions. Nurses can adjust emergency preparedness programs by visiting reputable websites to protect themselves and their families (43).

2. Protect

2.1. Telemedicine

Providing remote care with telemedicine can reduce physicians' risk of infections by creating social distance and preventing the hospital from crowding. This platform provides the initial screening and treatment of patients without the presence of a physician (9, 12, 44-46).

2.2. Protective measures and equipment supply

One of the most critical factors/measures influencing nurses' willingness to serve in emergencies and epidemics is the availability of personal protective equipment (N95 mask, gloves, etc.) (1, 13, 17, 28, 31, 32, 40, 41, 43, 47, 49, 58). Also, supplying vaccines and diagnostic tests for treatment HCWs and their families requires attention (17, 28). Other measures include: reprocessing of protective equipment (49), providing a suitable place to quarantine sick and suspicious HCWs (28, 36), developing infection control checklists to reduce the chances of infecting HCWs (18), disinfecting surfaces regularly (32), and considering transportation facilities for HCWs to prevent disease transmission (17, 36, 47).

2.3. Revising and adjusting work shifts

One way to reduce the shortage of HCWs during a pandemic is to use staffing models that take disease epidemiology into account (1). Furthermore, to minimize casualties in the medical staff, the strategic distribution of human resources and not using vulnerable people (elderly, people with underlying diseases, etc.) in the front-line is recommended (1, 28, 32, 37).

2.4. Early detection

Monitoring the HCWs' infection status for early diagnosis and considering measures for quarantine of positive and suspicious cases is one way to take care of the health status of HCWs (1, 21, 48).

3. Support

3.1. Organizational psychological support

In order to reduce burnout and fatigue, it is useful to gather a specialized psychological team (consisting of psychologists and psychiatrists) to care for front-line staff. In some studies, setting up hotlines (31, 38, 41, 52) and telemedicine (13) to communicate with this team has been suggested (24-27, 36, 50, 51). Other organizational psychological support includes: celebrating patients' recovery, allocating space to keep alive the memory of dead HCWs, allocating centers for caring for HCW's children during school closures(36, 47), and holding breathing sessions to reduce work stress (3).

3.2. Peer support

In order to reduce the psychological burden caused by crises, it is necessary to create a communication network and a cordial atmosphere between HCWs in order to support each other, increase interactions between them and express sympathy. This network also provides peer support during quarantine (3, 10, 14, 15, 26-31, 34, 35, 38, 39, 41, 52-54).

3.3. Welfare support

The physical health of HCWs in epidemics and their well-being seem essential. Therefore, providing basic needs such as break time and restrooms, sufficient time off, and easy access to water and food has been suggested (13, 14, 26, 29, 35, 36, 39, 47, 54).

3.4. Professional support

Establishing explicit, effective, and honest communication from the manager with the HCWs causes and increases security, unity, teamwork (37), and resilience in the HCWs. (9, 10, 27, 39) In this regard, HCWs involvement in the decision-making process and delegating the necessary authority for decentralized decision-making are suggested (9, 33). Other ideas and methods proposed to strengthen and maintain human resources include sending supportive and motivational messages from patients, managers, and prominent social activists to instill a sense of empathy (29, 30, 50), establishing organizational justice (such as ensuring tolerable workloads) and creating a flexible organizational culture (7, 10), rewards and financial support(34, 57) and supporting HCWs in times of conflict with patients' families (17), Furthermore, to reduce the work and psychological pressure caused by the epidemic on nurses, the possibility of communication between the patient and his family can be facilitated or mediated by someone else, taking this burden off their shoulders. (34)

3.5. Smart human resource utilization

Strategic distribution of human resources is essential to compensate for labor shortages, reduce workload, and prevent burnout. To achieve this goal, developing a clear and realistic plan(7, 15, 27, 30), organizing volunteer forces (13, 28), revising the work shift program, and taking measures to provide remote care are essential (13, 37, 39). It is also reasonable to use a support team consisting of ready-to-work specialists in various fields, including palliative medicine and dentistry, in emergencies (1, 17, 26, 55).

4. Care

4.1. Providing psychological care services

In the case of psychological trauma, the commitment of managers to provide treatment is critical. Therefore, it is necessary to establish mechanisms to assess and evaluate HCWs' mental health and, consequently, to consider specialized teams for early intervention and treatment of injured people (9, 29, 31, 34, 41, 53). In this regard, the proposed interventions are as follows: health applications with the possibility of screening and providing specialized medical services for the ones in need (38, 56), holding group therapy sessions(29), and using special treatment techniques such as Cognitive behavioral therapy (CBT) to solve and deal with psychological problems (59). To provide the human resources for these interventions, it is possible to reeducate counselors and psychologists and teach them treatment techniques (59).

4.2. Providing non-psychological care services

The two proposed interventions in this sub-theme prioritize HCWs and their families in treatment and drug allocation and provide services through narrative medicine (30, 49).

5. Feedback

5.1. Getting Active feedback

Managers need to be aware of their HCWs' concerns and respond to them accordingly. HCWs expect to be heard and understood. They also expect to be psychologically supported by managers. According to reviewed studies, effective communication with HCWs is a prerequisite for having stable and resilient HCWs (8, 57). In this regard, managers' visits of hospital wards (29, 34) and getting active feedback for solving the problems have been discussed (17, 21, 51).

5.2. Getting Passive feedback

Setting up hotlines to hear and meet the HCWs' needs and requests quickly and immediately (2, 8, 32) and creating a communication network to receive feedback are some of the suggested interventions in this sub-theme (23, 47).

Discussion

This study aimed to collect interventions for strengthening and sustaining HCWs in epidemics. Most studies have not been conducted in a specific geographical area, and most of them were on all health workers. In a bird's eye view of the findings of the study, preparation, protection, and support categories could prevent harm. On the other hand, interventions related to care and feedback categories could be suggested to treat potential injuries to HCWs sustainability. It was found that interventions related to support, preparation, and protection were more than the ones related to the care and feedback categories. This stark difference could suggest the preference of prevention over treatment to strengthen and sustain human health resources. Also, the most frequent subthemes included training programs, protection and equipment provision, professional support, peer support, and the intelligent use of human resources, respectively.

The emergence of a new disease and its rapid spread among different society sections often confront health systems with a new problem that they have not encountered before. In such a situation, preparing the system and its staff to face the new circumstance seems vital. Staff preparation is the only way to reach this goal. On the one hand, in an epidemic situation, physicians and nurses need to learn up-to-date knowledge related to the disease. On the other hand, due to this period's high workload and psychological stress, the staff must be educated in different subjects such as positive lifestyle and individual resilience (31). In this regard, it is possible to provide suitable educational packages for different HCWs in the form of digital packages (42). Also, due to the increasing development of social networks in communities, using this platform to share HCWs' experiences in different parts of the world seems useful (8, 26).

Because HCWs are at the front-line of fighting epidemics, they can become infected at any time. Therefore, one of the practical and emphasized strategies is to Protect HCWs and reduce their risk of disease infection. In these circumstances, personal protective equipment (PPE) is one of the HCWs' essential needs (32). Another useful issue in this theme is the early detection of infected HCWs. For example, in Singapore's largest medical hospital, a three-stage pilot model includes establishing a self-

reported reporting system based on HCWs with suspicious symptoms, identifying and screening groups in contact with suspected cases, and starting quarantine besides the necessary treatment which has been performed for infected HCWs. The model's results indicate this process' effectiveness: the covid-19 tests of only 14 HCWs were positive among 4,411 hospital staff over 16 weeks. In addition, telemedicine, by reducing face-to-face visits to clinics and providing high-quality medical services, can reduce the chances of disease transmission among HCWs (45). This strategy also plays an influential role in the themes of support and treatment by reducing the workload and facilitating the provision of medical services to the health personnel in need (21). However, the high cost, the need for building multiple infrastructures, the possibility of system disruptions, and the current workforce's resistance are some of the limitations of this intervention (46).

Although how human health resources prepared to cope with the new outbreak and to take protective measures to reduce their risk of disease are important, we still cannot expect any of them to be able to withstand the workload alone, without the need to receive special help and support of the organization, managers, and colleagues. Therefore, most of the proposed interventions are in the theme of support of health care workers. Human health resources in epidemics need various types of support, including psychological, welfare, and professional, and the responsibility of providing these needs rests on managers' shoulders. The existing workload has psychological consequences that cannot be dealt with except by managers' action to form teams of psychological experts and provide counseling services to HCWs.(26) Also, HCWs can help and support each other independently of their managers to reduce the stress of these problematic situations(39); Undoubtedly, the role of management in creating such a supportive culture and sincere atmosphere cannot be ignored. Another significant intervention is the intelligent use of human resources and their strategic distribution by reviewing HCWs' work shift schedules and considering the recruitment of volunteer workers.(28, 37) Given that in the theme of HCWs support – especially psychological – many interventions have been proposed and implemented, it is recommended to conduct systematic review studies in this field.

As mentioned above, the proposed interventions in the three themes of preparation, protection, and support of HCWs are more in line with preventing injury. Despite these measures, some HCWs suffer from severe injuries to the point that they get physical or mental illnesses. Meanwhile, caring for mental injuries, which is more common than physical problems and more challenging to diagnose, should be given more attention. Additionally, prioritizing medical facilities for the HCWs' families can be an effective measure in this theme.(58)

If we have a systematic point of view on the strengthening and sustainability of human resources, one of the special components of this subject is constant feedback from the situation. It is necessary to get feedback to gain awareness of the current situation, evaluate the implemented strategies, and apply alternative strategies appropriate to the circumstance. Another essential point is that feedback should not be a cross-cutting action and is implemented as a permanent process. Therefore, it is recommended to facilitate this process with proposed interventions to receive feedback, both actively and passively. This theme is considered a complementary arm and a tool for evaluating the interventions in other themes.

One of the practical interventions to getting feedback, which seems to have desired feasibility and at the same time does not require much cost and infrastructure, is setting up a hotline (8, 32) to hear the HCWs' needs immediately and provide consulting services to them. To implement this strategy, it is necessary to consider issues such as the existence of a transparent communication program, providing the required human resources, and considering the principle of confidentiality (2).

Conducted studies generally offered various interventions in a scattered manner. But, in this study, as one of our main strengths, we summarized and put together these interventions by providing them in the form of a thematic map and categorized model. Furthermore, because humans seem to be multidimensional beings with different needs, most studies have usually focused on one or two aspects of strengthening and maintaining human resources, whereas we tried to take a more comprehensive look at this issue. Therefore, the results of this study are likely to help policymakers to design more effective programs for strengthening and sustaining human health resources during epidemics, to meet the various needs of different dimensions of human existence.

One of the exciting points in reviewing this set of studies is the contradiction in some of the findings. For example, in a study conducted by Elsafty et al. in Egypt (57), financial incentives have been suggested as an effective way to strengthen and sustain human resources in the face of epidemics; In another study by Martin et al. in the United States, increased pay harmed HCWs' willingness to attend work (43).

Finally, it is recommended that researches can be conducted to evaluate the feasibility of the interventions and determine their effectiveness. It is also necessary to conduct cost-effectiveness studies due to limited resources such as human resources, time, and budget. On the other hand, given that most studies have been conducted in high-income countries, it is recommended to evaluate the feasibility and efficiency of available interventions in lower-income countries. Furthermore, conducting systematic review studies to analyze conflicting findings and conducting studies to provide interventions that simultaneously cover more themes of preparation, protection, support, care, and feedback are suggested.

Limitations

Overall, although a rich set of ideas and interventions have been proposed to strengthen and sustain human resources, most of these interventions have not been implemented or, if implemented, the details of the required infrastructure and implementation process are not mentioned. Lack of long-term assessment of interventions' effects, a control group, and cost-effectiveness studies were other limitations of the existing studies.

Conclusion

In this study, strategies to increase the sustainability of human resources in pandemics were summarized and presented. According to the analysis, the interventions were classified into five themes (preparation, protection, support, care and, feedback) and 15 sub-themes (creating communication networks, providing education programs, telemedicine, protective measures, and equipment supply, revising and adjusting

work shifts, early detection, organizational psychological support, peer support, welfare support, professional support, smart human resource utilization, providing psychological care services, providing non-psychological care services, getting active feedback, and getting passive feedback). Finally, it seems that to strengthen and sustain human resources in the face of epidemics, we must pay attention to various dimensions. Therefore, taking action in each of these themes cannot be helpful independently. It is recommended that managers and decision-makers implement strategies that cover more themes and are adjusted to their context.

Declarations

Ethics approval and consent to participate

Not Applicable.

Adherence to national and international regulations

Not Applicable.

Consent for publication

Not Applicable.

Competing interests

The authors declare they have no competing interest regarding to this research

Funding

Not Applicable

Authors' contributions

ZZJ, SV, MK, and AJ did the search, screening and data extraction. SD raised the research idea and supervises all phase of the research. All authors have equal contribution in drafting and reviewing the manuscript.

Acknowledgements

Not Applicable.

Availability of Data

Data of this research is available and could be sent upon contact with the corresponding author.

References

1. Mascha EJ, Schober P, Schefold JC, Stueber F, Luedi MM. Staffing With Disease-Based Epidemiologic Indices May Reduce Shortage of Intensive Care Unit Staff During the COVID-19 Pandemic. *Anesth Analg.* 2020;131(1):24-30.
2. Geoffroy PA, Le Goanvic V, Sabbagh O, Richoux C, Weinstein A, Dufayet G, et al. Psychological Support System for Hospital Workers During the Covid-19 Outbreak: Rapid Design and Implementation of the Covid-Psy Hotline. *Frontiers in Psychiatry.* 2020;11.
3. Gujral H, Rushton CH, Rosa WE. Action Steps Toward a Culture of Moral Resilience in the Face of COVID-19. *J Psychosoc Nurs Ment Health Serv.* 2020;58(7):2-4.
4. 'Staggering crisis': 7,000 health workers have died of COVID-19 2020 [Available from: <https://www.aljazeera.com/news/2020/9/3/staggering-crisis-7000-health-workers-have-died-of-covid-19>].
5. World Health Organization. Keep health workers safe to keep patients safe: WHO. News release. 2020;17.
6. World Health Organization. Health workforce 2030: towards a global strategy on human resources for health. 2015.
7. Maunder RG, Leszcz M, Savage D, Adam MA, Peladeau N, Romano D, et al. Applying the lessons of SARS to Pandemic influenza: An evidence-based approach to mitigating the stress experienced by healthcare workers. *Canadian Journal of Public Health.* 2008;99(6):486-8.
8. Rangachari P, J LW. Preserving Organizational Resilience, Patient Safety, and Staff Retention during COVID-19 Requires a Holistic Consideration of the Psychological Safety of Healthcare Workers. *Int J Environ Res Public Health.* 2020;17(12).
9. Restauri N, Sheridan AD. Burnout and Posttraumatic Stress Disorder in the Coronavirus Disease 2019 (COVID-19) Pandemic: Intersection, Impact, and Interventions. *Journal of the American College of Radiology.* 2020;17(7):921-6.
10. Heath C, Sommerfield A, von Ungern-Sternberg BS. Resilience strategies to manage psychological distress among healthcare workers during the COVID-19 pandemic: a narrative review. *Anaesthesia.* 2020;75(10):1364-71.
11. Labrague LJ, de Los Santos J. COVID-19 anxiety among frontline nurses: predictive role of organisational support, personal resilience and social support. *Journal of nursing management.* 2020.
12. Moazzami B, Razavi-Khorasani N, Dooghaie Moghadam A, Farokhi E, Rezaei N. COVID-19 and telemedicine: Immediate action required for maintaining healthcare providers well-being. *J Clin Virol.* 2020;126:104345.
13. Santarone K, McKenney M, Elkbuli A. Preserving mental health and resilience in frontline healthcare workers during COVID-19. *Am J Emerg Med.* 2020;38(7):1530-1.
14. Saqib A, Rampal T. Quality improvement report: setting up a staff well-being hub through continuous engagement. *BMJ Open Qual.* 2020;9(3).

15. Shechter A, Diaz F, Moise N, Anstey DE, Ye S, Agarwal S, et al. Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic. *General hospital psychiatry*. 2020;66:1-8.
16. Pourahmadi M, Delavari S, Delavari S. The Role of Empathy in Full-Scale Battle of Medical and Paramedical Learners Against COVID-19. *Iranian Journal of Medical Sciences*. 2020;45(6):491-2.
17. Taylor BL, Montgomery HE, Rhodes A, Sprung CL. Protection of patients and staff during a pandemic. *Intensive care medicine*. 2010;36(1):45-54.
18. Soma M, Jacobson I, Brewer J, Blondin A, Davidson G, Singham S. Operative team checklist for aerosol generating procedures to minimise exposure of healthcare workers to SARS-CoV-2. *Int J Pediatr Otorhinolaryngol*. 2020;134:110075.
19. Pavignani E. Human resources for health through conflict and recovery: lessons from African countries. *Disasters*. 2011;35(4):661-79.
20. Vardarli P. Strategic approach to human resources management during crisis. *Procedia-Social and Behavioral Sciences*. 2016;235(2).
21. Wee LE, Sim XYJ, Conceicao EP, Aung MK, Goh JQ, Yeo DWT, et al. Containment of COVID-19 cases among healthcare workers: The role of surveillance, early detection, and outbreak management. *Infection Control and Hospital Epidemiology*. 2020;41(7):765-71.
22. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International journal of social research methodology*. 2005;8(1):19-32.
23. Elo S, Kyngäs H. The qualitative content analysis process. *Journal of advanced nursing*. 2008;62(1):107-15.
24. Weingarten K, Galván-Durán AR, D'Urso S, Garcia D. The Witness to Witness Program: Helping the Helpers in the Context of the COVID-19 Pandemic. *Family Process*. 2020;59(3):883-97.
25. Schreiber M, Cates DS, Formanski S, King M. Maximizing the Resilience of Healthcare Workers in Multi-hazard Events: Lessons from the 2014-2015 Ebola Response in Africa. *Mil Med*. 2019;184(Suppl 1):114-20.
26. Akgün KM, Collett D, Feder SL, Shamas T, Schulman-Green D. Sustaining frontline ICU healthcare workers during the COVID-19 pandemic and beyond. *Heart and Lung*. 2020;49(4):346-7.
27. Aghili SM, Arbabi M. The COVID-19 Pandemic and the Health Care Providers; What Does It Mean Psychologically? *Advanced Journal of Emergency Medicine*. 2020;4(2s):e63-e.
28. Chersich MF, Gray G, Fairlie L, Eichbaum Q, Mayhew S, Allwood B, et al. Covid-19 in Africa: Care and protection for frontline healthcare workers. *Globalization and Health*. 2020;16(1).
29. Presti G, Dal Lago B, Fattori A, Mioli G, Moderato P, Sciaretta L, et al. Mental health support to staff in a major hospital in Milan (Italy) during the COVID-19 pandemic: A framework of actions. *General Psychiatry*. 2020;33(4).
30. Wu AW, Connors C, Everly GS, Jr. COVID-19: Peer Support and Crisis Communication Strategies to Promote Institutional Resilience. *Ann Intern Med*. 2020;172(12):822-3.

31. Balasubramanian A, Paleri V, Bennett R, Paleri V. Impact of COVID-19 on the mental health of surgeons and coping strategies. *Head Neck*. 2020;42(7):1638-44.
32. Majeed A, Molokhia M, Pankhania B, Asanati K. Protecting the health of doctors during the COVID-19 pandemic. *British Journal of General Practice*. 2020;70(695):268-9.
33. Maunder RG, Lancee WJ, Mae R, Vincent L, Peladeau N, Beduz MA, et al. Computer-assisted resilience training to prepare healthcare workers for pandemic influenza: a randomized trial of the optimal dose of training. *BMC Health Serv Res*. 2010;10:72.
34. Owens IT. Supporting nurses' mental health during the pandemic. *Nursing*. 2020;50(10):54-7.
35. Roney LN, Beauvais AM, Bartos S. Igniting Change: Supporting the Well-Being of Academicians Who Practice and Teach Critical Care. *Crit Care Nurs Clin North Am*. 2020;32(3):407-19.
36. Wei E, Segall J, Villanueva Y, Dang LB, Gasca VI, Gonzalez MP, et al. Coping With Trauma, Celebrating Life: Reinventing Patient And Staff Support During The COVID-19 Pandemic. *Health affairs (Project Hope)*. 2020;39(9):1597-600.
37. Billings J, Greene T, Kember T, Grey N, El-Leithy S, Lee D, et al. Supporting Hospital Staff during COVID-19: Early Interventions. *Occupational Medicine*. 2020;70(5):327-9.
38. DePierro J, Katz CL, Marin D, Feder A, Bevilacqua L, Sharma V, et al. Mount Sinai's center for stress, resilience and personal growth as a model for responding to the impact of COVID-19 on health care workers. *Psychiatry Research*. 2020;293.
39. Lefèvre H, Stheneur C, Cardin C, Fourcade L, Fourmaux C, Tordjman E, et al. The Bulle: Support and prevention of psychological decompensation of healthcare workers during the trauma of the COVID-19 epidemic. *Journal of pain and symptom management*. 2020.
40. Otu A, Ebenso B, Okuzu O, Osifo-Dawodu E. Using a mHealth tutorial application to change knowledge and attitude of frontline health workers to Ebola virus disease in Nigeria: a before-and-after study. *Hum Resour Health*. 2016;14:5.
41. 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. *Anesth Analg*. 2020;131(1):43-54.
42. Blake H, Bermingham F, Johnson G, Tabner A. Mitigating the Psychological Impact of COVID-19 on Healthcare Workers: A Digital Learning Package. *Int J Environ Res Public Health*. 2020;17(9).
43. Martin SD, Brown LM, Reid WM. Predictors of nurses' intentions to work during the 2009 influenza A (H1N1) pandemic. *American Journal of Nursing*. 2013;113(12):24-31.
44. Doshi A, Platt Y, Dressen JR, Mathews BK, Siy JC. Keep calm and log on: Telemedicine for COVID-19 pandemic response. *Journal of Hospital Medicine*. 2020;15(5):302-4.
45. Vargheese R, editor Leveraging cloud based virtual care as a tool kit for mitigating risk of exposure during a pandemic. 5th International Conference on Emerging Ubiquitous Systems and Pervasive Networks, EUSPN 2014 and the 4th International Conference on Current and Future Trends of Information and Communication Technologies in Healthcare, ICTH 2014; 2014: Elsevier B.V.

46. Rathod N, Rajput A, Fouzia M, Jyothi DB, Patil K. E-ICU's/tele ICU's, it's role, advantages over manual icu's and shortcomings in the current perspective of covid-19 pandemic: A critical review. *International Journal of Current Research and Review*. 2020;12(13):38-45.
47. Ripp J, Peccoralo L, Charney D. Attending to the Emotional Well-Being of the Health Care Workforce in a New York City Health System During the COVID-19 Pandemic. *Acad Med*. 2020;95(8):1136-9.
48. Rivett L, Sridhar S, Sparkes D, Routledge M, Jones NK, Forrest S, et al. Screening of healthcare workers for SARS-CoV-2 highlights the role of asymptomatic carriage in COVID-19 transmission. *Elife*. 2020;9:e58728.
49. Rowan NJ, Laffey JG. Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment (PPE) arising from Coronavirus disease (COVID19) pandemic – Case study from the Republic of Ireland. *Science of the Total Environment*. 2020;725.
50. Cheng W, Zhang F, Liu Z, Zhang H, Lyu Y, Xu H, et al. A psychological health support scheme for medical teams in COVID-19 outbreak and its effectiveness. *General Psychiatry*. 2020;33(5).
51. Nadler MB, Barry A, Murphy T, Prince R, Elliott M. Strategies to support health care providers during the COVID-19 pandemic. *CMAJ*. 2020;192(19):E522.
52. Chesak SS, Perlman AI, Gill PR, Bhagra A. Strategies for Resiliency of Medical Staff During COVID-19. *Mayo Clin Proc*. 2020;95(9s):S56-s9.
53. Dewey C, Hingle S, Goelz E, Linzer M. Supporting Clinicians During the COVID-19 Pandemic. *Ann Intern Med*. 2020;172(11):752-3.
54. Donnelly PD, Davidson M, Dunlop N, McGale M, Milligan E, Worrall M, et al. Well-Being During Coronavirus Disease 2019: A PICU Practical Perspective. *Pediatr Crit Care Med*. 2020;21(8):e584-e6.
55. Sacoor S, Chana S, Fortune F. The dental team as part of the medical workforce during national and global crises. *Br Dent J*. 2020;229(2):89-92.
56. Alexopoulos AR, Hudson JG, Otenigbagbe O. The Use of Digital Applications and COVID-19. *Community Ment Health J*. 2020;56(7):1202-3.
57. Elsafty AS, Ragheb M. The Role of Human Resource Management Towards Employees Retention During Covid-19 Pandemic in Medical Supplies Sector-Egypt. *Business and Management Studies*. 2020;6(2):5059-.
58. Park YS, Behrouz-Ghayebi L, Sury JJ. Do shared barriers when reporting to work during an influenza pandemic influence hospital workers' willingness to work? A multilevel framework. *Disaster Med Public Health Prep*. 2015;9(2):175-85.
59. Rothenberger DA. Physician Burnout and Well-Being: A Systematic Review and Framework for Action. *Diseases of the Colon and Rectum*. 2017;60(6):567-76.

Figures

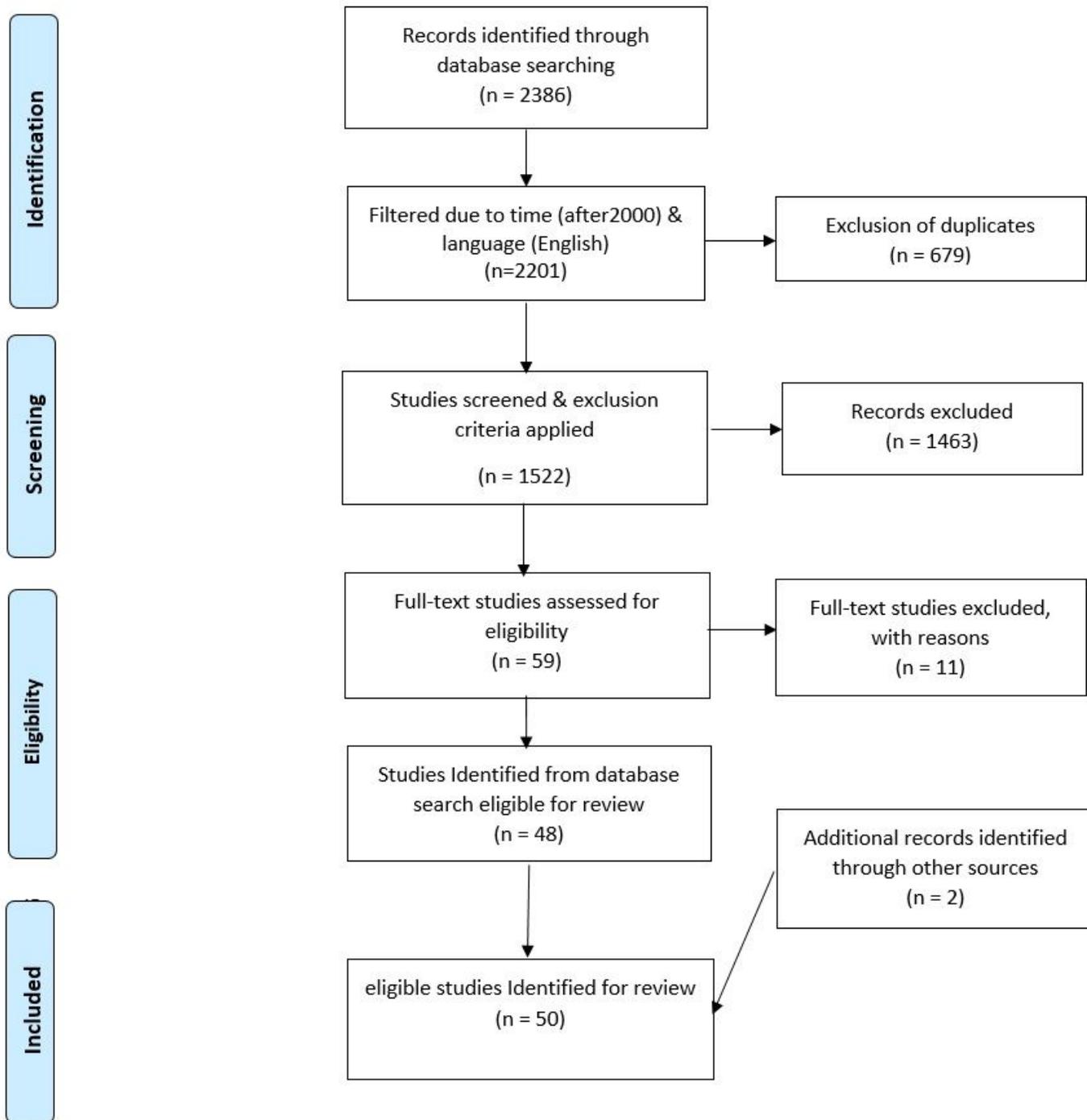


Figure 1

Selection process (PRISMA)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Appendix.docx](#)