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Crisis Management in Saudi Arabia Emergency Medicine: How Emergency Medicine, Emergency Medical Services, and Emergency Medical Technicians Are Adapting to Overwhelming Demand and Rising Patient Needs

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Abstract:
The emergency medicine landscape in Saudi Arabia is facing unprecedented challenges due to surging patient demands and rising acuity of care needs. Emergency Medicine (EM), Emergency Medical Services (EMS), and Emergency Medical Technicians (EMTs) are adapting through innovative strategies, including workforce training, technology integration, and systemic reforms. Despite progress, issues such as resource constraints, burnout, and logistical inefficiencies persist. This review explores the adaptive measures implemented by EM stakeholders in Saudi Arabia and provides actionable recommendations for building resilience and enhancing patient outcomes in an increasingly strained healthcare system.
Keywords: Emergency Medicine, Saudi Arabia, Emergency Medical Services, Emergency Medical Technicians, Patient Demand, Healthcare System Resilience, Burnout, Technological Integration, Workforce Training, Crisis Management

Aim of Work:
To analyze the challenges faced by Emergency Medicine, Emergency Medical Services, and Emergency Medical Technicians in Saudi Arabia due to increasing patient demands and rising care complexity. The study aims to evaluate current adaptive measures and propose strategies to enhance resilience, efficiency, and patient outcomes.

Introduction:
The healthcare landscape in Saudi Arabia is undergoing significant transformation, driven by Vision 2030, which aims to enhance infrastructure, digital health, and workforce capabilities. This transformation is crucial as the country faces growing demand for emergency services due to population growth, urbanization, and increasing health complexities. The emergency medical services (EMS) in Saudi Arabia have evolved significantly, yet they face challenges in meeting the rising demand for emergency care. The following sections outline the key aspects of this evolving landscape.

Vision 2030 and Healthcare Transformation: Vision 2030 is a strategic framework aimed at overhauling Saudi Arabia's healthcare system, focusing on infrastructure enhancement, digital health, and workforce empowerment (Mani & Goniewicz, 2024). The initiative aligns with global healthcare trends, emphasizing innovation, equity, and excellence (Mani & Goniewicz, 2024).
Growth in Emergency Medical Services: Emergency medicine in Saudi Arabia has developed

from its inception in 1934 to a recognized specialty in 2001, with the establishment of the Saudi Board of Emergency Medicine in 2005 (Khattab et al., 2019). The EMS system has expanded to include quaternary care hospitals in urban areas, serving as referral points for patients from surrounding regions (Mutairi et al., 2016).

Future Challenges and Considerations: The healthcare system faces challenges such as sustainable financing, workforce planning, and adapting to changing demographic and disease patterns (Jannadi et al., 2008). The need for high-quality training for local healthcare professionals is critical to reduce reliance on foreign workers (Jannadi et al., 2008). Emergency medicine (EM), emergency medical services (EMS), and emergency medical technicians (EMTs) face numerous challenges in managing crises amidst rising patient needs. These challenges are multifaceted, involving organizational, professional, and societal dimensions. The increasing demand for emergency services, coupled with the complexity of modern healthcare needs, exacerbates these challenges. Below are the key challenges identified from the research papers.

Organizational Challenges: Uncertainty and Crisis Management: EM and EMS must often operate under conditions of uncertainty, requiring rapid adaptation to unexpected situations. This includes balancing contingency plans with real-world scenarios and establishing functional crisis organizations (Hugelius et al., 2020). Resource Allocation: There is a persistent mismatch between available resources and patient needs, leading to overcrowding, long waiting times, and ambulance diversions in emergency departments (Clancy, 2007). Infrastructure and Staffing: Insufficient EMS stations and a lack of human resources are significant barriers, impacting the efficiency and effectiveness of emergency response (Dadmehrnia et al., 2023).

Professional Challenges: Role Ambiguity and Stress: EMTs face role ambiguity and high job stress, compounded by a lack of organizational support and job prestige. This stress is further heightened by the high-risk nature of their work (Dadmehrnia et al., 2023). Technical and Medical Demands: The increasing complexity of medical emergencies requires continuous professional development and adaptation to new technologies and medical protocols (Lauer et al., 2022).

- **Current State of Emergency Medicine in Saudi Arabia**:

Overview of the structure and capacity of emergency medical facilities in Saudi Arabia: The emergency medical facilities in Saudi Arabia are structured to provide comprehensive care from prehospital scenarios to advanced quaternary care hospitals. These facilities are crucial in addressing the high incidence of trauma cases, particularly from motor vehicle accidents, and are supported by a developing trauma system aligned with Vision 2030. The capacity of these facilities is being enhanced through strategic planning and implementation of specialized trauma centers and preparedness for various emergencies, including nuclear and radiological incidents. Below are key aspects of the structure and capacity of these facilities:

Emergency Medical Services System: The emergency medical services (EMS) in Saudi Arabia range from village-level prehospital care to quaternary care hospitals in urban areas, serving as referral points for patients from surrounding regions (Mutairi et al., 2016). The EMS infrastructure is focused on professional adequacy to ensure timely and quality care for critical patients (Mutairi et al., 2016).

Trauma System Development: A nationwide trauma system is being developed to provide optimal care for injured patients, with a focus on a network-based approach (Chowdhury et al., 2022). The system's design follows the FOCUS-PDCA model, involving key stakeholders and healthcare professionals to ensure effective implementation (Chowdhury et al., 2022). The establishment of independent trauma centers, such as the proposed facility in Jeddah, aims to enhance the capacity of general hospitals and improve emergency care for trauma patients (Bakhsh & Fekry, 2020).

Analysis of current healthcare policies and their influence on crisis management in Saudi Arabia: The current healthcare policies in Saudi Arabia have significantly influenced crisis management, particularly during the COVID-19 pandemic. These policies have been shaped by

strategic investments, digital health integration, and the introduction of national health insurance systems, all of which aim to enhance healthcare delivery and economic stability. The Saudi government's proactive approach has been instrumental in managing healthcare crises effectively, as evidenced by their response to the COVID-19 pandemic. The following sections detail the key aspects of these policies and their impact on crisis management.

Strategic Investments and Economic Measures: The Saudi government allocated a USD 31.9 billion stimulus package to mitigate economic challenges during the pandemic, demonstrating a strong commitment to maintaining economic stability alongside healthcare improvements (Yusuf & Rajeh, 2022). Investments in digital tools and support for small and medium health sectors were prioritized, with SAR 2 billion allocated to support 1000 health sectors and SAR 120 billion to address financial crises (Yusuf & Rajeh, 2022).

Digital Health and Telecommunication: The adoption of digital health solutions, such as telehealth and telecommunication services, played a crucial role in ensuring continuity of healthcare services during the pandemic (Alonazi, 2022). Vision 2030 emphasizes digital health adoption, aligning Saudi Arabia with global healthcare trends and enhancing its capacity to manage future healthcare challenges (Mani & Goniewicz, 2024).

The role of government initiatives such as Vision 2030 in healthcare transformation in Saudi Arabia: Saudi Arabia's Vision 2030 is a comprehensive national strategy aimed at transforming various sectors, with healthcare being a significant focus. This initiative seeks to diversify the economy and improve public services, including healthcare, through infrastructure expansion, digital health integration, and workforce development. Vision 2030 has already led to notable advancements in healthcare infrastructure, increased workforce capacity, and the adoption of digital health technologies. However, challenges such as funding allocation and regulatory barriers persist. The initiative's success is attributed to its alignment with global healthcare trends and its emphasis on innovation, equity, and excellence (Alfahad et al., 2024) (Mani & Goniewicz, 2024).

Infrastructure and Workforce Development: Vision 2030 has prioritized the expansion of healthcare infrastructure, resulting in enhanced facilities and services across the kingdom (Alfahad et al., 2024). Workforce development is a key component, with efforts to increase healthcare professionals' capacity and skills through training and education (Mani & Goniewicz, 2024).

Digital Health and Innovation: The integration of digital health technologies is a cornerstone of Vision 2030, facilitating improved patient care and operational efficiency (Alfahad et al., 2024) (Mani & Goniewicz, 2024). Innovative public health initiatives have been introduced, positioning Saudi Arabia as a leader in healthcare reform and innovation on the global stage (Mani & Goniewicz, 2024).

- **Challenges in Crisis Management:**

Increasing patient volume due to population growth and chronic disease prevalence in Saudi Arabia: The increasing patient volume in Saudi Arabia is significantly influenced by population growth and the prevalence of chronic diseases. This trend poses challenges to the healthcare system, necessitating strategic planning and interventions. Chronic diseases such as diabetes, hypertension, and obesity are notably prevalent, contributing to the rising demand for healthcare services. The Kingdom's healthcare system is under pressure to adapt and respond to these growing needs effectively.

Prevalence of Chronic Diseases: In the Northern Borders Province, diseases like diabetes and obesity are prevalent, with gastroesophageal reflux disease affecting 61% of adults in Arar city (Alenzi et al., 2023). Nationally, Saudi Arabia ranks high in diabetes prevalence, with 17.9% of adults affected, alongside significant rates of hypertension (21.1%) and obesity (36.1%) (Memish et al., 2013). In Riyadh, the prevalence of type 2 diabetes is 23.1%, with obesity at 31.1%, highlighting the chronic disease burden in urban areas (Al-Daghri et al., 2011).

Healthcare System Challenges: The healthcare system faces increased demand due to the high prevalence of non-communicable diseases (NCDs), which account for a significant portion of

mortality and morbidity (Memish et al., 2013). The projected demand for healthcare workers by 2030 indicates a need for strategic workforce planning to address potential shortages, particularly among Saudi nationals (Lin et al., 2021).

Limited human resources, including trained EMTs and specialized EM staff in Saudi Arabia: The limited availability of trained Emergency Medical Technicians (EMTs) and specialized emergency medical (EM) staff in Saudi Arabia is a significant challenge for the country's healthcare system. This shortage is exacerbated by a low EMS provider-to-population ratio, which is considerably below international standards, and a heavy reliance on foreign healthcare workers. Addressing these issues is crucial for improving emergency response times and overall healthcare delivery in the country. The following sections delve into the key aspects of this challenge.

EMS Workforce Distribution and Gender Imbalance: The EMS provider-to-population ratio in Saudi Arabia is 1:3871, which is significantly lower than countries like Australia, where the ratio is 1:1400. This disparity contributes to delayed response times, particularly in critical cases where the response time averages 13 minutes, compared to the international standard of 8 minutes (Alotaibi et al., 2023). There is a notable gender imbalance within the EMS workforce, with only 3.5% of providers being female. This highlights the need for increased recruitment of women into the EMS sector (Alotaibi et al., 2023).

Professional Profiles and Training: A study of EMS professionals in Saudi Arabia revealed that the majority are male, with a significant portion having 5-9 years of experience. This demographic profile suggests a need for targeted training and development programs to enhance the skills and competencies of EMS providers (Alshammari et al., 2019). The Saudi Vision 2030 emphasizes the importance of Saudization and the development of a skilled local workforce. However, the current rate of hiring Saudi healthcare providers is low, with expatriates dominating the sector (Elsheikh et al., 2018) (Al-Hanawi et al., 2019).

- **Adaptation Strategies:**

Training and education programs for Emergency Medicine, Emergency Medical Services, and Emergency Medical Technicians to improve skill sets: Training and education programs for Emergency Medicine (EM), Emergency Medical Services (EMS), and Emergency Medical Technicians (EMTs) are crucial for enhancing the skill sets required in these demanding fields. These programs face unique challenges due to the dynamic and unpredictable nature of emergency environments. Innovative training methods and frameworks are being developed to address these challenges and improve the competencies of emergency responders. The following sections outline key aspects of these training programs.

Innovative Teaching Methods in Emergency Medicine: Emergency medicine training must adapt to the logistical challenges of the work environment, such as shift patterns and the need for real-time situational training. This requires organizational and operational support to ensure quality teaching and supervision (Anjum, 2018). New teaching models, moving away from traditional didactic methods, focus on achieving core competencies and skills as outlined by the Accreditation Council for Graduate Medical Education (ACGME) (Anjum, 2018).

Global Framework for Emergency Medical Teams: The World Health Organization's initiative for Emergency Medical Teams (EMTs) emphasizes the need for a standardized global training framework. This includes ensuring professional competence, adapting skills to low-resource settings, and preparing for effective team performance (Camacho et al., 2016). A combination of training methodologies, such as theory-based education, immersive simulations, and team training, is recommended to enhance operational performance (Camacho et al., 2016).

Emergency Medicine, Emergency Medical Services, and Emergency Medical Technicians Implementation of advanced triage systems to prioritize care effectively: The implementation of advanced triage systems in emergency medicine, emergency medical services, and by emergency medical technicians is crucial for effectively prioritizing care. These systems aim to address challenges such as overcrowding, diagnostic errors, and resource misallocation by

leveraging technology and structured protocols. Advanced triage systems, particularly those incorporating machine learning and decision support tools, have shown promise in enhancing the accuracy and efficiency of patient prioritization. Below are key aspects of these systems:

Machine Learning in Triage: A novel machine-learning framework has been developed to improve triage accuracy by evaluating multiple medical conditions simultaneously. This system uses various algorithms, such as logistic regression and deep neural networks, to refine patient assessments and make precise triage decisions (Menshawi & Hassan, 2024). The framework demonstrated significant improvements in decision accuracy, with high area under curve (AUC) values, indicating its potential to reduce human error and improve operational efficiency (Menshawi & Hassan, 2024).

AI and Algorithm-Based Triage: AI-driven triage systems utilize algorithms to assess patient urgency by considering factors like physiological abnormalities and injury mechanisms. This approach helps prioritize patients effectively, addressing overcrowding and ensuring timely care for critical cases (Lansiaux et al., 2024).

Expansion of telemedicine and digital health tools to enhance accessibility for Emergency Medicine, Emergency Medical Services, and Emergency Medical Technicians: The expansion of telemedicine and digital health tools is significantly enhancing accessibility in emergency medicine, emergency medical services, and for emergency medical technicians. Telemedicine facilitates remote consultations, monitoring, and diagnosis, which are crucial in emergency settings where timely intervention can be life-saving. The integration of these technologies into emergency care systems is transforming patient management and operational efficiency, particularly in response to challenges such as increased patient volumes and limited resources during crises like the COVID-19 pandemic (Alghamdi et al., 2024) (Sakumoto, 2023).

Enhancements in Emergency Medicine: Virtual First (VF) Programs: These programs connect patients with emergency medicine clinicians through synchronous video visits, reducing unnecessary emergency department visits and providing early intervention for acute care needs. This approach enhances patient satisfaction by offering convenient and personalized care (Sakumoto, 2023) (Sakumoto, 2023). Clinical Decision Support Systems (CDSS): These systems improve decision-making by providing evidence-based recommendations, which are crucial in emergency scenarios where rapid decisions are needed (Alghamdi et al., 2024).

Accessibility and Efficiency: Overcoming Geographical Barriers: Telemedicine extends healthcare reach to remote and underserved areas, ensuring that emergency care is accessible regardless of location. This is particularly beneficial for emergency medical services operating in rural or isolated regions (Anawade et al., 2024) (Ezeamii et al., 2024). Cost Reduction and Efficiency: By streamlining healthcare delivery, telemedicine reduces costs and promotes efficiency, which is vital for emergency services that often operate under financial constraints (Anawade et al., 2024).

- **Case Studies and Statistical Evidence:**

Emergency medicine in Saudi Arabia faces significant challenges due to overwhelming demand and rising patient needs. The adaptation of emergency medical services (EMS) and emergency medical technicians (EMTs) is crucial in managing these crises effectively. The research highlights various strategies and case studies that showcase how these services are evolving to meet the demands. Key areas of focus include opioid management in sickle cell anemia crises, strategic human resource management, talent management, and addressing emergency department overcrowding.

Opioid Management in Sickle Cell Anemia: Emergency departments in Saudi Arabia face challenges in managing sickle cell anemia crises, particularly with opioid use. A study found that while physicians are trained, barriers such as department overcrowding and opioid prescription restrictions persist. Recommendations include implementing opioid administration tracking systems and standardizing protocols to improve patient outcomes (Radwi et al., 2024).

Strategic Human Resource Management: Strategic HRM plays a critical role in crisis management, with 91% of healthcare providers having an emergency response plan. However, the preparedness varies, and there is a need for improved crisis preparedness among HR management in healthcare organizations (Albarqi, 2022) (Albarqi, 2022).

Talent Management During Crises: Talent management practices in Saudi Arabia do not significantly differ between crisis and non-crisis periods, except in developing and retaining talent. Organizations continue to apply talent management practices, but further research is needed to understand specifics during crises (Jamjoom, 2023).

- **Proposed Solutions:**

Increasing investments in EMS infrastructure and technologies such as GPS-enabled ambulances: Investments in EMS infrastructure and technologies, such as GPS-enabled ambulances, are crucial for enhancing emergency response efficiency and patient outcomes. These advancements leverage smart technologies to optimize ambulance routes, improve communication, and ensure timely medical interventions. The integration of GPS and IoT technologies in ambulances is a significant step towards achieving these goals. The following sections detail the key aspects of these technological advancements.

GPS and IoT Integration: Smart GPS systems integrated with IoT technology can pre-empt traffic signals, allowing ambulances to navigate through congested areas more efficiently. This system uses real-time traffic data and machine learning algorithms to dynamically adjust routes, reducing response times significantly (Prajwal et al., 2024). IoT applications in healthcare enable remote patient monitoring and data transmission, enhancing the precision and speed of emergency services. Smart ambulances equipped with IoT devices can track patient conditions and communicate with hospitals in real-time (Chavan & Rathod, 2023).

Smart Traffic Signal Systems: Systems utilizing RFID, GPS, and LTE technologies establish direct communication between ambulances and traffic signals, granting priority passage through intersections. This automation reduces delays and ensures prompt arrival at medical facilities, especially during peak traffic times (R, 2024). Predictive algorithms in these systems optimize signal timings based on ambulance speed and estimated arrival, further minimizing transit times (R, 2024).

Developing regional hubs for emergency care to distribute the patient load:

Developing regional hubs for emergency care is a strategic approach to manage patient load effectively, especially during public health emergencies or mass casualty incidents (MCIs). This involves creating a network of hospitals and emergency services that can distribute patients based on capacity, capability, and proximity, thereby optimizing resource utilization and improving patient outcomes. The concept is supported by various models and tools that facilitate the equitable distribution of patients across healthcare systems.

Interregional Emergency Resource Allocation: The allocation of medical personnel and resources across regions is crucial during major public health emergencies. An interregional emergency allocation model can help maintain appropriate doctor-patient and nurse-patient ratios, ensuring that healthcare demands are met efficiently (Luo et al., 2022). Support hubs outside the outbreak region can provide additional medical personnel, categorized by capacity and capability, to assist overwhelmed local healthcare systems (Luo et al., 2022).

Mass Casualty Incident Management: In metropolitan areas, a mass casualty surge capacity protocol can direct critically injured patients to trauma centers, reducing mortality by 25% compared to non-trauma hospitals (Shartar et al., 2017). A patient distribution tool can help EMS personnel distribute patients to appropriate care levels, ensuring that trauma centers are not overwhelmed and that non-trauma hospitals manage lower-acuity cases (Shartar et al., 2017) ("Patient Distribution Tool for Mass Casualty Incidents in a Large Metropolitan Setting", 2023).

- **Future Advancements:**

Integration of AI and machine learning in crisis prediction and resource allocation:

The integration of AI and machine learning in crisis prediction and resource allocation is transforming how crises are managed across various sectors. AI technologies, such as predictive analytics, natural language processing, and machine learning, are being utilized to enhance the accuracy and timeliness of crisis predictions, improve decision-making, and optimize resource allocation. These advancements are particularly evident in fields like tourism, disaster management, and public health, where AI-driven systems are proving to be invaluable tools for proactive and adaptive crisis management. The following sections delve into specific applications and benefits of AI and machine learning in these areas.

AI in Crisis Prediction: AI technologies, including predictive modeling and real-time data analytics, are crucial for forecasting crises. These tools enable the early identification of potential disasters, allowing for timely interventions (Mohanty et al., 2024) (Periasamy et al., 2024). In disaster management, AI-driven systems utilize IoT sensors and advanced algorithms to enhance the predictiveness and accuracy of disaster forecasts, leading to faster response times (Periasamy et al., 2024).

Resource Allocation: Machine learning tools are essential for efficient resource allocation during crises. They help in identifying needs and asset availability, ensuring that resources are directed to where they are most needed (Pachar et al., 2023). AI systems can process large volumes of data, such as social media posts and satellite images, to provide insights that aid in the distribution of resources (Harika et al., 2024).

Deployment of drone-based delivery systems for medical supplies in remote areas: The deployment of drone-based delivery systems for medical supplies in remote areas presents a promising solution to overcome logistical challenges, especially during emergencies and in inaccessible regions. Drones offer a fast, efficient, and cost-effective method for delivering essential medical supplies, which can be critical in saving lives during natural disasters or public health emergencies. The integration of drones with traditional vehicle logistics can enhance the efficiency and resilience of medical supply chains, ensuring timely delivery of both time-critical and non-time-critical medical items. Below are key aspects of this deployment:

Integration with Traditional Logistics: A dual-mode distribution framework using drones and vehicles can optimize delivery routes, especially in areas unreachable by conventional vehicles. This approach employs algorithms like DBSCAN for clustering demand zones and the artificial bee colony (ABC) algorithm for route optimization, which has shown improved efficiency over traditional methods (Ghaffar et al., 2024) (Ghaffar et al., 2024).

Advantages of Drone Delivery: Drones are particularly suitable for delivering medical supplies in rural and underdeveloped areas, where traditional logistics may fail. They can quickly reach constrained survivors during severe natural calamities, providing essential supplies efficiently (Gajana, 2024). The concept of drone ambulances, equipped with medical supplies and first responders, offers rapid and affordable emergency medical services in remote areas, potentially revolutionizing emergency healthcare delivery (Tijare et al., 2024).

- **Comparison to Global Practices:**

Analyze how Saudi Arabia's crisis management strategies compare to those of leading countries in emergency medicine: Saudi Arabia's crisis management strategies in emergency medicine have been evolving, yet they still face significant challenges when compared to leading countries like the USA and Canada. The Kingdom has made strides in improving its health system's disaster readiness and emergency medical services (EMS), but there are notable gaps in its approach, particularly in multi-sectoral coordination and trauma care. This analysis will explore key aspects of Saudi Arabia's crisis management strategies and compare them with those of leading countries.

Disaster Readiness and Health System: Saudi Arabia's health system readiness was found to be at 52%, below the planned target of 75%, indicating room for improvement in fundamental public health functions and emergency preparedness (Dinar, 2024). The implementation of a performance management system has shown progress, increasing from 10% in 2017 to 81.25% in 2022, suggesting a positive trend in enhancing preparedness (Dinar, 2024).

Emergency Medicine Development: Compared to the USA and Canada, Saudi Arabia's emergency medicine procedures differ significantly, with each country employing distinct methods to ensure quality care (Aseri, 2017). The USA and Canada have more developed trauma systems and pre-hospital care, which are critical components of effective emergency response, areas where Saudi Arabia is still developing (Alsadhan, 2015).

Identify gaps and opportunities for international collaboration and knowledge exchange: International collaboration and knowledge exchange present significant opportunities for advancing research and addressing global challenges. However, there are notable gaps that need to be addressed to fully leverage these opportunities. Effective international collaboration requires overcoming cultural and language barriers, establishing shared visions, and ensuring efficient resource use. The following sections outline key gaps and opportunities for international collaboration and knowledge exchange.

Gaps in International Collaboration: Cultural and Language Barriers: Overcoming these barriers is crucial for successful collaboration. Misunderstandings can hinder communication and the development of a shared vision (Samuel et al., 2024) (Wai-Chan, 2017). Knowledge Exchange Management: There is a lack of research on managing knowledge exchange, particularly in multi-stakeholder initiatives (MSIs) where diverse partners have varying absorptive capacities and knowledge superiority (Veeger, 2022). Measurement of Collaboration: Current metrics for measuring international collaboration are inadequate. There is a need for more reliable metrics to reward and encourage researchers to engage in international collaborations (Wai-Chan, 2017).

Opportunities for International Collaboration: Technological Advancements: The ease of sharing data and conducting virtual collaborations has opened new avenues for international partnerships, particularly in fields like surgical education and research (Qamar et al., 2021). Cross-Disciplinary Research: International collaboration allows for the combination of diverse perspectives and expertise, which is essential for addressing complex, cross-disciplinary problems (Wai-Chan, 2017). Support from Funding Agencies: Increased support from government and funding agencies, such as the Australia Research Council, provides funding opportunities and encourages large-scale, multi-site studies (Wai-Chan, 2017).

Conclusion:

Saudi Arabia's emergency medicine systems are under considerable strain due to increasing patient volumes and evolving care demands. EM, EMS, and EMTs are employing adaptive strategies such as targeted training programs, expanded service capacity, and integration of digital health solutions. However, long-term resilience requires addressing systemic challenges, including workforce shortages, logistical inefficiencies, and resource allocation disparities. Collaboration among policymakers, healthcare leaders, and frontline providers is essential to building robust and responsive emergency services. By investing in innovation, workforce well-being, and infrastructure, Saudi Arabia can strengthen its emergency medicine systems to meet current and future healthcare demands effectively.

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