The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 7, 2025

ASSESSMENT OF KNOWLEDGE, PRACTICES, AND SYSTEM PREPAREDNESS FOR CRIMEAN-CONGO HEMORRHAGIC FEVER (CCHF) AMONG HEALTHCARE WORKERS IN BALOCHISTAN, PAKISTAN: A CROSS-SECTIONAL STUDY

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DOI: https://doi.org/10.5281/zenodo.17365004

Keywords
Crimean-Congo Hemorrhagic Fever; Healthcare Workers; Knowledge; Infection Control; Pakistan; Personal Protective Equipment

Article History
Received: 01 June 2025
Accepted: 20 June 2025
Published: 05 July 2025

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Abstract

Objective: *To assess the baseline knowledge, self-reported practices, confidence, and perceived system preparedness for CCHF management among healthcare workers (HCWs) in tertiary care hospitals of Quetta, Balochistan.* ***Study Design:*** *Descriptive, cross-sectional study.* ***Place and Duration of the Study:*** *Four major tertiary care hospitals in Quetta, Balochistan, during April-May 2025.* ***Methodology:*** *A self-administered questionnaire was distributed via Google Forms using snowball sampling. Sixty-nine HCWs involved in CCHF patient care participated. The survey assessed demographics, prior training, knowledge of CCHF transmission and infection prevention and control (IPC), confidence in performing resuscitation, and availability of institutional resources.* ***Results:*** *A significant majority (89.9%) had never received formal CCHF-specific IPC training, and 88.4% had no simulation-based training. While general awareness of transmission was high (89.9%), specific knowledge was variable: 65.2% correctly identified the comprehensive PPE protocol. A significant proportion (49.3%) reported low confidence in performing safe resuscitation on CCHF patients. System-level gaps were pronounced, with only 36.2% reporting clear protocols for high-risk cases, and a majority (75.4%) stating resuscitation kits were unequipped for CCHF or they were unsure.* ***Conclusion:*** *Major gaps in specific knowledge, confidence, and system preparedness for CCHF management exist among frontline HCWs in Balochistan. These findings underscore the critical necessity for targeted, simulation-based educational interventions and systemic strengthening to enhance safety and readiness.*

INTRODUCTION

Crimean-Congo Hemorrhagic Fever (CCHF) is a severe tick-borne viral disease with a high case fatality rate and a significant risk of nosocomial transmission, particularly during high-risk procedures like cardiopulmonary resuscitation (CPR) [1]. In Pakistan, the province of Balochistan is a high-risk region; a recent spatio-temporal analysis confirmed that most CCHF cases in the country are concentrated in a few key cities, including Quetta [2]. This is exacerbated by cross-border movement from

neighboring endemic countries like Afghanistan and Iran [3].

Healthcare workers (HCWs) in this region face a clear and present danger, as managing CCHF patients demands rigorous adherence to infection prevention and control (IPC) protocols. Unfortunately, the underdeveloped healthcare system in Pakistan is often not equipped to cope with such challenges, and a significant proportion of healthcare professionals have insufficient knowledge about CCHF [4]. Outbreaks among healthcare workers have been documented in other endemic regions, highlighting the persistent occupational threat [5]. The risk is compounded during resuscitation, where the urgency of the situation can lead to lapses in IPC, increasing the potential for pathogen transmission [6].

Simulation-based training has emerged as a powerful tool for preparing healthcare teams to manage high-risk, low-frequency events safely [7]. This study aimed to conduct a baseline assessment of HCWs in major tertiary care hospitals in Quetta, Balochistan, to evaluate their CCHF-related knowledge, self-reported practices, confidence, and perceived system preparedness. The findings establish the importance of the problem and justify the necessity for a subsequent simulation-based educational intervention.

2. Methodology

2.1. Study Design and Setting

A descriptive, cross-sectional study was conducted over April-May 2025 at four tertiary care hospitals in Quetta, Balochistan, that manage the bulk of CCHF cases in the province [8].

2.2. Participants and Sampling

A purposive sample of 69 healthcare workers involved in the direct care of suspected or confirmed CCHF patients was enrolled. The cohort was predominantly Doctors (n=64, 92.8%), with a smaller number of Nurses (n=3, 4.3%) and Paramedics/Others (n=2, 2.9%). Non-probability, snowball sampling was used.

2.3. Data Collection Tool and Technique

Data were collected using a self-administered, structured questionnaire on Google Forms. The tool covered:

1. Demographic and professional characteristics.
2. Previous training in IPC and CCHF management.
3. Knowledge of CCHF transmission, symptoms, and IPC measures.
4. Self-reported practices and confidence levels.
5. Facility-level resources and protocols.
6. Open-ended questions on challenges and recommendations.
7.

2.4. Data Analysis

Data were analyzed using descriptive statistics (frequencies, percentages). Qualitative responses were analyzed for thematic content.

2.5. Ethical Considerations

Ethical approval for this study was obtained from the Aga Khan University Ethical Review Committee (AKU-ERC). Informed consent was secured from all participants electronically prior to their participation in the survey.

3. Results

3.1. Participant Demographics and Professional Characteristics

Of the 69 participants, the majority were male (76.8%) and Doctors (92.8%). Experience levels were varied: 39.1% had 4-7 years of experience, 27.5% had 8+ years, 20.3% had 1-3 years, and 11.6% had less than one year of experience in healthcare.

3.2. Critical Gaps in Training, Knowledge, and Confidence

The analysis revealed profound gaps. As shown in Table 1, the vast majority of HCWs lacked formal and simulation-based training. While awareness of transmission was high, knowledge of correct post-exposure procedures was lower. Nearly half reported low confidence.

Table 1: CCHF-Related Knowledge, Training, and Confidence among Participants (n=69)

Domain	Question/Indicator	Responses	Frequency (n)	Percentage (%)
Training History	Received formal CCHF-IPC training	Yes	7	10.1
		No	62	89.9
	Participated in simulation-based resuscitation training	Yes	8	11.6
		No	61	88.4
Knowledge Assessment	Aware of CCHF transmission	Yes	62	89.9
		No	7	10.1
	Identified correct PPE for critical CCHF patient (N95, gown, gloves, face shield)	Yes	45	65.2
		No	24	34.8
	Correct action for needlestick injury (Wash, Report, PEP)	Yes	46	66.7
		Incorrect/Incomplete	23	33.3
Confidence & Experience	Confidence in safe resuscitation on CCHF patient (Not at all/Slightly Confident)	Low	34	49.3
		Moderate	22	31.9
		High	13	18.8
	Performed	Yes	19	27.5

Domain	Question/Indicator	Responses	Frequency (n)	Percentage (%)
	resuscitation on a CCHF patient			
		No	47	68.1
		Not Sure	3	4.3

3.3. Significant Systemic and Resource Gaps
The study identified significant weaknesses at the health system level, which are detailed in Table 2. These gaps create an environment where even knowledgeable HCWs cannot practice safely. This is particularly critical in low-resource settings where system-level preparedness is a key determinant of outcomes [9].

Table 2: Assessment of System Preparedness for CCHF Management

System Factor	Response	Frequency (n)	Percentage (%)
Clear protocols for high-risk infectious cases	Yes	25	36.2
	No	29	42.0
	Not Sure	15	21.7
Resuscitation kits equipped for CCHF	Yes	17	24.6
	No	27	39.1
	Don't Know	25	36.2
Infection control department in facility	Yes	22	31.9
	No	47	68.1

3.4. Qualitative Findings on Challenges and Recommendations
Thematic analysis of open-ended responses provided crucial context. The primary challenges cited were **"Lack of resources"** (specifically PPE and isolation rooms), **"Insufficient training and awareness,"** and **"Administrative neglect and lack of protocols."** One participant's statement powerfully encapsulates the systemic failures: *"The main issue is not the cases... the issue is that we are still not trained or equipped to deal with such cases... There's no triage in casualties... No PPE available."*
The most common recommendations from HCWs were for **"regular training and workshops," "provision of adequate PPE,"** and **"establishing proper isolation facilities and clear protocols."**

4. Discussion
This baseline study reveals a concerning landscape of CCHF preparedness among frontline HCWs in

Balochistan. The critical finding is the stark disconnect between high general awareness of CCHF (89.9%) and the profound deficits in specific training, system support, and personal confidence. While knowledge on PPE was relatively better (65.2%), the near-universal lack of formal CCHF-specific training (89.9%) and simulation experience (88.4%) is a central issue that directly explains the low confidence levels reported by nearly half of the respondents (49.3%). A workforce that lacks confidence in performing high-risk procedures is a threat to both its own safety and patient outcomes. This finding is consistent with studies from Turkey, which also identified training deficits as a major contributor to healthcare worker vulnerability [5].

The systemic gaps identified—unclear protocols (63.7% when combining "No" and "Not Sure"), unequipped or unknown status of resuscitation kits (75.4%), and the absence of a recognized infection control department in most facilities (68.1%)—create a challenging environment where safe practices are difficult to implement. These system-level failures have been recently identified as key reasons why Pakistan remains at high risk for CCHF epidemics, with explicit calls to address the lack of emergency preparedness and protect frontline workers [4, 10, 11]. The precariousness of the healthcare infrastructure in high-risk regions like Balochistan necessitates a fortified system response, especially for procedures like CPR in low-resource settings [9].

The qualitative data provides a powerful, human-centric view of these challenges, with HCWs explicitly calling for more training, resources, and administrative support. This baseline analysis provides unequivocal evidence for the necessity of a structured, hands-on educational intervention coupled with advocacy for systemic improvements. The findings strongly justify and will inform the development of a targeted simulation-based "train-the-trainer" program, aimed at bridging these critical gaps and enhancing healthcare worker safety in Balochistan, aligning with global recommendations for managing viral hemorrhagic fevers [12].

5. Conclusion

This study identified major deficits in CCHF-specific training, confidence, and systemic preparedness among healthcare workers in Balochistan. While knowledge in some areas was adequate, the environment and lack of practical training render this knowledge insufficient for safe practice. The results demonstrate an urgent and unmet need for comprehensive training that includes simulation-based education for HCWs and simultaneous, decisive strengthening of health systems. These findings justify and will guide the immediate development and implementation of an educational intervention and policy recommendations to protect frontline HCWs and improve patient outcomes during CCHF outbreaks.

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