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Primary Health Care Challenges in Managing Emerging and Re-emerging Infectious Diseases: A Comprehensive Literature Review

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Abstract

Background: The emergence and re-emergence of infectious diseases present critical challenges to global public health, resulting in increased mortality rates and substantial economic burdens on healthcare systems. This comprehensive review examines primary healthcare initiatives designed to combat emerging and re-emerging diseases across diverse populations. The objective is to analyze the healthcare system's experiences and derive key lessons that can enhance future responses.

Methods: A comprehensive search of international databases, including PubMed, Scopus, Web of Science, and Embase, was conducted, with data extraction based on the World Health Organization's (WHO) 6-building block framework for health system strengthening.

Results: A total of 57 studies were included in the final analysis. Six major themes emerged from the review: (1) the necessity for coordinated national and international efforts, as well as the cultivation of public trust; (2) the need for innovation and optimal utilization of existing resources to improve community health services and safety; (3) ensuring psychological and financial support for healthcare personnel; (4) maintaining adequate reserves and timely access to essential medications, treatments, and protective equipment; (5) the importance of updated, reliable communication systems to disseminate information effectively; and (6) securing sustainable financial resources for medical supplies, protective equipment, and staff remuneration.

Conclusion: The findings underscore the vital importance of learning from past pandemics to strengthen healthcare systems and enhance preparedness at both national and global levels, especially in light of the growing prevalence of infectious diseases. This review offers a roadmap for improving primary healthcare responses to future public health crises.

Keywords: Emerging, Re-emerging, PHC, Epidemics

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Introduction

Emerging and re-emerging infectious diseases represent significant public health challenges and are among the primary causes of mortality, leading to substantial healthcare costs. These issues arise from the continuous

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↑What is "already known" in this topic:
Pandemics present significant challenges to healthcare systems, impacting leadership, service delivery, workforce well-being, and resource allocation. Previous research highlights the importance of clear leadership and management frameworks, the rapid adoption of telemedicine, and the psychological toll on healthcare workers during crises. Stockpiling essential resources and effective supply chain management have been recognized as vital for ensuring healthcare operations during emergencies.

→What this article adds:
This article adds to the understanding by emphasizing the need for adaptable healthcare systems with robust leadership frameworks, mental health support for workers, and strategic resource allocation. It advocates for the long-term integration of telemedicine and highlights the importance of ongoing research to evaluate the lasting impact of pandemics on healthcare systems.

interaction between humans and pathogens, as well as globalization and ecological disruptions (1, 2). Notably, a large proportion (60.3%) of these diseases are caused by zoonotic pathogens (3, 4). Emerging infectious diseases are defined as those caused by pathogens that have either appeared de novo, are experienced with greater intensity in a specific region, or are observed for the first time. In contrast, re-emerging infectious diseases refer to those that were previously under control but have reappeared in areas from which they had disappeared (5). Factors such as increased travel, changes in human behavior, contact with animals, and methods of food production and distribution contribute to the heightened risk of pathogen transmission (6). Pathogen changes that allow for adaptation to new environments, along with their resistance to commonly used antimicrobial agents, such as penicillin-resistant Staphylococcus aureus, have occurred over time. Decades later, resistant strains have become significant contributors to morbidity and mortality in healthcare settings and communities. In addition, inadequate monitoring of treatments, investment in health, and research may contribute to the resurgence of infectious diseases, highlighting the reality that these diseases have not only never completely disappeared but continue to evolve, particularly in low- and middle-income countries, as well as in industrialized nations (7-10). Notable examples of emerging infectious diseases that have tested and improved the capacity of control and prevention systems include severe acute respiratory syndrome (SARS), Middle East Respiratory Syndrome (MERS), Influenza A H1N1, H7N9 avian influenza, Ebola virus, Zika virus, yellow fever, dengue fever, and coronavirus disease 2019 (COVID-19) (11-14).

The Alma-Ata Declaration of 1978 (September 6-12, 1978) (15) emerged as a milestone in public health, bringing together 134 countries and 67 international organizations. It introduced primary health care (PHC) as the key to achieving better health for all and stated that enlightened policies aimed at ensuring equitable access to healthcare services could improve population health and, consequently, overall development (16, 17). The World Health Organization (WHO) advocates for PHC as the primary strategy for improving health and enabling active participation of individuals in economic and social activities (18, 19). PHC provides all populations with access to essential health services at all levels, including health centers, clinics, and hospitals (20-23). Health personnel, in collaboration with governance and supported by medical equipment and financial resources, engage in essential health development activities, prevention, treatment, and rehabilitation (24, 25). PHC is adaptable and can be modified over time based on the existing health conditions and policies of each community, depending on their priorities (25-28).

Vaccination programs against smallpox and polio, effective treatment for tuberculosis, and appropriate antibiotic therapy serve as examples of successful efforts to reduce morbidity and achieve PHC objectives (29, 30). Historical pandemics serve as reminders of the importance of PHC in managing and addressing such crises (31). Significant challenges remain in addressing emerging and re-emerging infectious diseases, including identifying risk factors, improving skills and service delivery, workforce inadequacies, and developing surveillance systems (2, 14). Implementing multiple strategies to tackle these challenges and limitations, tailored to specific diseases and geographical contexts, can lead to improved health and public health outcomes (32, 33). This study aimed to review the capacities, weaknesses, strengths, strategies, and responses of healthcare systems during outbreaks of emerging and re-emerging infectious diseases. The main goal was to identify key factors, such as coordinated leadership, adequate resource allocation, and strong health workforce support, which contribute to effective primary healthcare responses during disease outbreaks, with the aim of informing strategies for improved preparedness and management of future emerging and re-emerging infectious diseases. This comprehensive literature review examined the experiences of managers, healthcare personnel, and staff in responding to such outbreaks, focusing on the capacities, weaknesses, strengths, strategies, and overall responses of health systems in these contexts.

Methods

Search Strategy

An extensive literature review was performed across 4 key international databases: PubMed, Scopus, Web of Science, and Embase. The search methodology utilized various keywords and MeSH terms, connected through Boolean logic (AND/OR). An illustrative PubMed search query incorporated terms like ("Emerging infectious diseases" OR "re-emerging diseases") combined with healthcare system terminology and specific disease names.

The search was conducted without date limitations to ensure complete historical coverage. Duplicate entries were managed using EndNote (Version 20). The screening process involved 3 sequential phases—title, abstract, and full text review—with 2 independent reviewers evaluating each article. When disagreements arose, a third expert was consulted for resolution.

To ensure thoroughness, grey literature was examined, reviewing the initial 10 pages of Google Scholar results using comparable search terms. The search was further expanded by examining both the references and citations of selected articles to identify additional relevant studies.

Eligibility Criteria and Screening

The review applied specific inclusion and exclusion criteria to ensure the relevance and quality of the studies analyzed. Observational studies, including cross-sectional, cohort, and case-control designs, that explored experiences and lessons learned within primary healthcare systems during outbreaks of emerging and re-emerging diseases were included. Moreover, studies documenting healthcare professionals' experiences, such as those of physicians and nurses working in hospital or emergency settings during these outbreaks, were eligible for inclusion. Clinical trials, letters to the editor, case reports, case series, and review articles were excluded. Studies unrelated to the experiences or responses of healthcare systems and professionals were also excluded, as were articles not published in Eng-

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lish. This strict focus ensured that the review addressed its research objectives effectively.

The screening process employed a systematic and rigorous methodology to maintain the integrity of the review. Records identified through database searches were imported into EndNote software (Version 20) for organization. Duplicate entries were removed using automated tools and manually verified. The screening process began with title screening, during which articles unrelated to the research objectives were excluded. This initial stage applied predefined inclusion and exclusion criteria and was conducted independently by 2 reviewers. Abstract screening followed, further narrowing down the studies based on relevance. Disagreements during this stage were resolved through discussion or adjudication by a third expert. Full-text screening was conducted on the remaining articles to confirm their eligibility. This stage applied strict inclusion criteria, focusing on studies that documented experiences and lessons learned from managing emerging and re-emerging disease outbreaks. Articles analyzing the responses of healthcare professionals or health systems during these outbreaks and those published in English were prioritized. All decisions made during the screening process were systematically documented to ensure transparency. The multistage screening process resulted in the selection of studies most aligned with the research objectives. A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram has been provided to illustrate the process, detailing the number of records at each stage and the reasons for exclusion.

Data Extraction

Data extraction was based on the WHO 6-building block framework for health systems, which encompasses the following domains: (1) leadership and governance; (2) service delivery; (3) health workforce; (4) medical products, vaccines, and technologies; (5) health information systems; and (6) financing. For each study, relevant information within these domains was extracted, along with the experiences and lessons learned from managing emerging and re-emerging diseases.

The extracted data were analyzed using the directed content analysis method. Key findings from each study were categorized and coded according to the WHO framework. This approach allowed for the identification of patterns and themes across the studies, facilitating a deeper understanding of the strategies and challenges encountered by healthcare systems during these disease outbreaks.

Qualitative Analysis

The qualitative data, derived from the studies included in the review, were analyzed using thematic analysis. This approach allowed for the identification of recurring themes and subthemes related to healthcare system performance, such as leadership effectiveness, workforce resilience, and resource management during disease outbreaks. The data were coded inductively, ensuring that the themes emerged from the data rather than being predetermined. This method provided a nuanced understanding of the contextual factors influencing healthcare responses, and the findings from the qualitative analysis were integrated with the quantitative results to offer a comprehensive overview of the challenges and strategies within health systems during disease outbreaks.

Results

In this study, after the implementation of the search strategy and retrieval of all articles, 1478 articles were retrieved from the PubMed database, 2321 articles from the Scopus database, and 853 articles from other databases, including the Cumulated Index to Nursing and Allied Health Literature (CINAHL), SPORT Discuss via (EBSCO interface), Web of Science, and Embase. After removing 311 duplicate articles, 4642 articles were screened based on their titles. At this stage, 3082 articles were excluded, and 1252 articles were screened based on their abstracts and then their full texts. Ultimately, a total of 57 articles were included in the study (Figure 1 and Table 1).

The extracted information was based on the 6 domains that were investigated.

Leadership and Management

The leadership and management in the healthcare system have been examined in several aspects. In the assessment of the internal coordination of the healthcare system, the lack of a clear framework for management and coordination to address the needs of the subordinate departments, weakness in supervision or excessive supervision, and making decisions without considering the needs and situation of the personnel, as well as poor communication among the staff, including physicians, nurses, and healthcare center personnel, during pandemics, disrupted the order and caused stress for the personnel and the community (34-42) (Tables 2 and 3).

Pandemics have become an opportunity to break down the sectoral barriers, especially during COVID-19, where the lessons learned from previous pandemics led to increased coordination, supervision, and decision-making through consultations and appointing representatives from different levels, as well as regular meetings (38, 43, 44). The need to improve coordination at the national and intersectoral levels has been felt in various studies and pandemics (Tables 2 and 3).

Requesting data and information from different sources has resulted in an additional burden and the risk of violating patients' privacy (45-47). Providing information and reports from various sources in the community and concealing pandemics at the beginning, due to political and security reasons in countries, has endangered patients and healthcare personnel, and reduced the public's trust in the healthcare system (35, 37, 39, 48-50) (Tables 2 and 3).

In some countries, during the Ebola pandemic, building trust was achieved through cooperation with trusted community members, forming community committees, and gaining public cooperation for education and PPE distribution, which restored the public's trust in the healthcare system (37, 48). With the advancement of online channels

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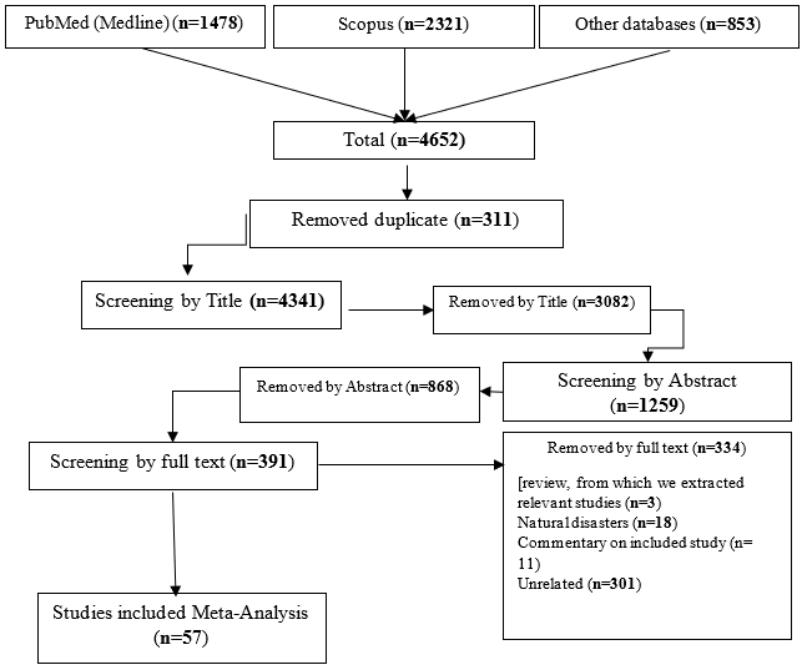

Figure 1. A flow diagram demonstrating the study selection process

during COVID-19, the necessary trust was created among the public through social interactions in virtual spaces (51) (Tables 2 and 3).

Formulating and reviewing guidelines during pandemics is one of the critical and essential duties of the healthcare system to establish a clear path and coordination within the system. During the SARS pandemic, the guidelines did not reach the personnel on time (52)The written guidelines were not clear and concise, and the personnel did not adhere to them (53, 54). Additionally, despite the changing roles of pharmacies, no guidelines were developed for them (55) (Tables 2 and 3).

During the COVID-19, H1N1, and Ebola pandemics, the healthcare systems faced challenges such as a large number of guidelines and their frequent changes, which caused confusion among the personnel (12, 25, 38, 28). The existence of international guidelines and the use of other countries' experiences during pandemics, while considering the national culture and resources, can be considered a contributing factor in controlling pandemics (36, 50, 54, 56). In Singapore, refresher courses and continuous training were used to better understand the existing guidelines (52) (Tables 2 and 3).

Determining new roles based on the increased workload and changing conditions was the decision made for the personnel during these times. Taking on new roles had a negative impact on the mental health of the personnel. On the other hand, pharmacists, to ensure the continuity of pharmaceutical services, experienced new roles such as educator, vaccinator, and screener, but their roles were not formally recognized despite their presence on the frontline of the fight against the disease. Defining new roles requires examining the conditions and writing precise guidelines for all the individuals engaged in the system (38, 50, 55-58) (Tables 2 and 3).

Health Service Delivery

The provision of services during a pandemic underwent significant changes compared to normal times. During the SARS and Ebola pandemics, the provision of services decreased due to fear of infection among both personnel and the public (34, 59). However, during the COVID-19 pandemic, this decrease was observed due to the limitation of in-person services and prioritization of services (41, 49, 54, 56, 60). The limitation of COVID-19 testing, the reduction in maternity care due to staff shortages, and the closure of private clinics led to the referral of pregnant women to the public healthcare system (57, 61, 62) (Tables 2 and 3).

Some of the control measures implemented in different countries during the SARS and COVID-19 pandemics include setting up screening stations in crowded places and inter-city transit hubs, conducting house-to-house searches to find symptomatic individuals, establishing triage systems to prioritize and respond to patient inquiries, designating specific hospitals for pandemic cases, and separating sick individuals from others (37, 48, 50, 58, 63-69) (Tables 2 and 3).

On the other hand, the provision of remote services, such as telephone counseling (52, 53, 65-67, 70-73) and the use of virtual spaces and online consultations created opportunities for patient interaction without physical contact and reduced the burden of public visits, allowing the provision of services to patients who were recovering at home during the COVID-19 pandemic (38, 39, 46, 49, 58, 65, 69, 71, 74-76) (Tables 2 and 3).

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Table 1. The characteristics of included studies

Citation	Design	Participants (n)	SEX (AGE)	Location	Context (Type of disease)	Methods of collecting information
W. C. Wong (2004) Hong Kong (73)	Cross sectional survey	family medicine (183)	Male 82.4% (44.4)	Primary care clinics	SARS	Postal survey
S. Al-Amri (2019) (79) Saudi Arabia	cross-sectional study	PHC physicians (85)	Male 61.2%	Primary care clinics	MERS-CoV	interview
W. C. Wong (2007) (34) Hong Kong/ Canada	Quantitative	family medicine(188)	Male 84.7%	Hospital (114)	SARS	survey
S. Verma (2004) (69) Singapore	Quantitative	general practitioners(721)	Male 60.6%	worked in either a SARSaffected hospital or clinic	SARS	Survey
A. Herceg (2005) (53) Australian	Quantitative	general practitioners(184) general practice principals (n = 74)	Male 46%		SARS	Survey
Z. Austin (2007) (55) Canada	Qualitative	pharmacists(27)	Male 56%		SARS	Interviews
N. C. Tan (2006) (52) Singapore	Qualitative	family physicians (8)	Male 75%	Primary care	SARS	Interviews
J. Ives (2009) (35) United Kingdom	Qualitative	Healthcare workers (64)	Male 50%	Hospital and primary care clinics	Influenza	focus groups (n = 9) and inter-views interviews (n = 5)
O. Sarikaya (2007) (81) Turkey	Qualitative	directors, specialists and general practitioners,health officers, and midwife and nurse (17)		Hospital and primary care clinics	H5N1	interviewed
T. Tomizuka (2013) (68) Japan	Cross sectional survey	medical doctors (174)	Male 95.4%	Clinics and hospitals	H5N1, H7N9	postal survey
P. Eizenberg (2009) (80) Australia	Commentary	PC experiences		hospitals	H1N1	Opinion
M. Caley (2010) (36) England	Quantitative	GPs (367)		primary care clinics	H1N1	Survey
A. Corley (2010) (43) Australia	Phenomenological qualita-tive research	Nurse and doctor focus groups(16) Survey(32)		Hospitals	H1N1	focus groups Survey
K. El Emam (2011) (40) Canada	Tiangulation design	family physicians (37)	Male 35%	Primary care clinics	H1N1	focus groups
S. Y. Wong (2012) (82) ong Kong	Mixed methods cross-sectional survey	Doctor(300)	Male 57.1%	Primary care clinics	H1N1	survey
P. Masotti (2013) (45) Canada	Qualitative	key informants(56) Primary Care/Family physicians and gov-ernment leaders		Hospital and primary care clinics	H1N1	Interviews/ Symposium
M. Kunin (2015) (66) Australia, Israel and England	Qualitative	primary care physicians (65)		Hospital and primary care clinics	H1N1	Interviews
P. Iyengar (2015) (59) Liberia	Quantitative	PHC		primary care clinics	Ebola	Anonymized service utilization data were downloaded from the Liberia District Health Infor-mation Software (DHIS) / Margi-bi and Bong

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Citation	Design	Participants (n)	SEX (AGE)	Location	Context (Type of disease)	Methods of collecting information
K. Siekmans (2017) (85) Liberia	Mixed methods	Trained community health workers (CHW) (60)		primary care clinics	Ebola	structured survey, n = 60; focus group discussions, n = 16
Y. Li (2018) (86) Chinese Ebola treatment center, Liberia	qualitative	The participants had general and clinical health certificates Senior medical technicians, English teachers	Male 66%	Chinese Ebola treatment center	Ebola	interviews
N. P. Miller (2018) (37) Guinea, Liberia, and Sierra Leone	mixed methods	16 focus groups		primary care clinics	Ebola	Interviews focus groups
J. Raven (2018) (48) Sierra Leone	qualitative	District Health Management Teams and local councils, health facility managers and international partners(19) health workers (25)	Male 40%	primary care clinics	Ebola	interviews
S. Udod (2024) Canada (44)	qualitative study	Managers (frontline supervisors) (14)	Females 100% (30-60 y)	health regions[1]	COVID-19	semi-structured interviews
L. Baatiema (2024) Ghana (49)	qualitative study	frontline health workers (47)	Male 38% (20->50)	delivery of care for hospitals but working across all levels of care (primary health care, regional and tertiary referral hospitals)	COVID-19	face-to-face in-depth interviews
A. Tran (2023) Canada (56)	qualitative research	Emergency physicians (16)	Male 31% (43 (28-62 y))	Emergency departments	COVID-19	semi-structured interviews
J. Skagerstrom (2023) Sweden (38)	qualitative study	managers in primary health care	Male 7% (30-69 y)	primary healthcare organization/center	COVID-19	semi-structured interviews
S. Parker (2023) Ireland (39)	qualitative study	health system professionals[2] (16)	Male 43%		COVID-19	Semi-structured interviews
L. Makowski (2023) Germany (54)	qualitative study part of a cross-sectional study with a mixed methods design	General practitioners (GPs) (22)	Male 59% (31-80 y)		COVID-19	semi-structured telephone interviews

[1] Dialysis, Ambulatory Care Clinic, Emergency Care Clinic, ICU, Long Term Care, Observation Unit, Geriatric Rehab, Public Health
[2] Managers (GP, Occupational therapist, Physiotherapy, Public health physician) and frontline workers (Consultant, Nursing, Psychology, Occupational therapist)

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Citation	Design	Participants (n)	SEX (AGE)	Location	Context (Type of disease)	Methods of collecting information
A. Isaacs (2023) Australia (71)	a qualitative study underpinned by qualitative description	Clinician[1] (47)	Male 25.5% (20-39 y)		COVID-19	open-ended survey instrument and service users through semi-structured interviews.
S. H. Gwon (2023) USA (46)	Interpretive description using a descriptive qualitative study design	Public health nurses[2](15)	Females 100%	public health departments	COVID-19	semi-structured interviews
S. Fumagalli (2023) Northern Italy (62)	A qualitative study	Midwives (15)	Females 100% (26-54 y)	maternity hospital	COVID-19	audio-recorded semi-structured interviews by video-call or face-to-face
B. Dobrowolska (2023) Poland (60)	qualitative study	ward managers nurses (15)	Males 13.33 %	ICUs	COVID-19	In-depth phone interviews
S. H. Schriger (2022) Philadelphia (75)	Mixed Methods Study	Community Mental Health Clinicians[3](45)	Male 13% (36)	community clinics	COVID-19	telehealth in response to open-ended questions
E. Peter (2022) Canada (41)	a generic qualitative approach	Nurses (24)	-	ICU, Resource team, Community, Labor and delivery, Mental health, COVID assessment center, Emergency department, CCU, PICU, Respiratory, Internal medicine	COVID-19	semi-structured, audio-recorded interviews
Z. Olateju (2022) Nigeria (47)	a generic qualitative study	Community Health Workers[4] (15)	Male 20% (42)		COVID-19	semi-structured interviews
C. Juárez-Ramírez (2022) Mexico (65)	qualitative, exploratory study	health workers[5] (103)	-	medical units of ambulatory care were selected in rural and urban areas	COVID-19	semi-structured qualitative interview
C. M. Gonzalez (2022) USA (64)	A confidential survey	Frontline Physician (54)	Male 22% (42.9±8.7)	Emergency medicine/Urgent care setting, telemedicine, Follow-up care	COVID-19	web-based survey

[1] GPs and mental health clinician networks, Occupational therapist, Psychologist
[2] Frontline, Supervisor/Consultant or both
[3] Master's-level clinician, social worker, other position, Marriage and family clinician, Psychologist
[4] Community Health Extension Worker, Community Health Officer, Community Mobiliser, Community Volunteer
[5] Health managers, medical personnel, Nursing personnel, health Promoters

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Citation	Design	Participants (n)	SEX (AGE)	Location	Context (Type of disease)	Methods of collecting information
C. Durand (2022) France (50)	qualitative study	community pharmacists (16)	Male 50% (< 30 y: 19%, 30–39 y: 6%, 40–49 y: 19%, 50–59 y: 50%, ≥ 60 y: 6%)	Primary care from a professional organization of pharmacists	COVID-19	Semi-structured qualitative interviews
I. Couper (2022) 11 countries[1] (63)	a constructivist epistemology	Rural doctors (physicians)[2] (13)	Male 61%		COVID-19	Semi-structured interviews
J. Blanchard (2022) USA (87)	qualitative component of a mixed-methods	Frontline healthcare workers[3] (32)	Male 53% (36 (25–58 y))	academic sites	COVID-19	in-depth interviews
V. Zamanzadeh (2021) Iran (88)	qualitative descriptive	Nurses (20)	Male 45% (25–49 y)		COVID-19	semi-structured and in-depth telephone interviews
M. Wanat (2021) Europe[4] (58)	exploratory qualitative study	primary care professionals[5] (80)	Male 32% (44.5)	primary care	COVID-19	semi-structured interviews
A. Shahil Feroz (2021) Pakistan (76)	exploratory qualitative research	front-line healthcare providers (IDIs=12) senior management and hospital leadership (KIIs=19)	KII= Male 42.1% (45 (34–58)) IDI= Male 8.3% (31 (22–48))	private tertiary care teaching hospital in Karachi	COVID-19	semi-structured interviews (key-informant interviews (KIIs) and in-depth interviews (IDIs))
Z. T. Osakwe (2021) NY (72)	part of a larger, qualitative study	home healthcare (HHC) nurses and home health aides (HHAs) for patients with Alzheimer's disease and related dementias (25)	Male 4% (49.8±9.1)	Agencies[6]	COVID-19	in-depth, semi-structured interviews
K. Hugelius (2021) Sweden (74)	A mixed-methods study with a convergent parallel design	providing psychosocial support (managerial position or as a psychosocial support provider) (340)	Male 32% (18-65 y: 87% ≥65 y: 11%)	21 healthcare regions[7]	COVID-19	web-based survey

[1] Australia, Bosnia and Herzegovina, Democratic Republic of Congo (DRC), New Zealand, Nigeria, Pakistan, Philippines, South Africa, Thailand, Wales (UK), Zimbabwe
[2] Early-career, mid-career, and experienced
[3] emergency physicians, emergency medicine nurses, and emergency medical services
[4] Netherlands, Belgium, Denmark, Norway, UK, Spain, Greece, Germany, Poland, Hungary, Croatia, Ukraine, Moldova, Armenia, Georgia, Ireland, France, Romania, Sweden, and Switzerland
[5] GPs, Nurses, Other
[6] 2 private for-profit, 2 nonprofits; 3 in New York City, 1 in Westchester County
[7] Metropolitan area, city, Town or Rural area, National

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Citation	Design	Participants (n)	SEX (AGE)	Location	Context (Type of disease)	Methods of collecting information
S. Hantoushzadeh (2021) Iran (57)	qualitative research using a descriptive phenomenological approach	midwives and gynecologists (12)	Female 100% (36 to 57 years)	health centers, hospitals, or private offices	COVID-19	in-depth semi-structured individual interviews
J. Goberna-Tricas (2021) Spain (89)	the qualitative methodology of the phenomenological tradition	Frontline Midwives (10)	Female 100% (29 to 50 years)	primary care, hospital, and independent care	COVID-19	An individual semi-structured interview
K. Chovanec (2021) USA (51)	-	challenges of meeting the discharge planning needs of the hospitalized population between team members, patient, and family engagement	-	urban health system	COVID-19	-
Z. Cengiz (2021) Turkey (78)	a parallel mixed pattern converging quantitative and qualitative	Nurses working actively during the data collection (1260)	Male 21.4% (≤30y:40.1% ,31- 40 y: 51.8%, ≥ 41 y: 8.1%)	Emergency, ICU, Service, Pandemic Sections, Others	COVID-19	a self-administered (online) open-ended structured survey
G. Catania (2021) Italy (77)	A descriptive qualitative study with thematic analysis	front-line clinical nurses (23)	-	different acute care hospital settings: intensive care, emergency department, sub-intensive care, and departments of infectious diseases	COVID-19	web-based questionnaire
S. Baldwin (2021) UK (84)	A qualitative study	Qualified health professionals[1] working with patients with COVID-19 admitted to the hospitals (19)	Male 31% (29-59 y)	three hospital sites across a large London-based hospital trust	COVID-19	semi-structured interviews

[1] 6 were doctors, 8 were nurses and 5 were allied health professionals

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Citation	Design	Participants (n)	SEX (AGE)	*Location*	Context (Type of disease)	Methods of collecting information
K. Alnuaimi (2021) Jordan (61)	descriptive phenomenological qualitative	midwives (20)	Female 100% (37)	two hospitals	COVID-19	Semi-structured interviews using telephone calls
C. Vindrola-Padros (2020) UK (83)		staff members working[1] (30)	Male 43%	emergency departments and ICU in three hospitals	COVID-19	semi-structured telephone interviews
A. Nadkarni (2020) Australia (67)	cohort	critically ill COVID-19 patients (18)	Male 78% (67)	intensive care unit	COVID-19	-
L. M. Mobula (2020) Congo (90)	perspective piece (recommendations for the COVID-19 response based on lessons from the Ebola outbreak)	3,461 confirmed and probable cases	-	North Kivu province	Ebola	-
N. Fetene (2020) Ethiopia (42)	-	stakeholders across Ethiopia's primary healthcare system (41)	-	health center (Amhara, Oromia, SNNP, and Tigray regions)	-[2]	face-to-face key informant interviews
T. Al Ghafri (2020) Muscat, Oman (70)	focus group discussions	[3]Health-Care Workers (40)	Male 12.5% (9 ± 4 (range = 5-22))	primary care level in Muscat	COVID-19	Semi-Structured Interview

[1] Nurses, Doctors, Allied health professionals, Senior staff, Junior Staff
[2] Systematically describes how managers experience accountability in their day-to-day work, highlighting common challenges, and revealing a desire for improvement.
[3] Family physicians, general practitioners, nurses, health managers, administrators, and public health experts involved in clinical or field or technical or administrative management of COVID-19

[DOI: 10.47176/mjiri.39.71]

Table 2. Key Experiences from the Studies Based on the 6 Building Blocks of the WHO Health System

Citation	Leadership and governance	Health service delivery	Health workforce	Access to essential medicines and equipment	Health system financing	Health information system
W. C. Wong (2004) Hong Kong (73)		Unpreparedness of the system to control the epidemic Telephone and patient follow-up	Their clinical practices and behavior have changed in response to this epidemic significant anxiety in primary care doctors the SARS exposed doctors tended to over prescribe antibiotics			
S. Al-Amri (2019) (79) Saudi Arabia	Failure to follow guidelines		The need for Education and retraining information			
W. C. Wong (2007) (34) Hong Kong/ Canada	the lack of a framework for disease management to lead, support, or coordinate responses between the institutions' service sectors	Disease control by restricting the provision of services in limited centers(Hong Kong)	The need for Education and retraining information Decreased income and information from informal sources cause anxiety		Concern about access to sufficient financial resources	
S.Verma (2004) (69) Singapore	Need instructions and information to update	Setting up of screening stations and directing patients to the hospital predetermined for SARS treatment Launch an aggressive public education campaign to educate the public about the symptoms, causes and illness..	the psychological distress experienced by GPs	Appropriate provision of protective equipment	Concern about access to sufficient financial resources	
A. Herceg (2005) (53) Australian_	there were other sources of guidelines, the guidelines were not appropriate for general practice, the guidelines were 'overkill', and the practice had no suspected cases.	Telephone and patient follow-up		problems obtaining equipment, including reduced availability, cost and long waiting times.		
Z. Austin (2007) (55) Canada	Improve collaboration between government, pharmacies, public health and hospitals Lack of updated information and detailed guidelines and protocols for pharmacies The lack of transparency of the role in the outbreak was the cause of pharmacists' discomfort	Reduced PHC capacity led to increased reliance on local pharmacies	during times of crisis, pharmacists begin to assume a variety of duties and beyond their traditional scope of practice./Team coordination before the outbreak led to better performance during the outbreak.			
N. C. Tan (2006) (52) Singapore	Failure to provide timely information and training at the beginning of the outbreak, holding conferences and new guidelines after the initial weeks	Telephone follow-up and notification of patient results	Providing information and related use of PPE for self and family protection was considered as one of the ways to reduce stress holding conferences and new guidelines after the initial weeks	Using PPE without knowing its effect on disease		

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J. Ives (2009) (35) United Kingdom	Lack of trust in the health system /Poor communication between parts of the health system unclear job descriptions		Worrying about the health of yourself and your family			
O. Sarikaya (2007) (81) Turkey	quick coordination of personnel and managers helped to control the disease The lack of preparation and prior planning to deal with new diseases	Visiting patients' homes		Lack of laboratory facilities and equipment needed at the beginning of the epidemic		Inefficiency of the patient information system
T. Tomizuka (2013) (68) Japan	Lack of full implementation despite the programs and guidelines against the epidemic and the role and performance of personnel and helping their working and family conditions.	The presence of specific hospitals for severe cases of illness Isolation of epidemic patients from other patients		Lack of effective protective equipment/Sufficient drug storage and required vaccine supply		
P. Eizenberg (2009) (80) Australia	Absence of clear communication channels to receive infectious disease information and protocols to reduce time wastage for administrative work during the pandemic.			Lack of available equipment/Non-availability of medicines for personnel use		
M. Caley (2010) (36) England	Lack of coordination among the systems providing information Frequent changes in guidelines					
A. Corley (2010) (43) Australia	Ambiguity in guidelines for the use of PPE		The lack of specialist labor affected the care of patients. Increasing cooperation and maintaining group spirit and hard work of personnel to compensate for the lack of specialists Increased workload and fatigue of personnel and fear of infection	Reduced availability and shortage of PPE		Due to the presence of unnecessary staff and visitors, confidentiality of patient information and privacy was at risk.
K. El Emam (2011)(40) Canada	Fear of providing too many services to patients due to excessive monitoring of doctors' performance					The government's request for patient information contradicts patients' privacy.
S. Y. Wong (2012) (82) ong Kong	The existence of proper guidelines and proper communication ways to obtain information		Reluctance of health workers to inject vaccines Increase in volume and working hours			

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P. Masotti (2013) (45) Canada	Planning in the health system needed to be changed and adapted for local levels Lack of interdepartmental coordination			Failure to supply the required amount of vaccine	Lack of specific information to provide employee compensation or purchase of equipment	
M. Kunin (2015) (66) Australia, Israel and England	Poor communication within the health system Reaching the guidelines to the media before the health system Time-consuming reporting system during an epidemic The guidelines were not suitable / Failure to receive timely and fast guidelines to the health system	Examining Ahzad Mashkodak in a private car, home visits and phone calls	Increased workload	Lack of facilities to isolate suspicious people/ Uncertainty about the protective effect of PPE		
P. Iyengar (2015) (59) Liberia		Closure of public clinics due to decrease in referrals Reduction of services due to reduction of referrals		Limited protective equipment		
K. Siekmans (2017) (85) Liberia			Lack of manpower Leaving service due to fear and lack of PPE Fear of infection and transmission to the family	Lack of medicine and equipment		
Y. Li (2018) (86) Liberia	Insufficient international relations Lack of international guidelines		Lack of trained staff	Medicine equipment, PPE equipment		
N. P. Miller (2018) (37) Guinea, Liberia, and Sierra Leone	Lack of coordination within the health system Weakness of the monitoring and evaluation system of the health system People's lack of trust in the health system Using international guidelines and providing training to personnel	The provision of services was reduced due to lack of power and fear Distribution of PPE door to door Isolation and prevention of contacts of sick people Door-to-door search for people with symptoms Increasing education and drug distribution with the help of trusted people Formation of popular mobilization committees	Lack of personnel	Lack of medicine and equipment	Change in bonus payment rules and improve conditions for personnel	

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J. Raven (2018) (48) Sierra Leone	Society's lack of trust in the system	Lack of triage	Training to use PPE Lack of personal hygiene in the beginning Lack of personnel information about the disease Stress and increased workload Anxiety and isolation of personnel Fear of getting diseases To support personnel Providing psychological support with the help of helpers and holding workshops	Lack of laboratory and equipment	Provide financial assistance	
S. Udod (2024) Canada (44)	made decisions without the requisite information of what was occurring on the front lines, and without being fully aware of how the consequences of their decision-making affected the staff's ability Guidelines established by the hospital management Team information was replaced with updated guidelines or processes before reaching the intended health provider, some information contradicted previous information, creating uncertainty and insecurity	Providing emotional support to staff	shortage of human resources Cooperation and collaboration created bonds of support that facilitated agile decision-making at the front lines of care An overarching moral burden (the duty to focus on the safety of others) increased stress, encountered fear and resistance from staff as they worked longer hours given additional responsibilities anxious, exhausted, and demoralized as the intensity and pressure of providing care did not ease.	Lack of PPE while also navigating shortages of other medical supplies		
L. Baatiema (2024) Ghana (49)	lack of guidelines and protocols for managing people during the pandemic. There was an information gap regarding treatment for people with suspected COVID-19 cases as well as those with pre-existing conditions	massive scale down in outpatient visits misinformed about the presentation of COVID online consultations to patients response and coping strategies adopted: 1. postponement of reviews and reduced consultation periods. 2. reduced and infrequent inpatient and outpatient visits. 3. change in prescription practices. 4. Teleconsultation.	increased workload and burnout (given the absence of their colleagues who were either being isolated, quarantined, infected, or had passed on) increased infection rates source of fear and stigma in the community long-shift systems insufficient motivational package for health workers by the government (Frontline expectations about bonuses, tax rebates on salaries, and holidays abroad were often cited)	lack of essential consumables, equipment, logistics, and more importantly personal protective equipment. (Exposed them to COVID-19 infections.)		

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A. Tran (2023) Canada (56)	continuously changing guidelines and protocols, poor communication from administration	Concern for patients' isolation, miscommunication and disconnection from care	Disruption and loss of emergency department shift work While clinical shifts were reducing, many noted increased non-clinical duties, often non-paid work in administrative and disaster planning roles. feeling of an unsafe work environment This stress added to fears regarding COVID-19 unknowns Increased team bonding the initial phase of the pandemic was stressful and anxiety-provoking feeling fatigue, anxiety, anger (attributed to the uncertainty of the pandemic and the long hours of PPE usage)	lack of appropriate use of PPE and uncertain PPE supply		
J. Skagerstrom (2023) Sweden (38)	Lacked social support Alack of collegial support in decision-making and practical matters, from other managers or the superior management felt isolated from management colleagues organizational changes due to new routines and guidelines from above	Digital solutions provided opportunities to interact with patients without having physical contact Prioritizing was considered as an everyday manager task	being able to cope with the new situation, more flexible than they had expected high workload (keeping up with and distributing information, planning schedules and new routines, etc.) both the employees not only in their own unit but also in other health-care units had gained a shared mission Cooperation outside the regular limits increased feeling loneliness in implementing and prioritizing the changes and adjustments causing feelings of exhaustion of vast amounts of information every day (To reduce the flow of information passed on to the employees, some of the managers screened and excluded parts of the information)			

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S. Parker (2023) Ireland (39)	The pandemic response fostered opportunities for integration by providing a shared goal that helped to break down boundaries between previously fragmented care sectors, settings and cultures.	developing new ways of working or providing care (telemedicine, access to resources and technology and flexibility, adaptability and the use of virtual platforms)	the importance of relationship-building and trust in facilitating effective collaboration to improve universal access to integrated care.			the need to build what one health system manager
L. Makowski (2023) Germany (54)	Communication with health authorities were described as insufficient lack of sufficient protection, guidance, and support constantly changing measures, recommendations, and guidelines in primary care were reported as an additional burden health departments had failed to adapt their capacities to the epidemiological situation insufficient data on the clinical presentation	Special infection consultation hours were offered	staff was divided to work in teams and cleaning and disinfection were enhanced perceived teamwork in practice as a particularly important source of support to solve problems excessive working hours in everyday practice and felt overworked, strung up, and overburdened become creative due to the shortages of critical healthcare supplies, for example, medical masks were heated in the oven to be re-used. Also, they would find new suppliers or make PPE themselves. effective teamwork and professional collaboration were perceived as essential sources for emotional support and resources for overcoming frustration and the sense of overload caused by the pandemic fear of infecting relatives or the absence of leisure activities to compensate for their stressful workday.	PPE was scarce and could only be purchased at elevated costs		the GPs perceived one official source of clear and consistent information, easy access to accurate information and sources for advice, and the promotion of collegial exchange as crucial
A. Isaacs (2023) Australia (71)		Using the telephone was also beneficial to mental health clinicians when they had to work from home due to COVID-19 restrictions. Tele-mental health (TMH) rendered mental health services much more accessible for those who isolated but not conducive as a service for who could not afford a phone or internet				

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S. H. Gwon (2023) USA (46)	the Incident Command System organizational structure had been operated from the outset of the pandemic and it continued to be implemented at the time of this study control by communicating with local community partners	PHNs made an effort to raise public awareness about infection prevention	Allocating staff according to the organizational needs alone produced unequal experiences and frustration among staff. ask for volunteers and to hire new staff, called limited-term employees (LTE) stress and anxiety, scared lack of skills, experience, and/or support for doing what was required of them Feeling "overwhelmed," "too tired," and "underappreciated" having formal (Mental health services, Employee Assistance Programs, and supports from public health partnerships) and informal (self-care activities and teamwork/organizational culture) supports helped reduce emotional exhaustion Emergency drills and volunteer management plans were department specific receive mandatory annual online training for emergency preparedness, covering (a) Incident Command System (ICS), (b) Electronic Surveillance Systems, and (c) partnerships and resources COVID-19-related policy and the clinical guidelines	setting up mobile COVID-19 testing sites and getting supplies (e.g., vaccines, gowns, marks) were put on hold		
S. Fumagalli (2023) Northern Italy (62)	the rapid, unclear, contradictory and continuously changing nature of information, protocols and guidance, particularly regarding the identification and treatment	lack of core midwifery care (tried to put in place strategies to compensate while difficulties in agreeing with and implementing unclear and unreasonable policies) the women required extra midwifery support and presence the absence of waiting room relatives during labor reduced interruptions and improved the quality and efficiency of care feelings of apprehension and anxiety Regular testing service offered to healthcare professionals re-organization of maternity services and care pathways The midwives adapted care to meet changing user needs, focusing on communication between the woman and her distant companion Technology helped midwives compensate for the absence of birth partners	The pandemic prompted a rapid reorganization of maternity services, including lockdown adherence, suspension of leave, extra shifts, more obstetricians, and a dedicated midwife for COVID-19-positive women. psychological struggle resulting from continuous changes in organizational and clinical procedures midwifery team as a strong, resilient, cohesive and tight-knit group very intense, sympathetic, and compassionate human relationships, allowing a safe space for sharing emotions, feelings, and difficulties	uncomfortable PPE		updated daily via several emails and text messages with multiple information often contradicting previous guidance

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B. Dobrowolska (2023) Poland (60)	how poorly the infrastructure was adapted to the pandemic requirements Nurse managers stressed the need for 24/7 communication of updates, including answering night calls for assistance and instructions. lack of support from hospital management, supervisors and medical personnel. absence of clear and understandable procedures for dealing with lack of proper communication between nurses and doctors.	They reduced their patient-related work to a minimum, which resulted in less than the highest level of care	shortages of medical personnel issue of how the young personnel would deal with the situation work one extra shift ICU nurses, and skilled professionals, were expected to operate respirators in other wards. worked slower with limited vision, sensation, and movement due to protective clothing nurse managers acting as therapists, reassuring staff to reduce fear and maintain calm in-patient care and at home. nursing staff expressed hesitation about working fear and panic at the beginning, very strong sense of responsibility for the team, concerns about staff negligence in safeguarding and exposing the treatment team to infection risks, Exhaustion and fatigue, inability to relax, memory lapses from the excess of information and sensory overload expressed the need for more support from their superiors, including help in setting up workstations for the nurses and also to devise top-down clear, transparent, and well-thought-out routes and procedures, and need for psychological support insufficient knowledge of how to keep oneself and the patients safe	shortages of PPE though nurse managers often had to ration and supervise the distribution		
S. H. Schriger (2022) Philadelphia (75)	the need for telehealth resources and funding, including compatible supplies, specific incentives, and technology access for low-income clients.	telehealth appears to be slowing the pace of therapy difficulty with implementing core TF-CBT practice elements over telehealth (eg, trauma narrative) teletherapy offers an opportunity for more creativity and collaboration than in-person therapy they find telehealth to be convenient, although some may find it more challenging and uncomfortable	Caregiver engagement and involvement has generally increased Clinicians want more training and support in telehealth clinicians who are creative and flexible may have an easier time implementing treatment over telehealth, as will those with greater motivation and greater bandwidth.	limitations in the use of physical tools and supplies through telemedicine essential access to devices, frequent internet issues, and digital disparities		

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E. Peter (2022) Canada (41)	decisions that were made at a distance and generally without nurses' involvement on changes to nursing staffing models A lack of care for nurses was evident in the administration's treatment of those sick with COVID-19 and their limited in-person contact. Responses to professional therapy varied; some found it valuable, while others felt therapists were disconnected from their work. Freeing hospital beds to accommodate COVID patients	concerns regarding the withdrawal of non-COVID related treatment from vulnerable patients to make room for COVID patients reduction of community services	insufficient staffing or clinical resources did their best to facilitate patients' relationships with their families (provided tablets and other virtual means for families to connect) Nurses also relied on self-care activities to help sustain their capacity to continue to meet their caring responsibilities. Feeling tension PPE acted as a barrier to nurses' moral actions Community services were reduced to curb COVID-19, limiting nurses' face-to-face contact and resources to meet clients' needs.			
Z. Olateju (2022) Nigeria (47)	Government collaborated with organizations	continuous patient follow-up was seen as essential due to depressive symptoms following the diagnosis the need for CHWs to continuously educate communities tried their best to tackle COVID-19, by setting up isolation centres and distributing food, and free home care kits to infected individuals access to care has significantly increased due to their community sensitization and health education	finding transportation to their duty post was extremely difficult during the initial lockdown physically and emotionally draining due to extra responsibilities CHWs who knew COVID-19 survivors viewed the virus as less threatening, boosting their eagerness to work. More willing to work as they adjusted to and became familiar with the pandemic and its restrictions. arguments with people who refused to follow guidelines uncertainty surrounding their exposure fear due to COVID-19's unfamiliarity All participants expressed a sense of duty and responsibility believed that their fate was in God's hands, lowering their perceived threat of COVID-19, hence increasing their willingness to work	Employers provided PPE for most CHWs, but was inadequate		

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C. Juárez-Ramírez (2022) Mexico (65)	Once training was received, infrastructure adaptation in medical facilities were the following step. In rural areas, the authorities collaborated with health personnel by keeping non-essential activities closed, escorted them for protection Once the national epidemiological system gave the alert. The states began designing local guidelines to organize care using the existing scientific evidence, but there was no glimpse of what the impact of the virus might be	When the pandemic was formally recognized, medical facilities were prepared severe cases and deaths made medical care more difficult. monitored remotely via telephone and social media (Pregnant, under five, tuberculosis, and chronic diseases) organization of health personnel under their charge to carry out community preventive measures and show them how to use PPE The positive cases were given information for home care; some of them received an aid kit including an oximeter that later had to be handed back to the health personnel. Health teams were integrated to give prevention information in key places screening stations were installed at state and municipal borders and in bus stations and airports	permanent virtual training through videoconferences continuation of preventive programmes When the pandemic was formally recognized, training for teams of health professionals was intensified	When the pandemic was formally recognized, Preventive measures were disseminated to the population As cases increased; a shortage of PPE occurred in rural areas. Health personnel used their own money distributed PPE to health staff which had been donated by ordinary people and civil society organizations.		
C. M. Gonzalez (2022) USA (64)	Effective leadership appeared to enhance morale for those on the receiving end of it. Effective communication from leadership enhanced trust. lack of transparency stoked resentment and anger checking temperatures at entry to the hospital several shortcomings of new institutional policies The impact of the pandemic highlighted opportunities for revision of previously existing protocols	restricting lab tests to specific specialty services For a new illness [like COVID-19] is not helpful inability to prepare for the COVID pandemic negatively affected healthcare delivery in Areas like routine medical care, continuity of care Challenges to continuity of care manifested in hospital discharge planning: "Patients may not be able to get the supportive care they need due to COVID distancing restrictions Participants identified strategies to adapt to new care delivery models, combat isolation for their patients, and improve the discharge process	setting up check-ins with psychologists/psychiatrists/social workers for front-line workers, reducing the number of patients per provider, and providing scrubs and PPE enhanced some participants' morale. substance misuse, survivor guilt, grief, loneliness, anxiety, depression, and PTSD	PPE shortage		The lack of shared information between different health systems to help prepare frontline physicians

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Citation	Leadership and governance	Health service delivery	Health workforce	Access to essential medicines and equipment	Health system financing	Health information system
C. Durand (2022) France (50)	relying on several sources of information to update their knowledge and services reassuring and educating patients (ex vaccination) rapidly changing guidelines and service users' COVID-19-related anxiety as major challenges to the provision of services mistrust and misinformation lack of support and recognition for pharmacists from health authorities despite being essential frontline health workers They have often been the public's first point of contact for reliable COVID-19 information and explanations regarding government health measures	they did not recommend patients any specific treatment other than antipyretics. continuing and adapting their usual pharmaceutical services providing various preventative health services to prevent and mitigate the spread of SARS-CoV-2	they initially screened patients and made appropriate referrals to GPs and testing centers	Being granted new responsibilities by health authorities, such as renewing and refilling prescriptions and providing certain medicines without medical Advice encouraging service users to receive COVID-19 vaccines facilitating the distribution of vaccines to GPs as well as administering vaccines in pharmacies		
I. Couper (2022) 11 countries (63)	Rapid system changes Collaborations between rural doctors, businesses, and community leaders led to innovative ways to support small communities. Local communities reciprocated by supporting their frontline HCWs. changing information about acute management and public health messages	the centralization of COVID-19 treatment limited the services available for rural people, particularly where there was not universal access to hospital care provide in-home testing and support for patients in isolation Rotating teams of HCWs provided some respite and avoided all staff being exposed to a subsequent service collapse In rural hospitals without access to life-support equipment, doctors had to adopt more basic approaches to managing critically ill COVID-19 patients	teams bonded and supported one another humbled or overwhelmed by the constant uncertainty and workload At times, problems such as burnout, panic attacks, and depression prevented doctors coming to work feeling isolated. fear and anxiety, and a sense of not being in control as multiple problems were encountered Rural doctors were encouraged and sustained by the dedication and humanity displayed by their teams	Lack of personal protective equipment (PPE), limited COVID-19 testing. Some rural services struggled to access basic PPE, testing kits, hand sanitizer dispensers, and oxygen concentrators		

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J. Blanchard (2022) USA (87)	They viewed leadership as reactive and focused on output rather than providing staff with appropriate resources and frequent communication Participants also felt that leadership was not transparent about budgetary cuts and protocol changes Protocols frequently changed that required providers to spend excess time and effort making care decisions	there were mental health resources available to them at the workplace to support them	Increased workload, Sleep deprivation, Trouble concentrating feelings of stress, anxiety and poorer health. depression, emotional exhaustion, PTSD, and burnout Moral dilemma distress (Difficulty choosing between two ethical options.) Moral conflict distress (Conflict over the most ethical action.) Moral constraint distress (Circumstances preventing ethical action.) Moral uncertainty distress (Uncertainty about the right action.) Moral tension distress (Inability to share beliefs with others.)	Reuse of PPE and deviation from routine approaches to patient care		
V. Zamanzadeh (2021) Iran (88)	Due to political issues and to keep the society calm, during the first days of the outbreak, the treatment staff were not notified that patients with COVID-19 had been hospitalized. Lack of scientific information		due to fear of the disease, some staff members refused to provide care and treatment to these patients in the wards ambiguity in care planning high workload fear of the disease Empathy and cooperation compassionately provided care for the patients with COVID-19 despite being aware of the poor facilities and lack of equipment Confusion, anxiety, frustration, stress	the non-standard design and low usability of personal protective equipment (PPE) the poor facilities and lack of equipment		

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M. Wanat (2021) Europe (58)	constantly changing information from multiple official sources Limited knowledge and changing guidance on typical and atypical symptoms in the early stages of the pandemic were difficult to deal with New roles at times also had an impact on PCPs' Workload In contrast,	Care for patients needing face to-face appointments was organized differently across countries. most countries providing health checks and annual reviews remotely or in group format Some countries also focused on vulnerable patients All countries organised triage in order to prioritise and respond to patients' queries. Germany, Greece, and Sweden: Continued seeing patients with respiratory infections; Sweden set up tents initially, later creating permanent care areas. Poland: Patients with COVID-19 symptoms were advised to contact hospitals; PCPs struggled to interpret guidance. England, Belgium, Netherlands: COVID hubs were established in cities; Belgium's PCPs set up hubs independently without guidelines. Ireland: PCPs moved all consultations online and referred patients to drive-through testing centers. challenges and resulted in having to follow different protocols.	New roles at times also had an impact on PCPs' Workload In contrast, some PCPs experienced a decrease in clinical workload and wanted to contribute more New roles had a negative impact on their mental health PCPs across all countries seemed to turn to their colleagues for moral support and by, for example, setting up daily team updates or using social media to share information and discuss patient cases Working well together and towards the same goal brought huge satisfaction and a sense of solidarity	Participants reported that lack of PPE or having to source and buy it without government support, sometimes at very high cost was one of the main problems, coupled with a lack of clear guidance on when to use PPE or being told to 'save it		daily team updates or using social media
A. Shahil Feroz (2021) Pakistan (76)	institutional leadership regularly visits COVID-19 units for staff appreciation and encouragement. standard operating procedures (SOPs) have been designed to manage COVID-19 cases front-line providers appreciated the support received from management and institutional leadership	regular training was being carried out on the job and at the CIME, and that master trainers were being trained to then disseminate information and train the rest of the department the senior management responds to healthcare providers' concerns promptly through a WhatsApp group	Overwhelmed and exhausted by the workload and exhaustive donning and doffing process Mental health challenge and feeling guilty about potentially carrying the virus to their families. fear of being stigmatized	shortages of PPEs were notified by a few healthcare providers alongside sanitizers while providing care to the patients.		The strong hospital system of information sharing during the COVID-19 crisis (information was being shared through video messages and those helplines and hotline for staff and the public were effective in screening)

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Z. T. Osakwe (2021) NY (72)	Limited access to information and resources was reflective of the limited organizational support HHAs encountered related to infection control during the COVID-19 pandemic. gaining access to COVID-19-related information necessary to facilitate patient care was a challenge		Working Alone and Feeling Isolated that was exacerbated during the pandemic (HHAs worked as the only staff in the patient's home for extensive periods) limited access to emotional support HHAs noted that they incurred extra financial expenses and received no incentives during the pandemic.	While HHAs expressed concerns about the lack of access to testing, many HHAs appreciated the daily screening for COVID-19 which their agencies conducted via telephone limited Access to PPE and Hand hygiene products		limited information about COVID-19 testing for HHAs.
K. Hugelius (2021) Sweden (74)	Integration within the overall response facilitated the psychosocial response by adding structure and coordination lack of updated knowledge on evidence-based	In towns, rural areas or national districts, plans for the psychosocial support response were significantly more absent than in metropolitan areas or bigger cities remote support or digital alternatives to adjust the traditional forms Visiting restrictions added an extra psychosocial burden on the family members of hospitalized patients and limited the possibilities to offer psychosocial support	One major challenge was having access to a sufficient number of competent crisis support personnel over time Many of the needs amongst the health care professionals were not strictly caused by the COVID-19 pandemic, but by other general work-related or private problems, rather than symptoms of being traumatized or affected by the pandemic itself.			
S. Hantoushzadeh (2021) Iran (57)		Considering the reduction in prenatal care, the possibility of pregnancy complications increased due to the neglect.	many healthcare workers contracted the virus, reducing staff availability per shift. This increased the workload and responsibilities of the remaining staff, leading to greater fatigue, burnout, and the creation of new roles. confusion about how to deal with that. Stress due to lacks. fear of becoming infected as well as fear of transmitting. lack of contact with their families has weakened them morale	shortage of personal protective equipment (PPE)		

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Citation	Leadership and governance	Health service delivery	Health workforce	Access to essential medicines and equipment	Health system financing	Health information system
J. Goberna-Tricas (2021) Spain (89)	the new data were only being published in scientific studies and articles "in dribs and drabs" because of the lack of information, certainty and proof. the medical authority prioritized the safety of protocols, but the scarcity of scientific evidence saw obstacles being placed in the path of respecting women's rights and autonomy. protocols that ignore ethical and social aspects have been introduced The protocols established by some hospitals were bereft of any humanity healthcare guidelines are continually changing or are ambiguous.	At the beginning, maternity services were not a focus of attention because of a lack of knowledge Safety (in relation to the disease and the virus) has been put before fundamental rights such as in the case of patients' autonomy and decision making. The professionals developed tools to allow them to adapt to the new situation and to acquire the resilience necessary to deal with unforeseen and conflictive situations.	the very persons who should have been providing safety became vulnerable agents themselves never-ending shifts with no substitutions fear; uncertainty and insecurity; concern, distress, sadness and anxiety; confusion; loneliness and despair, anger and impotence.	precariousness of the work conditions and of the equipment to protect health professionals		
K. Chovanec (2021) USA (51)	the care manager facilitated the risk mitigation through the promotion of shared decision-making to develop an individualized plan of care, including discharge goals. The hospital care managers sent referrals to the family communication team members through a secure messaging function in the electronic health record The core competencies of care management are well aligned to support these aims, as the primary purpose is to activate patients to become better managers of their own health	A template was used to guide the conversation, including the provision of updates on laboratory test results, tests, procedures, progress notes, and care plans safely discharged with instructions for self-management at home A tele-monitoring service for patients with heart failure (HF) and chronic obstructive pulmonary disease (COPD); The completion of virtual social work psychiatric-assessments in the ED; and The implementation of a process to discharge patients with oxygen directly from the ED.	The acute transitional care management team utilized the motivational interviewing therapeutic communication technique to actively listen and engage patients in their care, encouraging high trust and activation.	The medical equipment company deployed a staff member to provide education on oxygen use and care in partnership with a home health care agency in the home setting.		The home health tele-monitoring platform was expanded to support at-risk populations with HF and COPD when access to routine primary and specialty care was often disrupted. Sustaining a virtual environment for the patient and the care manager to communicate

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Table 2. Key Experiences from the Studies Based on the 6 Building Blocks of the WHO Health System

Citation	Leadership and governance	Health service delivery	Health workforce	Access to essential medicines and equipment	Health system financing	Health information system
Z. Cengiz (2021) Turkey (78)			required in putting on and taking off PPE often causes physical fatigue. not sufficiently compensated for the work they did Changes in working environment, order, and hours The pandemic caused difficulty in nurses' performance and motivation Stress, Anxiety, and Fear (concern about the future, fear of death, losing someone loved or patient, and being a carrier or getting infected.) Depressive emotions, obsessive behaviors, and psychological fatigue Increasing the number of staff, arranging the shift system, providing psychological counseling and guidance in the form of support services on online platforms or by phone, especially to relieve front-line nurses can alleviate the permanent effects of psychological difficulties high rates of adherence to quarantine rules	Low comfort due to continuous use. difficulty in using PPE insufficient materials and low-quality		
G. Catania (2021) Italy (77)	the value of a single, identifiable person as a source of information and a focal point of leadership. required the development of ad-hoc and newly created protocols. The new guidelines for the management of infected patients were strict to contain the infection and to protect practitioners.	Human and material resources had to be increased	The staffing changes imposed by the COVID-19 emergency led to extremely challenging skill mix situations. (Newly graduated disoriented nurses) strengthened them knowledge base and devised new solutions. substantial impact this pandemic has had on them physically shift patterns and working hours changed regularly and dramatically being able to be autonomous in providing care generates insecurity & low confidence. the initial surprise of the onset of the pandemic, followed by doubts and the fear of being infected. anxieties due to the inability to care for patients properly. anguish of seeing their colleagues hospitalized or dying of COVID-19.	lack of PPE, the inadequacy of PPE, and a lack of guidance about its correct use	Human and material resources had to be increased	communication from coordinators and management in several ways: by formal means (i.e., e-mails, notices to staff) and by verbal communication to those who were present in the department

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Citation	Leadership and governance	Health service delivery	Health workforce	Access to essential medicines and equipment	Health system financing	Health information system
S. Baldwin (2021) UK (84)	there was a hierarchical management a system where the senior manager/leaders were less visible at the frontline during the pandemic unclear infection control policies in some healthcare settings	inadequate COVID-19 testing for healthcare staff support services provided by the organization (the regular 'Communication' emails and the information available on the trust intranet. psychology team)	Working during the pandemic brought about a sense of camaraderie among the health professionals well-evidenced link between staff well-being and quality of care delivery feeling fear, confused, angry and frustrated with the speed at which everything progressed, resulting in additional demands placed on staff. they prioritized their patients' needs before their own	Personal safety and the lack of adequate personal protective equipment (PPE)		
K. Alnuaimi (2021) Jordan (61)	the Jordanian Ministry of Health instructions to minimize the number of health workers lack of information resources as the organization or the Ministry of Health did not offer courses or leaflets about the relationship between the disease and maternal health. the importance of following infection control instructions.	closure of the antenatal and private clinics, made all other cases referred to the hospital in massive numbers. the care provided to clients did not change during the COVID-19 crisis, but with more precautions. different levels of discomfort from wearing Personal Protection Equipment (PPE).	new schedule to work with less than 50% of the personnel and increased the number of days off Extra workload and the shortage of staff Living in turmoil. The level of fear reached the maximum and decreased with time. when they looked after a suspected woman who had a COVID-19 test and. increased levels of stress and fear some took an online workshop about COVID-19 in general and had a certificate.			
C. Vindrola-Padros (2020) UK (83)	National guidelines have included more information on revised methods of delivering mental health services than on their availability and use by health workers.	dehydration and the challenges of PPE use when fasting during Ramadan.	advice, information, and training were insufficient. staff have formed new connections which I think they'll strengthen our network at work and strengthen the way we work together On social media, some HCWs Affirmed pride in doing their jobs on the front line Despite challenges and fatigue.	For instance, policies related to personal protective equipment (PPE) changed throughout the pandemic, with one major change being the allowance of PPE reuse.		Policies and the infrastructure for testing HCWs increased throughout the study. (Rapid establishment of 3 laboratories to develop COVID-19 testing kits to test HCWs.)

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Citation	Leadership and governance	Health service delivery	Health workforce	Access to essential medicines and equipment	Health system financing	Health information system
A. Nadkarni (2020) Australia (67)	ICU treatment guidelines and early clinical experience was shared across the State.	make every patient interaction a time and resource-efficient as possible The RAH ICU's bereavement follow-up service has proven effective in supporting bereaved family members at the end of life, with valued feedback from both families and staff involved in the care of patients dying from COVID-19. Therapeutic procedures were enacted early and followed locally developed COVID-19-specific protocols, daily Telephone calls, and videoconferencing, using secure Health Direct Videocall software. Telephone calls were made to families twice daily, with at least one from an ICU doctor. State health authorities deployed clinical pathways to triage all suspected COVID-19 cases to the Royal Adelaide Hospital (RAH).	All ICU staff underwent PPE training and mask-fit testing. A secure 'WhatsApp' group of all ICU medical staff established to share promptly important communications limit the number of shifts worked in our 'COVID pods', avoided rostering inexperienced staff, and making confidential counseling services available to all. Nosocomial healthcare worker infection (solution: funded quarantine arrangements) a variable degree of anxiety and fear appear between staff (solution: they were invited to highlight concerns, in confidence, to the senior clinical leadership team and higher-risk individuals were redeployed to non-COVID-19 areas of the ICU.)			an ICU COVID-19 dashboard was established, and succinct daily briefs cascaded by email to all members
L. M. Mobula (2020) Congo (90)	Coordination of international and national counterparts (regular strategic meetings, monitoring framework that looks at performance Indicators) Used evidence to adapt and improve strategy, Create SOPs and guidelines for optimized care based on existing evidence	performance indicators at the beginning were poor. But then improvement in the quality of surveillance activities (prompt investigation, early detection and isolation, an adaptive vaccination strategy, community-based surveillance, and the prioritization of follow-up with high-risk contacts.) Established standardized package for Infection prevention and control (IPC)	Community structures and community health workers who speak the local language used to better communicate with communities			Go. Data, a software developed by the WHO and Global Outbreak Alert and Response Network partners

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Citation	Leadership and governance	Health service delivery	Health workforce	Access to essential medicines and equipment	Health system financ-ing	Health information system
N. Fetene (2020) Ethiopia (42)	The need to improve two-way com-munication between different levels of the health system (overall lack of responsiveness from higher levels in the system) Multiple,unsynchronized lines of accountability for healthcare managers exist need for guidance regarding their role. in accountability practices because Degrees of understanding about the link between accountability and per-formance are varied poor merit-based appointment system creates lack of incentives for high performance					
T. Al Ghafri (2020) (70)	Participants highlighted the effective-ness of a comprehensive and multi-sectoral approach in the management of COVID-19 pandemic All primary care guidelines were re-visited and changed to meet the national COVID-19 management guidelines. (Divide the clinics into COVID-19 and non-COVID clinics-telephonic consultations and virtual communica-tions were initiated for individuals with comorbidities)	telephonic consultations and virtual communications were initiated for individuals with comorbidities using different technologies (Integrating infor-mation technology support)	human resources were static imbalance between responsibilities and human resources increased workload reported as exhausting. stress of re-structuring the clinics as per the infection prevention and control guidelines			

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Table 3. Key Lessons and Experiences from the Studies

Citation	Epidemic	Lessons/ recommendations
W. C. Wong (2004) Hong Kong (73)	SARS	1. the financial support from the government and a contingency plan organised centrally, to mitigate business risks, and the provision of financial support for PCOs were recommended. 2. improve collaboration between government, primary care
S. Al-Amri(2019)(79) Saudi Arabia	MERS-CoV	1. ncreased availability of infectious disease education and Use of the website of the Ministry of Health and the Ministry of Health's manuals.
W. C. Wong(2007)(34) Hong Kong/ Canada	SARS	1. weaknesses in organization and support for primary care systems, the need to improve collaboration and communication, and suggest ways to better manage epidemics in the future such Develop an active and collaborative disease surveillance system that integrates frontline and public health system. 2. 2. Relevant and practical training in infection control can be made available to family physicians in the form of continuous medical education.
S. Verma(2004)(69) Singapore	SARS	1. Launch a public education campaign to educate about the disease. by doing so, he somehow removed the disease from the realm of traditional Chinese medicine and its explanation and treatment. 2. Setting up of screening stations and directing patients to the hospital predetermined for SARS treatment
A. Herceg(2005) (53) Australian	SARS	1. planning for future emerging disease outbreak events should incorporate general practitioners so that the plans reflect what is a feasible response in the general practice setting. 2. Improving collaboration between government, public health and hospitals. and improving internal communication health organizations between public health officials and clinicians, including pharmacists 3. Provision of timely information and instructions and reliable delivery mechanisms of general practice and pharmacies 4. Determining the roles of people and having detailed plans for patients. 5. provide training for the infectious disease outbreak and associated requirement for use of PPE 6. organised supply of equipment and more money 7. Provide staff vaccination
Z. Austin (2007) (55) Canada	SARS	1. Teamwork (the ability of a group to function cohesively, flexibly, and cooperatively) is one of the best ways to control disease. 2. Develop specific emergency policies and procedures using lessons learned. 3. Provide timely information and training
N. C. Tan (2006) (52) Singapore	SARS	1. Outbreak experiences provide a roadmap or behavior modification to help effectively manage unknown future epidemics. 2. The way to control the anxiety of the real interpretation of media reports through PHC was considered as one of the ways to relieve public opinion. 3. Provide timely information and instructions 4. Use of protective equipment (PPE)
J. Ives (2009) (35) United Kingdom	Influenza	1. Having a clear job description and receiving timely training 2. Providing welfare facilities to reduce staff anxiety
O. Sarikaya (2007) (81) Turkey	H5N1	1. Creating coordination between health system departments and health system coordination with other systems of the country 2. Control and supervision of all people referring to the health system for timely identification of new diseases 3. Improving and strengthening communicable disease notification systems 4. The need to prepare the healthcare system in terms of equipment, manpower and information collection systems
T. Tomizuka (2013) (68) Japan	H5N1, H7N9	1. Increase preparation and storage of required equipment 2. The need for the health system to be fully aware of national plans to deal with the epidemic 3. The need to increase supervision of the implementation of national guidelines
P. Eizenberg (2009) (80) Australia	H1N1	1. The need for government transparency in the field of PPE supplies and warehouses 2. Supplying medicine to personnel before they become symptomatic 3. Determining reliable ways to obtain updated information on the epidemic

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Citation	Epidemic	Lessons/ recommendations
M. Caley (2010) (36) England	H1N1	1. Having integrated instructions to deal with people with symptoms of the disease 2. Sufficient drug availability and clarity of how to prescribe and control the disease 3. Increasing coordination in the system to receive useful information from a single source
A. Corley (2010) (43) Australia	H1N1	1. Conducting annual infection control courses for all personnel 2. Having an infection control team is very effective during an epidemic 3. Appointments are made in the hospital to control the disease and reduce the workload of the staff 4. Providing equipment for the convenience of personnel for cleaning before leaving the workplace 5. Designating a contact person in the hospital to coordinate and transfer useful and concise information
K. El Emam (2011)(40) Canada	H1N1	1. It is necessary to consider rules for data sharing in the context of physician concerns about patient privacy.
S. Y. Wong (2012) (82) ong Kong	H1N1	1. Providing continuous training 2. Examining the causes of non-observance of some safety tips by health workers 3. Investigating the cause and finding ways to increase vaccine willingness among health workers
P. Masotti (2013) (45) Canada	H1N1	1. Coordination between health workers and managers leads to a better response to the spread. 2. Having specific plans for power supply in times of epidemic 3. The necessity of coordinating and making the guidelines a single source 4. The need for national and local systems to cooperate with the health system against the epidemic 5. The need for specific programs appropriate to culture and urban and rural areas 6. The need to determine the role of employees during the epidemic
M. Kunin (2015) (66) Australia, Israel and England	H1N1	1. Detailed plans to separate suspected people from healthy people 2. Providing guidelines for familiarizing employees with antiviral treatments 3. Infection control guidelines should be written considering the physician-patient relationship and resources 4. Guidelines are distributed before the media in the system through the appropriate communication network
P. Iyengar (2015) (59) Liberia	Ebola	1. Developing guidelines for the continuation of services for pregnant women during the epidemic 2. The epidemic has an effect on the provision of health services, and guidelines for their continuation should be developed to reduce the complications of the epidemic
K. Siekmans (2017) (85) Liberia	Ebola	1. Developing guidelines to isolate suspicious people and continue routine services to other people 2. Management of drug supply during epidemics 3. Increasing public education during the pandemic 4. Having trained and reliable personnel to provide services during a pandemic
Y. Li (2018) (86) Chinese Ebola treatment center, Liberia	Ebola	1. Cultivating diplomatic people to communicate and receive help from other countries and international organizations 2. The existence of international guidelines to deal with epidemics 3. Comprehensive training for medical teams 4. Increasing coordination in the country 5. Identify recreational and psychological support programs for health teams
N. P. Miller (2018) (37) Guinea, Liberia, and Sierra Leone	Ebola	1. Formation of community monitoring committees during the epidemic 2. Formation of popular mobilizations for surveillance during the epidemic with the help of people trusted by the people 3. Use of international guidelines and experiences 4. Determining ways to gain people's trust during a pandemic 5. Increasing education with the help of trusted people 6. Increasing people's participation in receiving treatments with the help of trusted people 7. Attracting participation and hygiene by people by distributing equipment in the community 8. Improving the rules for paying bonuses and hiring employees

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Table 3. Key Lessons and Experiences from the Studies

Citation	Epidemic	Lessons/ recommendations
J. Raven (2018) (48) Sierra Leone	Ebola	1. Holding training workshops for PPE training 2. Having programs to gain people's trust during the pandemic 3. Having programs for financial support of personnel in times of epidemic to reduce psychological burden 4. Having psychological support programs to increase the efficiency and health of personnel 5. Using advanced communication platforms
S. Udod (2024) Canada (44)	COVID-19	1. Managerial caring behaviors and role modeling were demonstrated in acts of comforting and supporting staff. 2. Adaptive leadership was described as participants taking steps to resolve problems and make decisions without having guidelines to rely upon. 3. Training and education on crisis management were viewed as a strategy to strengthen staff's skillset and/or confidence in subsequent crises. 4. Creating a culture of care for self and staff including physical and emotional/mental health support for themselves staff was a key learning
L. Baatiema (2024) Ghana (49)	COVID-19	1. It is important to highlight experiences that adversely affected frontline health workers and, in many ways, affected the optimality of care. Policy-makers and health managers need to take these experiences into account in modifying pandemic preparedness and response policies 2. These need to be tailored to ensure they protect frontline health workers. 3. It is also imperative to ensure these issues receive the greatest political attention and prioritization. Such plans when implemented will help mitigate the impact of future pandemics on frontline health workers
A. Tran (2023) Canada (56)	COVID-19	1. emergency physicians experienced emotional and psychological distress during the early COVID-19 pandemic, at a time when COVID-19 prevalence was low 2. Study's findings could guide future interventions to protect emergency physicians against pandemic-related distress
J. Skagerstrom (2023) Sweden (38)	COVID-19	1. Managers stressed the importance of remaining calm and collected in front of the employees and taking the time to talk to everyone 2. many situations had to be resolved from day to day at the expense of the long-term perspective of the work at their unit 3. Cooperation with units outside their primary health-care center functioned well and improved 4. the common focus on certain issues, such as hygiene and digital meetings, made it possible to reach out and implement new routines and tools much more quickly than would have been the case otherwise, according to the managers
S. Parker (2023) Ireland (39)	COVID-19	1. The role of reflexivity in system functioning, where human perceptions and actions are framed as both the cause and consequence of system dynamics 2. health reform is further complicated by the fact that health systems are constantly evolving, changing and adapting, both to internal and external stimuli such as the current health crisis 3. Strengthened the potential contribution of the findings for informing health reform in Ireland and internationally
L. Makowski (2023) Germany (54)	COVID-19	1. the importance of improving crisis management through consistent and clear guidelines, fewer bureaucratic obstacles, and quick access to adequate PPE in future health crises 2. The importance of empowering people with public health and crisis management experience to make crisis-response decisions 3. Suggestions for supporting GPs and expressing public appreciation of their contribution to the crisis include providing financial and human resources to support GPs, for example, strengthening research in primary care and promoting collaboration with the inpatient sector 4. Participants wished to stimulate social solidarity, especially through reliable administrative information that creates awareness of the importance of infection control measures while not generating fear, so that pandemic restrictions can be accepted in the long term.
A. Isaacs (2023) Australia (71)	COVID-19	1. At a time when mental health services were typically difficult to access, a TMH service was most welcome despite its shortcomings. 2. Implications for policy and practice.

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S. H. Gwon (2023) USA (46)	COVID-19	1. Emergency preparedness and response was essential for public health. The training provided participants with practical tools (e.g., how to operate a testing site and vaccine clinic, and how to perform contact tracing and case reports) 2. Suggested support for PHNs' mental and psychological health to improve resilience. 3. Support for safe staffing levels of PHNs. 4. Assessments of the pandemic impact on the PHN workforce. 5. Enhanced emergency preparation training for PHNs. 6. Programs for team cohesion and group bonding. 7. Future research is needed, which focuses on PHNs' experiences, activities, and mental health during the emergency/disaster recovery phase.
S. Fumagalli (2023) Northern Italy (62)	COVID-19	1. Ensure well-being: Provide appropriate PPE, adequate hours, and regular breaks for midwives. 2. Support emotional health: Allow midwives to share experiences and concerns individually and in groups. 3. Acknowledge vulnerabilities: Recognize midwives' and their families' personal circumstances. 4. Provide guidance: Offer clear instructions during reorganizations of maternity services. 5. Implement telehealth: Equip midwives with tools for telehealth to include birth companions remotely.
B. Dobrowolska (2023) Poland (60)	COVID-19	1. Preparedness: ICU nurse managers stress the need for advance planning for epidemiological crises during hospital construction and ICU procedure development. 2. Training: In-service training for ICU management is crucial for effective emergency response and enhancing patient and staff safety. 3. Communication: Clear communication channels among professionals and management are essential for crisis management.
S. H. Schriger (2022) Philadelphia (75)	COVID-19	1. Future work should determine which clinicians and clients are best suited for telehealth, identify how to better engage clients, and reduce digital disparities 2. Client Suitability: Telehealth may suit some clients better than others, requiring insight into who benefits the most 3. Engagement Issues: Clinicians face challenges engaging clients, especially young ones, indicating a need for better engagement strategies. 4. Access Barriers: Low-income families may lack necessary devices or internet access, underscoring the need to address disparities for equitable telehealth services.
E. Peter (2022) Canada (41)	COVID-19	1. Infection control measures and priorities set in response to the pandemic made at distant population and organizational levels impacted nurses who continued to try to meet the ideals of care in close proximity to patients and their families. 2. The care nurses received themselves enabled them to continue to care for others. 3. Nurses benefited most from the moral communities they had with their colleagues and occasionally nurse leaders, especially when they were supported in a face-to-face manner.
Z. Olateju (2022) Nigeria (47)	COVID-19	1. The most discussed improvement was financial incentives 2. Provision of adequate PPE was suggested, to ensure CHWs are protected at all times. 3. Provision of transportation for CHWs to and from their duty post during lockdowns, particularly in rural locations, would be invaluable. 4. More staff were required to lighten the individual workload and aid in the continuation of care 5. Despite facing many challenges during the COVID-19 pandemic, CHWs remained devoted to their role to protect their communities. 6. Collaboration with non-governmental organizations is needed to fund the strengthening of Nigeria's CHW workforce for future disease outbreaks.
C. Juárez-Ramírez (2022) Mexico (65)	COVID-19	1. The nursing personnel recommended home care measures to infected persons and their families. 2. Crisis Adaptation: Effective crisis management relies on adapting health services through resource management. 3. Emergency Response Plans: Establishing public health emergency response plans is essential for timely and effective care. 4. Local Health Services: Local health services effectively met pandemic-related care demands using existing resources and community coordination. 5. Resource Limitations: Resource constraints and regional variability resulted in delays in addressing other urgent health issues. 6. Public Health Policy: Public health policies must consider local health conditions and service capacities to strengthen health systems against complex challenges.

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Citation	Epidemic	Lessons/ recommendations
C. M. Gonzalez (2022) USA (64)	COVID-19	1. Leadership should be aware of actions that might limit physicians seeking mental health services 2. the benefit of engaging frontline physicians as important stakeholders in institutional policy generation, evaluation, and revision; they highlighted challenges, successes, unintended consequences, and lessons learned in the first wave of the COVID-19 pandemic 3. opportunities to examine institutional performance, effect policy change, and improve crisis management to better prepare for this and future pandemics
C. Durand (2022) France (50)	COVID-19	1. Community pharmacists significantly contributed to the COVID-19 response by ensuring the continuity of pharmaceutical services and taking on new roles as educators,screeners, testers, and vaccinators. 2. Despite facing challenges in implementing guidelines and managing service users, their involvement highlights the importance of integrating pharmacists into health emergency planning for managing infectious diseases.
I. Couper (2022) 11 countries (63)	COVID-19	1. With limited resources and support, rural doctors' resourceful and innovative responses underscore a strong problem-focused coping approach and a shared commitment to their patients, healthcare colleagues, and communities. 2. Doctors drew support from sharing experiences with peers (emotion-focused coping) and finding positive meanings in their experiences (meaning-based coping). 3. Despite these coping strategies, the longer-term impacts on rural doctors and their adaptive resources are causes for concern.
J. Blanchard (2022) USA (87)	COVID-19	1. Substantial moral distress among frontline emergency care providers that has been largely underreported during COVID-19. 2. underlying deficiencies in preparedness will need to be addressed to maintain a healthy and productive healthcare workforce during future pandemics.
V. Zamanzadeh (2021) Iran (88)	COVID-19	1. Nurses lived and worked among many paradoxes during the COVID-19 pandemic. 2. Many nurses withdrew from care due to high workloads, inadequate facilities, and the need to protect their families, facing stressful conditions despite some showing empathy and the presence of under-equipped volunteers. 3. The results of this study could provide a clearer understanding to aid the country's managers and healthcare policymakers in taking appropriate measures to support the nurses and improve the quality of nursing care to combat COVID-19.
M. Wanat (2021) Europe (58)	COVID-19	1. Organization of Care: Provide practical guidance on transforming services from a central source / Maintain non-COVID care to mitigate secondary impacts / Ensure primary care representation in policy decisions 2. Resources: Provide PPE with training on proper use / Clarify reimbursement and financial support for service redesign / Improve IT infrastructure for remote care 3. Remote Care and Uncertainty: Offer ongoing training on adapting remote care / Provide mental health resources to support clinician resilience / Acknowledge uncertainty is natural when working in a pandemic 4. Adjusting to Changes: Encourage teams to share advice and resources within and between practices / Consider the impact of workload changes on mental health
A. Shahil Feroz (2021) Pakistan (76)	COVID-19	1. By providing more extensive services to surrounding communities, the hospital could not only alleviate the stigma faced by front-line workers but also reduce the surge of false information 2. healthcare providers (doctors and nurses) of other sub-specialties need to be trained as a backup to mitigate situations when entire internal medicine teams may be placed in self-quarantine due to COVID-19 exposure 3. There should be a central backup plan for staff coverage in both COVID-19 and routine wards. 4. Adequate training and drills, sufficient PPE, a safe and secure hospital environment, healthcare providers' motivation, supportive hospital management and leadership, a strong hospital system of information sharing, and psychological support to address the mental health needs of front liners are necessary. to improve the overall experiences of healthcare providers fighting COVID-19

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Table 3. Key Lessons and Experiences from the Studies

Citation	Epidemic	Lessons/ recommendations
Z. T. Osakwe (2021) NY (72)	COVID-19	1. HHC agencies develop clear processes that would facilitate staff access to testing. 2. COVID-19 training, teaching material, and other information should be provided in English and Spanish 3. The pandemic further exacerbated HHA's sense of being alone, PPE and information shortages, financial stress, and feelings of being undervalued, while triggering new dilemmas in patient care, which all contributed to working in a state of fear and anxiety 4. Communication with nursing staff - broadly defined - plays a key role in infection prevention and control efforts in HHC. 5. The use of information technologies, specifically phone text messaging was a valued and accepted strategy for screening
K. Hugelius (2021) Sweden (74)	COVID-19	1. An effective, efficient, and resilient psychosocial response in a long-term crisis such as a pandemic requires that operations be formally structured, planned, and integrated into the overall response. 2. Psychosocial support should also rely on updated evidence, interventions, and approaches adapted to large-scale situations. One cornerstone to achieve 3. This is adequate and specific competence in how to both manage and provide psychosocial support in major incidents. Increasing the general awareness of psychosocial needs and psychosocial support among health professionals and their first-line managers is suggested to facilitate a more resilient healthcare system in everyday life and major incidents or disasters.
S. Hantoushzadeh (2021) Iran (57)	COVID-19	1. Adaptation: Continuously adjust to evolving maternity care guidelines during crises. 2. Strengthen Services: Enhance maternity health services for safe, effective care. 3. Empathy and Teamwork: Foster collaboration among healthcare workers to address challenges. 4. Psychological Support: Provide counseling for staff to manage pandemic-related stress. 5. Home-Based Services: Develop home midwifery platforms for safer maternity care. 6. Rapid Screening: Implement rapid tests in delivery rooms to reduce transmission. 7. Telemedicine: Expand telemedicine for follow-ups and virtual consultations. 8. Continuous Communication: Maintain clear communication with pregnant women to reduce anxiety.
J. Goberna-Tricas (2021) Spain (89)	COVID-19	1. Protect Women's Rights: Advocate for the rights and autonomy of women to ensure dignified care. 2. Emotional Support: Provide support for the emotional well-being of both patients and midwives. 3. Work-Life Balance: Promote initiatives to help midwives achieve a better work-life balance. 4. Empowerment: Encourage midwives to enhance their roles in health management and patient care. 5. Safe Birth Spaces: Advocate for safe environments for women to give birth with dignity. 6. Awareness and Advocacy: Raise awareness among society and political authorities about the challenges faced by midwives and their patients. 7. Ongoing Research: Support continuous research to improve childbirth care practices.
K. Chovanec (2021) USA (51)	COVID-19	1. Innovative Interventions: Develop multifaceted strategies to support health-promoting behaviors and self-care. 2. Effective Communication: Foster communication among team members and engage patients and families in discharge planning, even virtually. 3. Trust Building: Establish and maintain trust with patients through empathetic virtual interactions. 4. Transitional Care Support: Provide ongoing transitional care management to ensure smooth patient transitions to the next level of care. 5. Service Connection: Connect patients to appropriate care services beyond hospitalization. 6. Evaluation of Impact: Assess the effectiveness of interventions on hospital stay length, readmission rates, and patient satisfaction post-pandemic. 7. Feedback Utilization: Collect qualitative feedback from all stakeholders to inform future strategies in acute care management.

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Citation	Epidemic	Lessons/ recommendations
Z. Cengiz (2021) Turkey (78)	COVID-19	1. Protection of Vulnerable Nurses: Nursing managers should focus on safeguarding sensitive groups, particularly those working in pandemic services and those with chronic diseases. Providing adequate mental health support is crucial, especially for high-risk nurses who require additional personal precautions. 2. PPE Management: The discomfort associated with PPE has been a significant concern. Nurse managers must ensure the availability of suitable equipment and address PPE-related issues by organizing frontline nurses' working hours effectively. 3. National Cooperation: There is a pressing need for enhanced cooperation between governments, health systems, and management to ensure optimal responses during health emergencies. This includes fair treatment, zero tolerance for discrimination, and equitable payment conditions for nurses. 4. Long-term Support Planning: Planning for long-term psychological support for nursing staff is vital, particularly for those in high-risk categories, to help them cope with ongoing challenges related to the pandemic.
G. Catania (2021) Italy (77)	COVID-19	1. Psychological Support: Nursing managers must prioritize mental health support for staff facing fear, overwork, and loss. Long-term care strategies are essential to combat burnout and psychological distress. 2. PPE Management: Ensure the availability of appropriate PPE and confidence in supply chains. All staff should receive core training on proper PPE usage and communication strategies with patients and relatives. 3. International Collaboration: Foster coordination among governments and health systems to enhance responses to health emergencies, focusing on timely communication and safety for healthcare professionals and patients.
S. Baldwin (2021) UK (84)	COVID-19	1. More involvement from managers and working together with health professionals at the frontline was viewed as being necessary to be an effective leader. 2. Health professionals should prioritize self-care by taking regular breaks, staying hydrated, and eating well. They need to be aware of and utilize available support services, recognizing that asking for help is not a weakness. Celebrating individual achievements is important, and professionals should also support their colleagues by offering assistance, sharing resources, and promoting well-being. 3. Managers and leaders should prioritize their well-being to effectively support others and model self-care. Being visible and approachable during a crisis shows care for junior staff. Regular communication, debriefing opportunities, and involving team members in decision-making enhance support. Prioritizing staff well-being through mandated breaks and access to facilities is essential, and leaders must be aware of available support services to utilize and direct others to as needed. 4. Organizations: Healthcare organizations should prioritize adequate food, drink, rest facilities, and staff safety by limiting working hours. They need to address resource inequities, provide regular updates on risks, and recognize staff contributions to boost morale. Support for managers in team support and mental health promotion is essential, along with access to psychological support. Effective communication is crucial for allowing junior staff to voice concerns, using personalized approaches through various forums and formal methods.
K. Alnuaimi (2021) Jordan (61)	COVID-19	1. The suggestion was to assign a midwife or a doctor with the civil defense team as a triage person to bring the most priority cases to the hospital. 2. recommends more attention to be paid to the midwives' experiences and factors that might affect the quality of care 3. The management and administrative team should do their best to reduce the work pressure and arrange the shifts and holidays appropriately. 4. Policymakers and the government should provide midwives with a safe work environment and updated information resources about the new infectious disease, in particular, its effects on maternity and newborn care. 5. Also, emotional and financial subsidies and rewards should be taken into consideration
C. Vindrola-Padros (2020) UK (83)	COVID-19	1. Improved testing and consistent guidance for PPE for all staff 2. Allowing breaks every 2 hours while wearing PPE was effective in preventing dehydration 3. There needs to be improved redeployment of staff, specifically nurses 4. Clearer guidance at an earlier stage was also called for, specifically about training 5. Changes in the system should be continued and improvements should not be undone

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Table 3. Key Lessons and Experiences from the Studies

Citation	Epidemic	Lessons/ recommendations
A. Nadkarni (2020) Australia (67)	COVID-19	1. provide practical and local insights to consider alongside national guidelines 2. the complexity of managing uncertainty, and the importance of a coordinated and dynamic response recognized
L. M. Mobula (2020) Congo (90)	Ebola	1. a strong decentralized coordination system, 2. A sensitive surveillance system rooted in communities, risk communication, and community engagement. 3. Technical innovations including IPC, decentralized treatment facilities, 4. Strengthening health services to avoid secondary crises is also critical.
N. Fetene (2020) Ethiopia (42)	-	1. Developing a shared understanding of system-wide accountability, 2. streamlining managerial reporting lines, 3. strengthening medico-legal knowledge and systems, 4. and developing mechanisms for bottom-up accountability.
T. Al Ghafri (2020) (70)	COVID-19	1. Participants, especially in the managerial group, stressed the need to develop: (a) capacities in public health, (b) clinical skills, and (c) infrastructure to improve access to services. 2. Overcoming the resistance to change daily was acknowledged by all participants as an "experience of wisdom" during this pandemic

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Sick individuals who were at home were educated on personal and family isolation, and home visits were conducted if necessary (63, 65, 71). In general, the methods used to combat diseases have progressed with technological advancements, but in some cases, a slowdown in the rate of recovery was observed (75) (Tables 2 and 3).

Health Workforce

The target population for physicians, nurses, caregivers present in healthcare centers, pharmacists, and other individuals assisting in the healthcare field are considered the frontline during the pandemics that have occurred worldwide. They must face the challenges that exist on this path, as the psychological impact on individuals in various areas is significant. The fear of contracting the disease and transmitting it to their families or the social stigma at the beginning of the outbreaks creates a sense of fear, anxiety, and stress in individuals. The increased workload leads to burnout, increased stress, and extreme fatigue during this period. The simultaneous use of PPE further increases the stress levels of the personnel due to the reduced range of motion and decreased visibility (34, 38, 48, 49, 52, 56, 57, 73, 77) (Tables 2 and 3).

Teamwork during pandemics and increased coordination between individuals about their role in teams and the supportive actions of team members towards each other have led to increased efficiency and are considered essential resources for emotional support and overcoming the sense of hopelessness and excessive burden caused by the pandemic (38, 54-56) (Tables 2 and 3).

The shortage of specialized personnel during pandemics increases the workload on other staff. Personnel are required to be present at work even on their holidays to compensate for the lack of manpower. The need for having plans and guidelines for pandemic times to quickly train and hire personnel during outbreaks was felt (37, 61). Having specific support programs for these times can improve the morale of the staff and partially compensate for the lack of manpower. Lessons learned from previous pandemics have led to the provision of more support programs for personnel during the COVID-19 pandemic. Providing psychological support through social workers, psychologists, and conducting training workshops, providing equipment and financial assistance to personnel, and supplying tablets to enable personnel to communicate with their families are among the successful supportive activities undertaken to reduce the psychological burden of the pandemic and staff fatigue (41, 46, 48, 52, 58, 60, 63, 64, 78) (Tables 2 and 3).

Communication Ways, Information Systems, and Education

The availability of reliable and accessible communication methods is a requirement during pandemics for the rapid, clear, and timely transmission of information and communication between managers and staff. Having updated websites and guidelines for the public to access reliable health system information is a need that has not been adequately addressed during pandemics. Obtaining new information from the media before disseminating it within the healthcare system has confused the staff (51, 58, 64, 66, 79-82) (Tables 2 and 3).

Training can be examined from two perspectives: one, the training of healthcare personnel, and two, the education of the general public. Healthcare personnel expressed the need to receive information and retraining during pandemics. Based on the experiences, the need for personnel includes conducting conferences for new guidelines, mandatory annual training for emergencies, and training on new technologies for remote care (34, 37, 46, 52, 65, 75, 83). After receiving information, these personnel are the ones who can effectively transmit the correct information to the community. Successful experiences include organizing educational campaigns, distributing medicines and personal protective equipment (PPE) by trusted individuals and the community, and providing comprehensive and continuous ongoing education (37, 69) (Tables 2 and 3).

Medicines and Equipment

One of the fundamental challenges during new disease outbreaks is the shortage of medicines and equipment. At the official declaration of pandemics, protective equipment became scarce and expensive, and healthcare systems faced difficulties in procuring these supplies, leading to rationing (37, 50, 53, 66, 68, 72, 75, 77, 80, 81, 84, 85). Alongside the PPE shortage, there was also a lack of laboratory and telemedicine equipment. Thus, the need for stockpiling medicines and vaccines during outbreak times is helpful (68) (Tables 2 and 3).

Financing

Due to the high cost and scarcity of PPE in the community caused by the lack of government financial support, some personnel were forced to purchase PPE at their own expense (58, 65). Guinea, Liberia, Sierra Leone, and Ghana, respectively, demonstrated government support for personnel during the pandemic through changes in payment reward policies, tax reductions on salaries, and the approval of financial assistance to alleviate the economic burden on personnel (37, 48, 49) (Tables 2 and 3).

Discussion

The present review study examines the experiences and lessons of different countries in dealing with the outbreak of emerging and re-emerging diseases. The experiences were evaluated based on the 6-block framework of the WHO health system, which includes leadership and governance, service delivery, human resources, medicines and equipment, information, and financing. By conducting these evaluations, the strengths and weaknesses of the healthcare systems in confronting disease outbreaks were identified, and it was observed that these points were proportional to the performance and political and economic situation of each country.

Leadership and Management

The challenges of supervision, management, and leadership of the healthcare system during the outbreak and the entire system's activity were revealed. The coordination

[DOI: 10.47176/mjiri.39.71]

between management and staff, and unilateral decision-making without involving the staff's environment and their problems in decisions and the development of multiple guidelines, as well as the lack of precise definition of the new roles assigned to the staff, have led to a wider gap in the healthcare system during the outbreak of new diseases. During the pandemic, the coordination between other sectors at the national level with the healthcare system and the numerous statistical reports and information from different sectors has led to a decrease in public trust in the healthcare system and an increase in the workload of the staff to regain the public's trust in the provided services.

Most studies had referred to the existing challenges and obstacles, and in the studies of Miller (37) and Raven (48) during the Ebola outbreak, and the study by Chovanec (51), it was mentioned that using the participation of popular and famous individuals in the form of coordinated mobilization can help regain public trust. In the COVID-19 pandemic, these participations, with the advancement of technology and the use of social media for rapid and integrated transfer with the participation of trusted individuals, have been very helpful (37, 48, 51). Providing quality and continuous services in nonemergency times can help gain public trust in times of emergency. The experience gained from these events, especially in countries that have experienced greater challenges, should be used to develop emergency guidelines internationally and nationally within the healthcare system and with other government sectors, according to the culture and economic situation, for future pandemics.

Health Service Delivery

The provision of services during the pandemic has undergone significant changes compared with nonemergency situations. Despite efforts to continue services in a normal manner, the provision of routine examinations, prenatal care, and care for patients with chronic diseases decreased during the pandemic (34, 57, 59, 61, 62).

Measures such as setting up border screening stations (65)designating specialized treatment centers (67, 69), and home visits (63, 66, 81) were useful for disease control and patient identification during the pandemics, especially the COVID-19 pandemic. Remote services, such as telephone consultations (52, 53, 65-67, 70-73) and online consultations were also beneficial control measures. However, a decrease in the speed of treatment was observed for some diseases (75), and there were limitations for individuals who do not use smart systems, as well as in countries with less technological advancement. Having up-to-date guidelines and protocols tailored to the community's conditions and for the provision and continuity of services during emergencies can help ensure the continuity of services and better treatment response and disease control.

Health Workforce

The lack of a specialized workforce and the absence of a supportive protocol for the recruitment and training of personnel during times of pandemics, despite the global experiences in previous diseases, also existed during the COVID-19 pandemic (43, 74, 83, 85). The shortage of personnel has led to changes in programs and an increase in the workload and work schedules of the staff (36, 38, 44, 55, 73), which, along with the conditions of the new disease, the lack of information and protocols, economic changes, fear of contracting the disease and transmitting it to the family, have created a ground for increased stress and anxiety among the workforce and led to their separation and isolation in social environments (41, 48, 52, 60, 73). Having programs for the psychological support of personnel, such as holding workshops or psychological sessions, as well as financial support, considering rewards and some free and available public services, and the availability of PPE, can be supportive programs for the personnel to maintain their performance (46, 48, 49, 60).

In addition to the general problems of the healthcare systems, with the advancement of technology, there is a need for fast and accessible communication channels to convey the correct messages and protocols to the personnel and the public before the media (51, 66, 82). At the same time, the current technology can be highly helpful for educating and coordinating the community in the fastest possible manner (51, 58, 79). Alongside the communication channels, the lack of adequate medicines and equipment for the use of both the personnel and the general public has been severely felt, not only in the past but also during the COVID-19 pandemic (37, 53, 54, 56, 63, 66, 68, 81). Having emergency reserve programs and warehouses can be particularly helpful, especially in the initial stages of a pandemic

Conclusion

This study underscores the major challenges and adaptive strategies healthcare systems adopted during pandemics, offering critical insights into leadership, service delivery, workforce management, communication, and resource allocation. Effective leadership and coordinated management structures are essential to avoid confusion and maintain morale. The rise of telemedicine during COVID-19 proved the potential of innovative models to enhance access while reducing infection risks, emphasizing the need to integrate such approaches into routine care. Policymakers must prioritize flexible, well-supported frameworks to enhance preparedness and resilience in the face of future health threats, ensuring that lessons from past pandemics lead to better outcomes.

Authors' Contributions

All authors contributed significantly to the development of this manuscript. Farhad Sattar Mohammed led the conceptualization, methodology design, data analysis, and drafting of the original manuscript. Sina Valiee was responsible for the literature search, data extraction, and contributed to reviewing and editing the manuscript. Adel Fatemi provided supervision, validated the findings, and participated in critical revisions. Kaveh Bahmanpour oversaw project administration, offered methodological guidance, and approved the final version for submission.

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All authors reviewed and approved the final manuscript.

Ethical Considerations

All participants gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki.

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Conflict of Interests

The authors declare that they have no competing interests.

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