# Enhancing Emergency Medicine Services at Rural Outreach Centers: A Comprehensive Needs Assessment for Project ECHO Education Program

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## ABSTRACT

**Background**

Emergency care is a crucial component of Universal Health Coverage; however, Nepal has limited development of emergency services, especially in rural areas. Providers in rural health care facilities have limited experience, emergency training, and resources. The lack of specialized training and resources highlights significant gaps in emergency care delivery, underscoring Nepal's urgent need for targeted education and capacity building.

**Objective**

To assess emergency medicine training needs for rural healthcare providers at Dhulikhel Hospital Outreach Centers.

**Method**

A cross-sectional study conducted in October-November 2024 surveyed healthcare providers from Dhulikhel Hospital's 18 Outreach Centers (ORCs) to assess emergency medicine training needs. Using a structured questionnaire, the study gathered demographics, emergency conditions encountered, barriers to care, and learning topics of interest. Participants completed the survey through in-person and telephone interviews. Data was analyzed using descriptive statistics.

**Result**

Sixty providers participated from all 18 ORCs. Participants included midwives (41.7%), health assistants (26.7%) and medical officers (25%). Most providers (58.3%) had < 5 years of experience. Reasons for referral included the need for lab tests, CT scans, and critical care services. The most significant challenges were insufficient training (96.7%) and lack of supplies (95%). Common emergency conditions managed were trauma, COPD exacerbations, and uncontrolled diabetes. Emergency training interests included poisoning, snake bites, airway, and breathing emergencies.

**Conclusion**

This assessment describes challenges and needs critical to improve rural emergency care. Focused investments in training, resources, and support aimed to empower providers can bridge critical gaps in emergency care delivery for rural communities.

## KEY WORDS

*Emergency medicine, Needs assessment, Project ECHO, Rural health services, Telementoring*

## INTRODUCTION

Emergency care is a crucial component of Universal Health Coverage (UHC).[1,2] World Bank estimates that over half of deaths in low- and middle-income countries (LMICs) result from conditions amenable to emergency care.[3] Yet, most LMICs have a shortage of specialty-trained healthcare workers, which poses a major challenge in delivering quality emergency care.[4]

In Nepal, emergency medicine (EM) is early in its development.[5,6] Less than 25% of primary and secondary level hospital emergency units meet the minimum functional criteria of being open and staffed 24/7 with use of triage protocols.[7] Most rural healthcare providers have minimal EM training and face significant challenges: long distances, difficult terrain, patient financial constraints, and isolation.[5,6] Consequently, providers must deliver emergent care in remote locations despite limited training and resources.

To address these challenges, Project ECHO uses a low-cost, scalable, telementoring model to connect under-resourced, remote providers with specialists for collaborative learning.[8,9] It has been shown to enhance provider skills, expand knowledge, and reduce healthcare disparities.[10,11] Project ECHO has been utilized for EM in multiple countries, and is a World Health Organization collaborating partner to strengthen communities in emergency preparedness and response.[12-15]

This study aims to assess the needs of rural outreach centers across five districts in Nepal to identify common emergency cases, challenges, and educational gaps. The findings will inform the development of a Project ECHO emergency medicine curriculum to enhance EM care in these rural communities.

## METHODS

A cross-sectional observational study was carried out between October and November 2024 among healthcare providers at all the Outreach Centers (ORCs) of Dhulikhel Hospital. Ethical approvals were obtained from the Nepal Health Research Council (NHRC Ref No. 825), the Institutional Review Committee of Kathmandu University School of Medical Sciences (KUSMS IRC-301/24), and the Icahn School of Medicine at Mount Sinai (Study-24-01272).

Healthcare providers from all 18 of Dhulikhel Hospital's Outreach Centers including Medical Officers (MO), Health Assistants (HA), Auxiliary Nurse Midwives (ANM), and Registered Nurses were interviewed following verbal consent. Participants were selected using convenience sampling. Data were collected using a secure, structured survey tool via REDCap, which covered practice locations, training levels, years in practice, staff resources, and patient volumes. The questions for the data collection tool were derived from previous needs assessment studies and were adapted to the context of rural outreach centers in Nepal.[16-18] The survey also captured information on emergency medicine conditions encountered, learning preferences, barriers to care, topics of interest, and feedback on the design of Project ECHO.

Data were collected using REDCap and analyzed with Microsoft Excel. Descriptive statistics of participants and outreach center demographics were calculated. Responses to questions regarding knowledge acquisition, challenges in rural care, emergency conditions encountered, and desired topics in emergency medicine education were expressed as frequencies and percentages.

## RESULTS

Sixty providers from 18 different outreach centers participated in the study. All invited participants responded (100% response rate). The majority of providers (58.3%) had five or less years of experience. Only 6.7% had 16-20 years of experience, and none had over 20 years (Table 1).

**Table 1. Characteristics of participants from all Outreach Centers (n=60)**

| Characteristics | Frequency (n=60) | Percentage (%) |
|---|---|---|
| **Years of practice** | | |
| < 1 | 7 | 11.6 |
| 1-2 | 10 | 16.6 |
| 3-5 | 18 | 30 |
| 6-10 | 13 | 21.6 |
| 11-15 | 8 | 13.3 |
| 16-20 | 4 | 6.6 |
| > 20 | 0 | 0 |
| **Level of medical training** | | |
| Health Assistant (HA) | 16 | 26.6 |
| Auxiliary Nurse Midwives (ANM) | 25 | 41.6 |
| Registered Nurse (RN) | 4 | 6.6 |
| Medical Officer (MO) | 15 | 25 |
| **Number of referrals from ORC in average per month** | | |
| 1-5 | 19 | 19 31.6 |
| 6-10 | 13 | 21.6 |
| 11-20 | 3 | 5 |
| 21-30 | 20 | 33.3 |
| >30 | 5 | 8.3 |

Of those surveyed75% were non-physician health workers (ANMs, HAs and RNs) while 25% were physicians (medical officers). A bimodal distribution of referrals per month is apparent with most providers referring 1-5 (31.7%) or 21-30 (33.3%) patients per month, whereas 8.3% refer > 30 patients per month. Most common reasons for referral included need for further lab investigations (51 responses, 85%), CT imaging (40 responses, 66.7%), expert consultation

(24 responses, 40%), critical care services ( 20 responses, 33.3%), or need for surgery (15 responses, 25%).

Dolakha Hospital, which is the only secondary level outreach hospital among ORCs, accounted for the largest proportion of participants (30%), consistent with the larger number of providers and patient volume; however, each outreach center was represented in the study (Fig. 1).

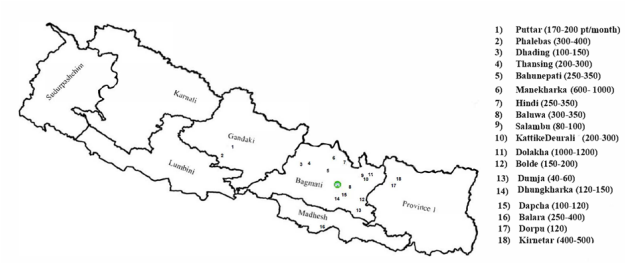


**Figure 1. Location of outreach centers with average monthly volume of patients**

Table 2 highlights key challenges in providing healthcare in rural areas. The most significant barrier to providing care was a lack of training or knowledge (98.3%), followed by the unavailability of diagnostic tests and equipment (85%) and lack of medications (71.7%). Staff shortages (28.3%) and a lack of guidelines (1.7%) were other notable concerns. The most pressing rural practice challenges were insufficient training (96.7%) and a lack of supplies (95%). Other challenges included lack of system support (23.3%), isolation (20%), and minimal staff support (1.7%), while a small proportion (5%) mentioned additional barriers such as negative practice, language barriers, and transportation difficulties.

**Table 2. Challenges in Knowledge Acquisition, Training, and Rural Healthcare Practice**

| Characteristics | Frequency (n=60) | Percentage (%) |
|---|---|---|
| **Reason it is difficult to provide care*** | | |
| Lack of training/knowledge | 59 | 98.3 |
| Diagnostic tests/Equipments are not available | 51 | 85 |
| Lack of medications | 43 | 71.7 |
| Lack of available staff | 17 | 28.3 |
| Other (Lack of guidelines) | 1 | 1.7 |
| **Factors making rural practice challenging*** | | |
| Insufficient training | 58 | 96.7 |
| Lack of supplies | 57 | 95 |
| Lack of support from system | 14 | 23.3 |
| Isolation | 12 | 20 |
| Other (Negative practice and lack of knowledge, language barrier) | 3 | 5 |
| Lack of support from staff | 1 | 1.7 |
| Negative experiences | 1 | 1.7 |

*multiple responses allowed

Across all 18 outreach centers, the most commonly encountered emergency conditions cited were trauma (17 ORCs, 94%), COPD/Asthma exacerbations (16, 89%), and uncontrolled DM (15, 83%). Other common cases were related to uncontrolled hypertension (11, 61%), myocardial infarction (7, 39%), sepsis (6, 33%), and seizures (4, 22%). Toxicology cases were also common among the ORCs, including alcohol withdrawal (9, 50%), poisonings (7, 39%), and snakebites (4, 22%).

The most common emergency topics requested for inclusion in emergency training included poisoning and snake bites (85%), airway emergencies (68%), breathing emergencies (67%), and pediatric emergencies (65%) (Table 3). Other priorities among top ten topics included circulation emergencies (63%), obstetrics (63%), Diabetes/DKA (58%), trauma (57%), seizures (53%) and emergency procedures (50%). Least selected topics included gastrointestinal bleeding (8%), thyroid disorders (12%), renal conditions (15%), abdominal pain (22%). Further distribution of selected emergency medicine topics are presented in table 3.

**Table 3. Topics selected for the Emergency ECHO sessions**

| Emergency Topics | Frequency \ Selected (n=60) | Percentage (%) |
|---|---|---|
| Poisoning and snake bites | 51 | 85 |
| Airway Emergencies | 41 | 68.3 |
| Breathing Emergencies | 40 | 66.7 |
| Pediatric emergencies | 39 | 65 |
| Circulation Emergencies | 38 | 63.3 |
| Obstetric emergencies | 38 | 63.3 |
| Diabetes/DKA | 35 | 58.3 |
| Trauma | 34 | 56.7 |
| Seizures | 32 | 53.3 |
| Emergency procedures | 30 | 50 |
| Orthopedic injuries | 29 | 48.3 |
| Stroke | 29 | 48.3 |
| Congestive Heart Failure (CHF) | 27 | 45 |
| Arrhythmias | 27 | 45 |
| Ultrasound | 22 | 36.7 |
| Disaster preparedness | 22 | 36.7 |
| Chronic Obstructive Pulmonary Disease (COPD) | 19 | 31.7 |
| Pneumonia | 17 | 28.3 |
| Acute Coronary Syndrome (ACS) | 14 | 23.3 |
| Abdominal pain | 13 | 21.7 |
| Renal conditions | 9 | 15 |
| Thyroid Disorders | 7 | 11.7 |
| Gastrointestinal bleeding | 5 | 8.3 |

## DISCUSSIONS

The study provides the first needs assessment for emergency medicine training and capacity building for

Dhulikhel Hospital's rural outreach centers. The findings provide insights into the common emergency conditions, common challenges, reasons for referral, and desired topics for training to improve emergency care and patient outcomes in these rural regions.

With 78% of the population residing in rural Nepal, a robust emergency care system in those regions holds a wide prospect for reducing many preventable deaths and disabilities.[19] Strengthening emergency health care services have been a priority in recent health policies of the Government of Nepal (GoN). The constitution of Nepal has assured of the right to basic and emergency health services to all the citizens.[20] National Health Policy 2019 envisions making emergency health services available at all levels.[21] However, an emergency care system assessment (ECSA) conducted in 2021 by the Ministry of Health and Population (MoHP) of Nepal, and World Health Organization highlighted the critical gap in training and capacity building among emergency care providers.[7] Our study has revealed that insufficient knowledge and training is one of the biggest barriers in delivering emergency care.

The majority of providers (58.3%) in our study had five or less years of experience, indicating a relatively young workforce. The predominance of a less experienced workforce in rural settings is observed globally which has both opportunities and challenges, which necessitates comprehensive support mechanisms including targeted training and capacity building strategies.[22]

The major barriers to providing care identified in this study included insufficient training and knowledge and lack of hospital resources, including diagnostic tests, equipment, medications, and staff. The absence of clinical guidelines was also noted as a contributing factor. Similar to these findings, a study conducted in Zambia highlighted lack of supplies and training as the most common challenges in delivering effective emergency care.[23] The barriers for effective emergency care reported in our study also align with the global findings as reported by a recent scoping review.[24]

Additional concerns highlighted by providers in this study included lack of systemic support and isolation. These findings align with a 2015 Canadian Rural Emergency Medicine Needs Assessment study, highlighting insufficient training, inadequate systemic support, and negative clinical experiences.[18] Strengthening training programs, ensuring better resource availability, and improving institutional support could help mitigate these challenges and enhance rural healthcare services.

The parallels between these studies emphasize the persistent need for resource allocation, infrastructure development, and targeted training programs to improve emergency medical care, particularly in resource-limited settings. Addressing these barriers through policy interventions and capacity-building initiatives could significantly enhance patient outcomes in rural and underserved areas.

Participants expressed significant interest in key emergency medicine topics for Project ECHO sessions. The most requested topics included poisoning and snake bites, airway, breathing, and circulation emergencies, pediatric emergencies, neurological cases, emergency procedures, orthopedic conditions, and cardiac emergencies. These findings from our study align with a broader study conducted across 51 districts of Nepal, which examined the Continuing Medical Education (CME) needs of doctors in both the public and private sectors.[25] The topics most wanted were management of acute medical, pediatric and orthopedic/trauma emergencies as well as obstetric skills. The most responses for the topic poisoning and snakebite might be due to high incidence and disproportionately high mortality from those conditions in Nepal.[20,26,27] Unlike our study, Butterworth et al. found poisoning and snakebite among the least preferred topics. This may be due to the areas in which the surveys were conducted as the areas in this study have a predominance of subsistence farming, leading to more toxicology emergencies. Globally, larger interest among emergency health care workers has been observed in cardiopulmonary emergencies, pediatric emergencies and trauma including mass casualty incidents (MCI) which is also observed in our study.[28] Our study emphasized the demand for training in acute emergency management, reinforcing the need for focused, evidence-based education to enhance emergency response capabilities in Nepal's healthcare system.

Given the shortage of trained healthcare workers has been a major challenge in delivering quality and efficient emergency care in rural regions, project ECHO is a promising model to address this gap. Like Butterworth et al, we found many facilities with computer and internet capabilities, making use of Project ECHO ideal for education and improving care in rural Nepal.[25] In the face of increased receptiveness of virtual training, technological advances, and shortage of trained emergency workforce, particularly in LMICs, online emergency medicine training and mentorship models like Project ECHO holds a promise for an innovative and scalable solution to address the gaps.[9]

By empowering rural healthcare workers with the knowledge, skills, and resources needed to manage emergencies effectively, training programs like Project ECHO can significantly improve patient outcomes and contribute to reducing healthcare inequalities in LMICs. Strategic collaboration between government, medical institutions, and technology providers is essential to effectively implement and sustain these initiatives.

While the study provides valuable insights into the challenges faced by rural outreach centers, certain limitations should be acknowledged to improve future research and interventions. The findings are based on data

from a selected number of rural facilities, highlighting the need for broader studies to capture a more comprehensive picture of emergency care needs in rural Nepal. Despite this, our survey includes all outreach centers served by Dhulikhel Hospital to provide input needed for this program. Also, the data collection tool was not tested for its validity and reliability which limits its application. However, the questions were derived from previously published studies, reviewed by several emergency medicine experts and simplified for the audience and purpose of the study. Expanding the scope of future research can enhance the generalizability of results and broader needs across Nepal or other LMICs.

Additionally, since the study relied on self-reported data from healthcare providers, incorporating objective assessments and real-time observations in future studies could help minimize response bias and provide a more accurate understanding of system deficiencies.

## CONCLUSION

The rural needs assessment conducted at Dhulikhel Hospital's outreach centers revealed key gaps, barriers, and opportunities in the current emergency care ecosystem. Using a collaborative and data-driven approach, the study aimed to inform the development of emergency medicine education and mentorship through Project ECHO. A major strength of the assessment was its broad engagement with healthcare providers from all 18 outreach centers, offering a comprehensive view of challenges and needs. However, limitations such as reliance on self-reported data and convenience sampling may affect the accuracy and generalizability of the findings.

The insights from this study carry important implications for improving emergency care in rural Nepal. Future efforts should prioritize the implementation of targeted education and mentorship programs via initiatives like Project ECHO to bridge the identified gaps. Additionally, further research is needed to evaluate the long-term effects of these interventions on patient outcomes and healthcare delivery. Strengthening these areas could lead to significant improvements in emergency medical services in underserved communities.

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