

Establishing a Training Standard for Family Medicine Practitioners in Healthcare Emergency Preparedness and Crisis Communication in Saudi Arabia

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ABSTRACT

This literature review examines the critical need for standardized training in healthcare emergency preparedness and crisis communication for family medicine practitioners (FMPs) in Saudi Arabia. Given the country's unique position as a hub for large-scale religious gatherings, such as the Hajj, Saudi Arabia's healthcare system must be prepared to handle both routine and crisis-level healthcare demands. While Saudi Arabia has significantly developed its healthcare infrastructure and emergency response capabilities in recent years, gaps remain in the training of frontline healthcare workers, particularly in primary care. FMPs, who often serve as the first point of contact in the healthcare system, play a vital role in managing health risks, addressing chronic conditions, and providing preventive care. This review synthesizes findings on the current state of emergency preparedness in Saudi Arabia, highlighting both the strengths and limitations of existing initiatives, as well as the potential for FMPs to contribute to a resilient healthcare framework. Additionally, it discusses global best practices and proposes specific training elements—such as simulation exercises, interdisciplinary drills, and psychological first aid—that could be integrated into FMP curricula to enhance preparedness. Strengthening FMP training in emergency response and public health crises is essential to advancing Saudi Arabia's Vision 2030 objectives for a sustainable, high-performing healthcare system capable of responding to both regional and global health emergencies.

KEYWORDS: family medicine practitioner, healthcare.

1. Introduction

Emergency preparedness in healthcare has emerged as a vital component of public health infrastructure, particularly in regions exposed to natural disasters, pandemics,

and large-scale gatherings. Saudi Arabia, hosting millions of international visitors annually for religious events like the Hajj, faces unique and complex challenges in healthcare emergency readiness. As a high-priority hub for crisis management and public health resilience, the Kingdom has invested substantially in enhancing its healthcare infrastructure, disaster response protocols, and workforce readiness to handle both routine and large-scale emergencies (AlJahdali et al., 2024; AlDulijand et al., 2023). Yet, despite these strides, gaps persist in training healthcare workers, especially primary care providers like family medicine practitioners, who play a critical role in frontline healthcare delivery.

Globally, healthcare emergency preparedness has evolved to encompass not only disaster management but also sustainable resilience within healthcare systems. A resilient system must prioritize continuity of care, safety, and operational efficiency during crises (Jafar & Taneja, 2017). Saudi Arabia has made significant advancements in these areas, particularly in developing emergency protocols and collaborating with international health organizations like the World Health Organization (WHO). Nevertheless, Saudi Arabia's healthcare infrastructure requires continuous refinement to adapt to evolving threats, especially in training and capacity-building for primary healthcare workers, who often serve in rural and underserved areas with limited access to specialty care (Mani et al., 2023).

Research highlights the importance of tailored training programs for family medicine practitioners that focus on essential skills for emergency response, including basic and advanced life support, crisis communication, and psychological first aid. Such training would equip FMPs to perform effectively in mass casualty incidents, infectious disease outbreaks, and natural disasters, thereby enhancing Saudi Arabia's overall health system resilience (Waring et al., 2018). Furthermore, incorporating interdisciplinary exercises and simulation-based training can strengthen interagency collaboration, enabling FMPs to coordinate seamlessly with emergency responders and public health officials (Skryabina et al., 2020). Standardized, regular training would not only improve response efficacy but also ensure that healthcare providers are prepared for diverse emergency scenarios, fostering a healthcare system that is both robust and adaptive in the face of growing public health challenges.

1. Healthcare Emergency Preparedness in Saudi Arabia: Status and Challenges

Healthcare emergency preparedness is critical in a country like Saudi Arabia, which faces unique challenges due to its geographical, environmental, and socio-political context. As a major hub for annual religious pilgrimages, such as the Hajj, Saudi Arabia welcomes millions of visitors from around the world, raising the stakes for emergency preparedness. The country's healthcare system must be prepared to handle not only routine healthcare demands but also potential health emergencies from natural disasters, infectious disease outbreaks, and mass casualty incidents (AlJahdali et al., 2024). Healthcare is also universally valued, and recent global crises -pandemics, natural disasters, and geopolitical tensions- have highlighted the interconnected nature of our world. This interconnectedness means that disruptions in one region can impact healthcare systems far beyond their immediate borders, underscoring the need for hospitals worldwide to be prepared for both local and global shocks. Hospitals here not only address daily healthcare demands but also

serve as critical response units during regional and global crises (Jafar & Taneja, 2017). The concept of sustainability in healthcare has evolved to encompass not only environmental stewardship but also the resilience and long-term viability of healthcare systems. Sustainable healthcare systems must be able to withstand, adapt, and thrive amid crises, ensuring continuity of care and community well-being even under adverse conditions. A study in Saudi Arabia's Eastern Province evaluated healthcare resilience by surveying 522 hospital staff on disaster preparedness. Key areas assessed included structural safety, standard operating procedures, disaster response training, data security, and resource management. Findings revealed that 53.7% of hospitals, mostly under the Ministry of Health, had comprehensive disaster recovery plans, with 64.1% of participants confirming these plans at their workplaces. Additionally, 70.6% of staff reported receiving disaster response training, indicating strong preparation efforts. These proactive measures underscore the region's commitment to a resilient healthcare framework, ensuring service continuity in the face of evolving global challenges (AlDulijand et al., 2023). Saudi Arabia has made significant strides in bolstering its healthcare emergency preparedness in recent years. Key advancements include investing in modern infrastructure, expanding healthcare facilities, and training healthcare personnel in disaster response. The Ministry of Health (MOH) has established disaster management protocols and emergency response plans, supported by collaborations with global health organizations such as the World Health Organization (WHO). Hospitals across the country have been equipped with designated emergency departments capable of handling a surge in patients, and regular disaster drills are conducted to test preparedness. Additionally, Saudi Arabia has worked to strengthen its infection control systems and health surveillance to detect and respond quickly to outbreaks—a capability highlighted during the COVID-19 pandemic (Mani et al., 2023).

1.1. Saudi Arabia's Healthcare Infrastructure and Response Capacity

Saudi Arabia, one of the Middle East's largest nations with over 34 million people, has made remarkable strides in its healthcare system (Gurajala, 2023). Through substantial government investments, the country has expanded healthcare infrastructure and enhanced access for citizens and residents, who receive free healthcare services. The Ministry of Health (MOH) regulates and oversees healthcare delivery nationwide, which includes primary, secondary, and tertiary levels of care. Primary healthcare centers (PHCs) offer preventive and basic services, while hospitals and specialty centers handle diagnostic, surgical, and emergency care. Tertiary services, provided through specialized hospitals, include advanced treatments like organ transplants and cancer care. The healthcare system is supported by the government's Ministry of Health (MOH) and other organizations like the Saudi Red Crescent Authority (SRCA), which provides pre-hospital emergency services. This infrastructure has grown substantially due to increasing population demands and the annual influx of pilgrims for Hajj and Umrah, a unique challenge that necessitates rigorous emergency preparedness and response capabilities. Initiatives such as universal health coverage, accreditation programs, and the adoption of healthcare technologies have led to improved quality of care and health indicators across Saudi Arabia, reflecting the government's commitment to a robust

healthcare system. Saudi Arabia has heavily invested in healthcare infrastructure, boosting the number of hospitals and primary healthcare centers nationwide. By 2021, the country had over 460 hospitals and 2,000 primary healthcare centers (Ministry of Health, 2023). To enhance care quality, the government launched programs like the National Accreditation Program for Healthcare Organizations (NAHCO) and the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) (Al Khashan et al., 2021). Over 50% of facilities were accredited by 2021, with evaluations based on standards like patient safety and infection control. Driven by Vision 2030 and the National Transformation Program (NTP), the Ministry of Health (MOH) continues to focus on raising healthcare quality and efficiency (Alhazmi, 2021). The Saudi government also emphasizes emergency readiness, establishing the National Health Emergency Operation Center (NHEOC) to coordinate crisis responses and implementing a Public Health Emergency Operation Plan with structured protocols for public health emergencies. These initiatives reflect a holistic approach to healthcare development in Saudi Arabia.

1.2. Role of Family Medicine Practitioners in Emergency Preparedness

Family medicine practitioners (FMPs) in Saudi Arabia care for diverse patients across their lifetimes. Since the specialty's inception in 1980, limited data has been gathered on FMP preferences. By 2014, three distinct groups of healthcare professionals were delivering family medicine services to meet the expanding and diverse healthcare needs of the local population as disease patterns continued to shift. Family medicine practitioners (FMPs) play a critical role in the healthcare system in Saudi Arabia, providing accessible and continuous care that positions them as essential responders in health emergencies. However, despite their prominent role, FMPs often lack specialized training in emergency preparedness and crisis communication. In a study conducted by Al-Ghamdi et al. (2021), the findings highlighted the need for standardized training and further research into activity preferences. The survey conducted in 2018–2019 asked FMPs to rate the meaningfulness of 20 common activities and indicate their preferred tasks. Results showed most FMPs favored managing health risks, addressing common complaints, and follow-up for chronic illnesses, while fewer preferred terminal care (46.8%), emergency care (32.3%), and addiction medicine (23.4%). Family physicians in Saudi Arabia manage diverse patients over extended periods, focusing on human needs rather than specific illnesses. Their role is essential in healthcare due to their comprehensive approach to patient care. The family physician's long-term patient relationship enables critical functions, including illness prevention, managing common complaints, identifying early-stage illnesses, managing chronic diseases, and guiding patients within the healthcare system (Bowman et al., 2017). This helps patients navigate complex healthcare pathways while ensuring continuity in primary care. Family medicine research addresses clinical and educational areas to uphold high care standards. Family medicine follows a model similar to primary healthcare, making it an effective approach to enhance primary care services. Focused on the unique needs and preferences of individuals and communities, it addresses wide-ranging health factors and provides holistic, personalized care across all stages of life (WHO, 2019). Family medicine practitioners with bachelor's degrees preferred emergency care more than higher-certified FMPs. Findings highlight the need for

standardized training and further research into activity preferences. Family medicine practitioners with bachelor's degrees preferred emergency care more than higher-certified FMPs. Differences in preferences for emergency care based on educational qualifications may reflect variations in training content and teaching methods. Given that family medicine practitioners in Saudi Arabia serve as primary care front-liners, similar to mid-level healthcare workers in Africa, it is crucial to standardize training and professional development programs to ensure consistent, high-quality care (Couper et al., 2018). Family medicine practitioners (FMPs) often serve as the primary entry point into the healthcare system, a role that requires them to identify and respond to early signs of medical emergencies. As frontline providers, FMPs are frequently responsible for recognizing critical symptoms that may indicate a developing health crisis. Their ability to assess and stabilize patients before transferring them to specialized emergency services is a crucial aspect of effective patient care. Research shows that prompt and skilled intervention by primary care physicians in emergency situations can significantly reduce morbidity and mortality rates by minimizing delays in diagnosis and treatment (Bhattarai et al., 2023).

Furthermore, FMPs' close relationships with their communities uniquely position them to observe health patterns and detect potential crises early. This role is particularly important in rural or underserved areas, where primary healthcare providers may be the only accessible medical support. FMPs in Saudi Arabia play a critical role in providing preventive care, patient education, and basic triage, particularly in underserved areas. As primary care providers, they are often the first point of contact for patients, offering guidance on lifestyle changes, immunizations, and early detection of diseases. In crisis situations, their responsibilities expand to include public health education, helping communities understand essential health measures to prevent the spread of illness (Al-Ghamdi et al., 2021). This role is especially important in times of outbreaks or natural disasters when rapid dissemination of accurate information is vital.

1.3. Challenges Specific to Healthcare Emergency Preparedness in Saudi Arabia

Despite these advancements, Saudi Arabia faces several challenges in its emergency preparedness efforts. The most significant challenges are training and workforce readiness. While Saudi healthcare workers receive disaster response training, a need for more specialized training in trauma care, infectious disease containment, and mass casualty management remains. Additionally, the high influx of international visitors during religious events requires healthcare staff to be trained in cultural sensitivity and multilingual communication to effectively manage diverse populations in emergencies. Family physicians are essential responders during natural and man-made disasters, serving on the frontlines of their communities. They play a critical role in identifying high-risk individuals, coordinating regional health risk management, and performing key tasks such as event detection, information gathering, triage, and post-disaster rehabilitation (Yılmaz et al., 2020). Despite their importance in disaster scenarios, family physicians often lack adequate training in disaster management, leaving many unprepared for effective response due to limited prior experience. This underscores the need to incorporate disaster management as a core component of their training, equipping them to develop disaster response plans

and make well-informed decisions under crisis conditions (Alamri et al., 2021). Studies in Saudi Arabia and other countries reveal that family physician residents have low participation in disaster drills and planning. For example, a study conducted in Turkey during the COVID-19 pandemic found that while 80% of family physicians recognized their critical role in disaster response, most had not engaged in disaster drills (83.3%) or participated in disaster planning (94.3%) (Yılmaz et al., 2020). This gap in training was echoed in other studies, such as those by Sinha et al., which identified knowledge deficits among medical students about disaster preparedness (Sinha et al., 2008). Without sufficient education, the future efficacy of disaster management in healthcare systems could be compromised (Pekez-Pavliško, et al., 2018).

A cross-sectional study assessed the awareness of family physician residents in Saudi Arabia about these responsibilities. Conducted through self-administered electronic questionnaires, the study revealed that only 38.5% had received training in disaster medicine, while 47.75% expressed interest in further training. Notably, 71% of participants demonstrated high knowledge of their disaster management role. These findings highlight the need for increased training to enhance preparedness among family physicians in Saudi Arabia (Alamri et al., 2021). To address these gaps, experts recommend mandatory training in disaster medicine for family physicians, residents, and medical students alike. Integrating disaster response training into medical education programs would not only improve preparedness but could also reduce healthcare provider anxiety in disaster situations. These efforts will strengthen healthcare resilience, improve patient outcomes, and prepare family physicians to handle complex emergencies confidently and efficiently. Currently, most FMPs in Saudi Arabia receive limited formal training in handling health crises or communicating with patients and the public during emergencies. Their education primarily focuses on general medicine, with emergency preparedness and crisis communication only lightly touched upon. This gap has led to a lack of confidence and efficiency when managing emergency scenarios. In a 2016 survey of Saudi Red Crescent EMS providers working during Hajj, 700 respondents cited real-life disasters as their primary source of disaster preparedness knowledge. A course in disaster management was the top choice for improving their skills. The study suggests pairing novices with experienced providers during Hajj to enhance knowledge sharing and practical experience (Al-Wathinani et al., 2021).

Training in emergency preparedness and coordination is essential for FMPs, ensuring they have the skills to manage acute issues and collaborate efficiently with other emergency and specialty services. Standardized training across primary care settings has been shown to enhance patient outcomes by ensuring that FMPs are prepared for a range of emergency situations (Garrison et al., 2023). Continuity of care, a core principle of family medicine, fosters high-performing healthcare teams by enhancing patient experience, population health, cost efficiency, and team well-being. In 2023, the ACGME introduced new continuity requirements for family medicine training, focusing on annual patient and resident continuity. This shift from volume-based metrics to continuity-centered training is pushing programs to revise their systems and policies to prioritize consistent, ongoing patient care (Eiff et al., 2023).

2. Recommended Training Components for Healthcare Emergency Preparedness and Crisis Communication

Emergency preparedness exercises (EPEs) give practitioners essential practice in problem-solving, decision-making, and teamwork, enhancing skills like shared situational awareness, coordination, and information sharing (Waring et al., 2018). EPEs are generally classified as discussion-based or operation-based. Discussion-based exercises encourage participants to talk through scenarios with response partners, familiarizing themselves with emergency roles and plans (ECDC, 2014). Operation-based exercises involve active drills, which test specific response functions within one entity, and functional exercises that focus on multi-agency coordination, command, and control through simulated scenarios (Berlin & Carlström, 2015). Full-scale exercises, the most complex, simulate real-life emergencies to test all major response functions, providing the highest level of realism and comprehensive skill-building (Sinclair et al., 2012).

Effective emergency preparedness and crisis communication training for family medicine practitioners (FMPs) should encompass a range of skills, from clinical procedures to communication and public health management. Emergency planning exercises are essential for testing healthcare systems' readiness for major incidents. A UK study evaluated the Emergo Train System (ETS) exercise on healthcare staff's confidence and preparedness for emergency response. Using pre- and post-exercise surveys and interviews from four ETS exercises, the study found improved confidence in personal, organizational, and multi-agency responses. Key elements driving this improvement included realistic scenarios, teamwork, and the level of effort put into preparatory activities. Practitioners agreed that ETS exercises enhance emergency readiness at multiple levels, especially when regularly conducted with realistic, multi-agency participation, and with responders motivated to prepare thoroughly (Waring et al., 2021).

The Emergo Train System® (ETS) is a widely-used, low-fidelity simulation exercise for health services in the UK and over 34 other countries. Focused on recreating the psychological dynamics of a mass incident (MI) rather than physical elements, ETS allows healthcare professionals to review emergency plans and set objectives beforehand, while keeping the specific scenario undisclosed to heighten realism. ETS uses magnetic boards to represent different locations, such as hospitals or incident sites, with puppets symbolizing patients and figures representing staff and transport resources. The system's bank of 800 diverse casualty profiles enables realistic scenario variation, from hospital-based drills to multi-agency command-post exercises (CPXs) for regional trauma network response (Skryabina et al., 2020). ETS-based health emergency preparedness exercises (HEPEs) primarily assess organizational readiness, revealing critical plan limitations, enhancing interagency communication, and fostering collaboration (Skryabina et al., 2017). Staff benefits include increased confidence, clearer role understanding, and policy knowledge. Research indicates that learning outcomes from EPEs improve with realistic, functionally accurate scenarios and comprehensive pre-exercise preparation (lectures, reading, and quizzes), which help participants identify knowledge gaps early. However, while high-fidelity full-scale exercises (FSXs) provide the closest experience to real crises, they are resource-intensive, making them less feasible for

regular training (Farra et al., 2019; WHO, 2017). Realism in simulation, rather than physical accuracy, enhances decision-making, and expert facilitators play a crucial role in translating these experiences into practical skills.

2.1. Risk Assessment and Hazard Identification

Risk assessment and hazard identification are essential components of emergency preparedness and public health in Saudi Arabia. Given the country's unique exposure to various high-risk scenarios—ranging from infectious disease outbreaks to large-scale religious gatherings and industrial hazards—it is critical that healthcare practitioners are equipped with the skills to accurately assess and respond to potential health threats. Training programs should therefore emphasize these areas, enabling practitioners to use risk assessment tools, interpret epidemiological data, and detect early warning signs. The Middle East Respiratory Syndrome (MERS) outbreak demonstrated the need for rapid disease detection and response. Saudi Arabia's role as a global travel hub increases its vulnerability to infectious diseases, making it crucial for healthcare workers to identify and manage outbreaks quickly (Al-Tawfiq & Memish, 2015). The annual Hajj pilgrimage brings millions of visitors to Saudi Arabia. These gatherings increase the risk of infectious disease spread, injury, and logistical challenges. Practitioners must be trained to manage health risks in mass gatherings, recognizing signs of crowd-related health threats and communicable diseases (Almehmadi, 2023).

Practitioners should learn to use risk assessment tools, interpret epidemiological data, and identify early warning signs for potential health threats. Practitioners should be trained to use tools such as the Hazard Vulnerability Analysis (HVA), which helps prioritize hazards based on likelihood and impact. This tool has been widely used to guide preparedness efforts and can be tailored for Saudi Arabia's specific risks (WHO, 2018). Epidemiological Data Interpretation: Understanding epidemiological trends and interpreting data are critical for identifying emerging health threats. By examining data, practitioners can assess risk levels and determine intervention priorities (Alamo et al., 2021). Training in data interpretation helps practitioners detect patterns, such as rising case numbers or infection clusters, which can signal an impending outbreak or crisis. Healthcare practitioners should be proficient in identifying early warning signs of potential health threats, which could include spikes in hospital admissions, unusual infection patterns, or environmental changes. Familiarity with Saudi Arabia's surveillance systems, such as the Health Electronic Surveillance Network (HESN), is essential for real-time monitoring (Alqifari et al., 2022).

2.2. Basic and Advanced Life Support Skills

Proficiency in both Basic Life Support (BLS) and Advanced Cardiovascular Life Support (ACLS) skills is fundamental for family medicine practitioners (FMPs), equipping them to handle critical emergencies effectively (Roshana et al., 2012). FMPs should be trained in trauma management, wound care, airway management, resuscitation techniques, and other life-saving procedures. In the U.S., BLS training for health care workers has been a standard since 1966, with global demand for courses steadily rising (Resuscitation, 1966). Recent studies have spotlighted gaps in CPR quality, prompting updates to BLS guidelines aimed at improving both in-

hospital and out-of-hospital CPR standards. BLS and ACLS training imparts knowledge of life-saving techniques crucial for immediate response to medical crises, particularly in pre-hospital and primary care settings where FMPs often act as first responders, especially in underserved areas.

BLS training encompasses foundational skills essential for maintaining circulation and supporting breathing until more advanced medical care is available. It includes cardiopulmonary resuscitation (CPR), the use of automated external defibrillators (AEDs), and airway management. Effective BLS skills are crucial for stabilizing patients experiencing cardiac arrest, respiratory failure, or other life-threatening conditions. Studies emphasize that FMPs trained in BLS show higher confidence in initial crisis response, increasing the chances of patient survival by enabling prompt action (Ghauri et al., 2020). ACLS builds upon BLS with a focus on managing cardiac emergencies through advanced interventions such as pharmacology, endotracheal intubation, and manual defibrillation. ACLS training prepares FMPs to treat complex cases of cardiac arrest, stroke, and acute coronary syndromes (Graham et al., 2015). ACLS guidelines provide FMPs with protocols to recognize and treat arrhythmias, manage airways under difficult conditions, and administer life-saving medications. FMPs also benefit from trauma and wound care training, which includes hemorrhage control, wound cleaning, suturing, and the management of fractures and dislocations. In emergency scenarios, these skills ensure that FMPs can provide immediate trauma support, which is critical for preventing complications before referral to specialized care (Bernabe et al., 2014). Proper airway management is crucial in emergency care, especially for patients who are unconscious or have compromised breathing. FMPs must be adept at techniques like bag-mask ventilation, oropharyngeal airway insertion, and endotracheal intubation. These skills are vital in situations such as respiratory distress, where maintaining airway patency can be the difference between life and death (Avva et al., 2017).

2.3. Psychological First Aid and Mental Health Support

Since emergencies often have a significant mental health impact on patients, practitioners must be trained to recognize signs of psychological trauma, provide initial support, and refer patients for further psychological care. Skills in managing anxiety, stress, and grief are crucial in post-crisis scenarios, as is familiarity with mental health resources. Psychological First Aid and Mental Health Support: Since emergencies often have a significant mental health impact on patients, practitioners must be trained to recognize signs of psychological trauma, provide initial support, and refer patients for further psychological care. Skills in managing anxiety, stress, and grief are crucial in post-crisis scenarios, as is familiarity with mental health resources (Wang et al., 2021). Globally, there is growing emphasis on training frontline workers in Psychological First Aid (PFA) to support distressed individuals and to manage their own well-being. Research shows that PFA training boosts knowledge in psychosocial response, enhances self-efficacy, and fosters resilience (Thum et al., 2021). As primary responders, healthcare workers face high stress, risking mental health challenges that can affect patient care and lead to workforce burnout. Historically, there has been limited focus on mental health prevention for healthcare providers, yet crises like the COVID-19 pandemic underscore the critical need for PFA to empower workers in crisis settings (Wang et al., 2021). Although

PFA models vary, most integrate the five key principles from Hobfoll's 2007 framework—promoting safety, calm, efficacy, connectedness, and hope—(Hobfoll et al., 2007) which are also core to PFA guides from the World Health Organization (WHO, 2011) and Johns Hopkins (2017) (Everly & Lating, 2017). These principles help PFA-trained providers deliver essential psychosocial support and improve recovery outcomes. PFA trains professionals in essential steps like assessing needs, offering information, and linking individuals with resources, all in a non-judgmental way. PFA also serves as a gateway for more intensive mental health skills, equipping healthcare providers with a versatile, low-intensity approach adaptable to various emergency situations (Jacobs et al., 2016). Over the past decade, the rise of PFA capacity-building initiatives reflects its importance as a frontline skill in disaster response, promoting resilience in both responders and those affected by crises (Roudini et al., 2017).

2.4. Crisis Communication and Public Health Messaging

Practitioners should receive training on delivering clear, accurate, and culturally sensitive messages to the public. This includes techniques for addressing misinformation, communicating health guidelines effectively, and offering reassurance to alleviate public fear or uncertainty during emergencies. Effective risk communication (RC) is a vital element in disaster management, requiring structured communication plans, policy transparency, expert training, and solid infrastructure to reduce confusion and inconsistency. However, challenges remain, particularly in defining RC's scope in disaster contexts. A recent study categorized disaster risk communication components into six main areas: communication processes and infrastructure, information handling, RC management, monitoring and control, education and training, and ethics. Key RC components include robust communication systems, timely information, risk perception assessments, logistical planning, and ethical considerations. The findings showed that establishing advanced communication tools and formats, integrating artificial intelligence, and ensuring real-time support can strengthen coordination, enhance organization within healthcare systems, and improve public engagement and trust (Dehghani et al., 2022).

Lessons from past events underscore risk communication as essential for successful emergency planning and response, requiring coordination across multiple levels. Health services during disasters must cover areas from rescue operations and disease control to environmental health, psychosocial support, and medical supplies (Ow Yong et al., 2020). Health managers play a central role in communication, engaging with officials, the public, and media to provide rapid, clear information. Risk communication is a core element at every disaster management stage, influencing outcomes from preparedness through recovery (Khangah et al., 2017). However, varied national approaches and a lack of clarity on specific RC components present challenges. Identifying RC components could improve strategic planning and foster more effective, adaptable disaster responses within healthcare systems (Sato et al., 2020).

2.5. Ethical and Legal Protocols in Emergencies

Training should cover ethical considerations and legal protocols, such as maintaining

patient confidentiality, prioritizing care in resource-limited situations, and understanding the legal implications of medical decisions during a crisis. In Emergency Medical Services (EMS), practitioners often face ethical challenges, especially concerning patient confidentiality. The principle of confidentiality, a cornerstone of medical ethics, becomes complex in EMS where rapid, life-saving decisions must be made, often without prior medical records (Bruun et al., 2022). As the first point of contact for acute medical issues, EMS personnel must establish trust with patients, as confidentiality fosters open communication and enhances diagnostic accuracy and treatment effectiveness. However, maintaining confidentiality can be challenging in chaotic, prehospital environments requiring collaboration among multiple specialists. These complexities underscore the need for EMS practitioners to navigate ethical dilemmas with careful consideration, ensuring both patient autonomy and effective, collaborative care (Farzaneh et al., 2020).

3. Training Modalities for Effective Skill Development

To effectively impart these skills, a blend of various training methods is recommended. The following approaches are based on best practices from global health organizations and training institutions:

3.1. Simulation-Based Training (SBT)

Simulation exercises provide hands-on experience in handling high-stakes emergency scenarios, helping practitioners build confidence and proficiency in critical skills without risking patient safety. Realistic simulation labs, virtual simulations, and emergency drills allow practitioners to practice triage, rapid decision-making, patient stabilization, and interdepartmental coordination. In Saudi Arabia, however, the healthcare system's readiness may be limited due to infrequent disaster drills and minimal standardized patient (SP) simulation training. To address this, a study was conducted to evaluate the performance of hospital staff during a simulated building collapse incident. The drill assessed emergency department (ED) response, interdepartmental communication, and patient management capacity. Observers gathered quantitative and qualitative data on healthcare practitioners' interactions, timing, and performance. Results showed that the ED team successfully triaged and assessed 67% of patients within five minutes, while 95% of critical cases spent less than 2.5 hours in the ED. Experienced paramedic SPs outperformed nurses, highlighting the benefit of prior disaster experience (Bajow et al., 2024).

Simulation-based training is at the heart of modern disaster medicine education, offering a powerful tool for improving healthcare responses to crises. These drills allow healthcare personnel to practice major incident plans, identify system issues, and clarify roles in mass casualty events. Research shows that simulation exercises improve knowledge, but further studies are needed to assess healthcare providers' preparedness and hospital readiness across various scenarios (Colman et al., 2019). One effective simulation tool is the MAC-SIM (Mass Casualty Simulation) system, used internationally in the MRMI (Medical Response to Major Incidents) course. This system has trained over 5,000 responders globally, providing interactive, comprehensive training across the entire rescue chain. However, a 2020 review highlighted a gap in standardized patient (SP) use with simulation exercises, particularly in developing countries, which frequently face disasters (Ingrassia et al.,

202). SPs, first introduced in 1964, are actors trained to realistically portray patients with specific conditions, enhancing the realism of simulation exercises. They provide valuable feedback through realistic symptom portrayals, vital signs, and patient histories, contributing to an immersive learning environment. Standardized patients could play a significant role in disaster preparedness, especially in regions needing advanced readiness for large-scale incidents (Chen et al., 2022).

3.2. Interdisciplinary Team-Based Training

Emergencies often require collaboration between different healthcare professionals. Interdisciplinary training, where family medicine practitioners work alongside nurses, emergency responders, and public health officials, can help improve communication, coordination, and role clarity in emergencies. Health care in the United States serves nearly 85% of the population annually, with many patients needing multiple visits across various providers (Rosen et al., 2018). Each interaction requires seamless teamwork among clinicians, administrative staff, patients, and families. However, fragmented care coordination remains a significant public health challenge, as gaps in teamwork and communication can lead to medical errors (Care, 2014). The health care system, highly complex and regulated, demands effective collaboration within and across diverse organizational and disciplinary boundaries. Efforts to improve care coordination often include educational and technological interventions that foster better team cohesion and adaptability, ensuring safer, high-quality care. Research on team dynamics helps design these interventions, aiming to enhance care delivery, boost patient outcomes, and ultimately support public health (Wilcox, 2020).

3.3. Continuing Medical Education (CME) with Periodic Recertification

To ensure that skills remain current, periodic CME on healthcare emergency preparedness and crisis communication should be mandatory, with recertification requirements every few years. This can also encourage practitioners to engage in self-directed learning and stay updated on new guidelines and technologies. Continuing medical education (CME) is essential for healthcare professionals to stay updated in their fields. The COVID-19 pandemic, however, drastically changed how CME is delivered and accessed, disrupting traditional methods. Interactive and relevant CME enhances clinician skills, improves patient outcomes, and reduces healthcare costs (Nissen, 2015). During the pandemic, restrictions such as social distancing and fear of large gatherings led to widespread cancellation of live CME events; 87% of CME planners reported canceling events in 2020 (Russell, 2020). This shift highlighted the need for adaptable CME solutions to meet licensure requirements and maintain healthcare quality. As COVID-19 progressed to an endemic stage, demand grew for flexible, on-demand learning that could safely replace in-person sessions. In response, some CME providers adopted innovative, nontraditional formats to meet these evolving needs, while others discontinued events entirely. These adaptations reflect a shift towards more resilient CME strategies, ensuring that healthcare professionals can access essential education in changing and environments (Kawczak et al., 2021).

3.4. Field-Based Exercises and Public Health Drills

Organizing public health drills and field-based exercises in real settings, such as healthcare facilities and community centers, helps practitioners experience real-time response dynamics. This is particularly useful in Saudi Arabia's high-risk locations, like pilgrimage sites, where FMPs can learn to manage crowd-related incidents and mass casualties. Public health units prioritize emergency preparedness, with field exercises playing a key role by testing response plans, uncovering weaknesses, training staff, and expanding surge capacity. In New South Wales, Australia, a large-scale field exercise in September 2008 simulated a response to a novel influenza strain. Just eight months later, in May 2009, Australia identified its first pandemic influenza case. This early-pandemic preparation helped assess the effectiveness of such exercises when the real H1N1 pandemic emerged. While the exercise proved valuable for most roles, it fell short in testing the public health planning team's capability to synthesize surveillance data and predict risks. Field exercises, though resource-intensive, provided timely pandemic preparation (Eastwood et al., 2010).

2. Conclusion

In Saudi Arabia, healthcare emergency preparedness is essential given the country's unique exposure to health risks associated with natural disasters, infectious disease outbreaks, and large-scale religious gatherings like the Hajj. In alignment with Saudi Arabia's Vision 2030 goals, the establishment of robust training standards for FMPs will contribute to a sustainable, high-quality healthcare system capable of effectively managing emergencies. As Saudi Arabia continues to advance its healthcare resilience, integrating such training into the professional development of FMPs will be key to ensuring a responsive, adaptable, and well-prepared primary care workforce for future challenges.

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