

Bridging Stroke Care Through Technology: Knowledge, Attitudes, and Practices of Barangay Health Workers in Quezon City on a Telestroke Network

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ABSTRACT

Background

Stroke is a leading cause of morbidity and mortality in the Philippines. Telestroke systems have been introduced to improve timely recognition and referral; however, their effectiveness depends on utilization at the community level.

Objective

To assess stroke and telestroke knowledge, attitudes, practices, and barriers among barangay health workers (BHWs), and to determine factors associated with telestroke utilization.

Methods

A cross-sectional study was conducted among 202 BHWs. Data were collected using a structured questionnaire assessing knowledge, attitudes, practices, and perceived barriers. Descriptive statistics were used to summarize responses. Associations between variables were analyzed using appropriate statistical tests, with significance set at $p < 0.05$.

Results

Respondents had high stroke knowledge (75.5%, SD = 17.45) and telestroke knowledge (85.5%, SD = 18.82), as well as favorable attitudes (mean = 4.37). However, only 31.1% reported telestroke utilization. The most commonly reported barriers were lack of training (61.4%) and poor internet connectivity (15.8%). Telestroke familiarity was significantly associated with higher knowledge ($p = 0.005$) and more favorable attitudes ($p = 0.001$). Stroke-related training ($p = 0.001$) and years of experience ($p = 0.001$) were significantly associated with higher utilization.

Conclusion

Despite high knowledge and favorable attitudes, telestroke utilization among BHWs remains low. Training, familiarity, and infrastructure appear to play key roles in bridging the gap between knowledge and practice. Strengthening these factors may improve the effectiveness of community-based telestroke systems.

Introduction

Stroke is a major global health concern and remains one of the leading causes of death and long-term disability worldwide, accounting for approximately 6.6 million deaths annually based on the Global Burden of Disease Study.¹ In the Philippines, stroke consistently ranks among the top causes of mortality and disability,

contributing significantly to the national burden of disease.^{9,10}

Timely recognition and referral are critical in stroke care, as early interventions within a narrow therapeutic window significantly improve outcomes.^{2,3} However, delays at the community level continue to limit timely access to treatment.

Telestroke—the use of telemedicine to deliver remote stroke consultation—has been shown to improve access to specialist care and support acute decision-making in resource-limited settings.^{2,3,4} Evidence from the American Heart Association indicates that telestroke systems enhance access to expertise and facilitate appropriate acute stroke management.^{2,3}

In the Philippines, stroke care is challenged by inequitable access to neurologists, uneven distribution of stroke-ready facilities, and logistical barriers such as transportation delays and limited emergency services.^{9,10} To address these challenges, a Telestroke Network was established through collaboration between our center and the Quezon City local government, representing the first LGU-anchored telestroke system in the country.

Unlike traditional hospital-based models, the QC Telestroke Network is community-anchored, with activation beginning at the barangay level. Barangay Health Workers (BHWs) identify suspected stroke cases, contact a telestroke hotline, and coordinate referral to stroke-ready facilities.

BHWs serve as frontline providers and are essential to early stroke recognition and referral. Previous Philippine studies suggest that while BHWs possess general health knowledge, gaps remain in stroke-specific competencies and referral practices.^{6,8}

This study aims to assess the knowledge, attitudes, and practices of BHWs in Quezon City regarding stroke and the QC Telestroke Network, and to identify factors associated with knowledge, attitudes, and system utilization.

METHODOLOGY

Research Design

A descriptive cross-sectional study was conducted to assess KAP and examine associations with telestroke utilization.

Study Site

The study was conducted in Quezon City, Philippines, focusing on Districts 1, 4, and 5, which had the highest telestroke coordination activity in 2024. The selection of these districts may overrepresent barangays with greater exposure to the telestroke system, potentially limiting generalizability.

The operational workflow of the QC Telestroke Network is illustrated in **Figure 2**. The system is initiated at the community level, where BHWs identify suspected stroke cases and activate the telestroke hotline. Clinical information is relayed to neurology residents at East Avenue Medical Center (EAMC), facilitating early assessment and coordinated referral to a stroke-ready facility.

Study Population and Sampling

A total of 202 active BHWs were recruited using convenience sampling during a mandatory Quezon City Health Department meeting. This approach may introduce selection bias toward more engaged or available participants.

Inclusion and Exclusion Criteria

Inclusion Criteria

Participants were eligible if they met the following criteria:

1. Active BHW assigned in any of the selected barangays
2. Minimum of six months of service as a BHW to ensure familiarity with community health services.
3. Previous involvement in stroke-related activities such as patient referral, health programs, or emergency response.
4. Willingness to provide informed consent and complete the survey questionnaire.
5. Ability to understand and respond to questions in English or Filipino.

Exclusion Criteria

Participants were excluded if they:

1. Declined to provide informed consent.

2. Had health or cognitive impairments that could prevent reliable completion of the questionnaire.
3. Were not formally recognized or accredited as Barangay Health Workers under the Quezon City Health Department.

Data Collection

A validated questionnaire assessed demographics, stroke knowledge, telestroke knowledge, attitudes, and practices.

Operational definition:

Telestroke utilization was defined as any instance in which a BHW initiated contact with the telestroke system (e.g., hotline call, referral coordination, or communication with EAMC neurology resident) for a suspected stroke case, within the past six months, regardless of whether the consultation was completed.

Pilot testing yielded a Cronbach's alpha of 0.719.

Data Analysis

Data were analyzed using SPSS version 29. Knowledge scores were calculated as the proportion of correct responses expressed as percentages, while attitude scores were determined using the mean values of Likert scale responses ranging from 1 to 5. Prior to conducting the analysis, the assumptions for ANOVA were assessed to ensure validity. Chi-square tests were used to evaluate associations between variables, and statistical significance was set at $p < 0.05$.

Ethical Consideration

The study was presented and approved by East Avenue Medical Center Institutional Ethics Review Board.

RESULTS

A total of 202 BHWs participated (mean age = 49 years, SD = 9.9). Most

respondents were female (89.5%) and had more than five years of experience (37.8%).

Knowledge

The mean proportion of correct responses for stroke knowledge was 75.5% (SD = 17.45), while telestroke knowledge was higher at 85.5% (SD = 18.82). Most respondents recognized stroke as a medical emergency and were familiar with the FAST acronym; however, only 31.2% correctly identified common stroke symptoms.

Attitudes

Attitude scores were high (mean = 4.37), indicating general agreement with positive statements regarding stroke and telestroke. Respondents strongly agreed that the telestroke network can save lives.

Practices

Despite high knowledge and favorable attitudes, only 31.1% of respondents reported telestroke utilization (Figure 1).

Barriers

The most frequently reported barriers were lack of training (61.4%) and poor internet connectivity (15.8%).

Associations

Telestroke familiarity was significantly associated with higher telestroke knowledge ($p = 0.005$) and more favorable attitudes ($p = 0.001$). Years of experience was associated with more positive attitudes ($p = 0.030$) and higher telestroke utilization ($p = 0.001$). Stroke-related training was also significantly associated with increased telestroke utilization ($p = 0.001$).

The relationship between knowledge, attitudes, and utilization is summarized in Figure 1. The operational workflow of the telestroke system is shown in Figure 2.

DISCUSSION

This study demonstrates a substantial knowledge–practice gap among

Table 1. Demographic and Professional Profile of Barangay Health Workers (n = 202)

Variable	Category	n (%)
Age (years)	Mean $\pm$ SD	48.6 $\pm$ 9.9
	25–35	24 (11.9)
	36–45	46 (22.9)
	>45	131 (65.2)
Sex	Male	20 (10.1)
	Female	179 (89.5)
	Others	1 (0.5)
Years of Experience	1 year	62 (30.8)
	2–3 years	32 (15.9)
	4–5 years	31 (15.4)
	>5 years	76 (37.8)

Table 2. Knowledge, Attitudes, and Practices Summary

Measure	Value
Stroke Knowledge (mean %)	75.5 $\pm$ 17.45
Telestroke Knowledge (mean %)	85.5 $\pm$ 18.82
Attitude Score (mean)	4.37 / 5
Telestroke Utilization (%)	31.1

Table 3. Barriers and Enablers to Telestroke Utilization (n = 202)

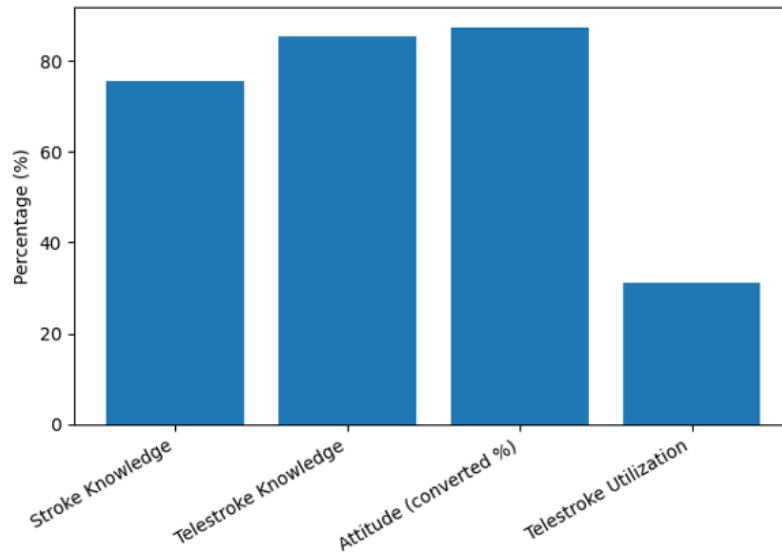
Category	Factor	n (%)
Barriers	Lack of training	124 (61.4)
	Poor internet connectivity	32 (15.8)
	Unfamiliar process	25 (12.4)
	No clear guidelines	14 (6.9)
	Not part of duties	14 (6.9)
	Lack of equipment	9 (4.5)
	Others	5 (2.5)
Enablers	Additional training	120 (59.4)
	Supervision	27 (13.4)
	Easier processes	27 (13.4)

Note: Multiple responses allowed; percentages may exceed 100%.

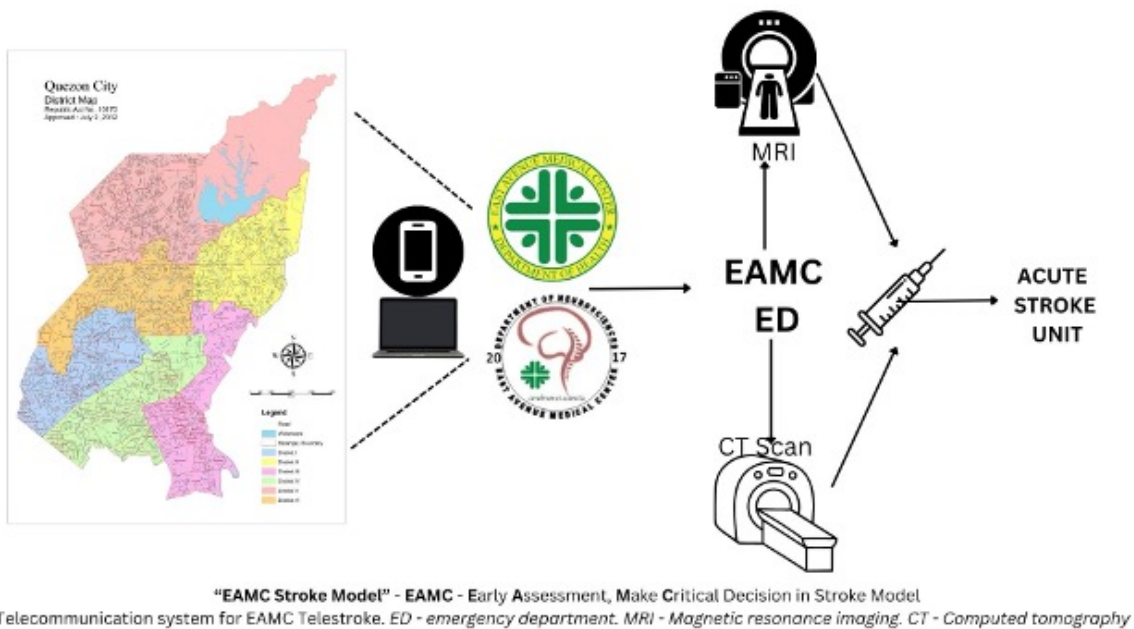
Table 4. Factors Associated with Knowledge, Attitudes, and Telestroke Utilization

Variable	Stroke Knowledge (Mean ± SD)	p-value	Telestroke Knowledge (Mean ± SD)	p-value	Attitude (Mean ± SD)	p-value	Telestroke Utilization n (%)	p-value
Age group	75.5 ± 17.5	0.546	85.5 ± 18.8	0.572	4.37 ± 0.56	0.797	—	0.569
Sex	75.6 ± 17.4	0.370	85.8 ± 18.5	0.881	4.38 ± 0.55	0.635	—	0.759
Years of experience	—	0.374	—	0.628	4.30–4.64	0.030	—	0.001
Educational attainment	—	0.378	—	0.052	3.93–4.47	0.075	—	0.780
Stroke-related training	—	0.690	—	0.848	4.41 vs 4.32	0.290	44 (75.9) vs 57 (48.7)	0.001
Telestroke familiarity	—	0.574	—	0.005	4.46 vs 4.09	0.001	49 (83.1) vs 89 (73.0)	0.135

Note: Values are presented as mean ± standard deviation for continuous variables and frequency (percentage) for categorical variables. Comparisons were performed using one-way ANOVA and chi-square tests. Bold values indicate statistical significance ($p < 0.05$).

Figure 1. Knowledge–Practice Gap**Figure 2. . Workflow of the EAMC- Quezon City Telestroke Network (EAMC Stroke Model)**

The system is activated at the barangay level, where Barangay Health Workers (BHWs) identify suspected stroke cases and initiate contact with the telestroke hotline. Clinical information is relayed to neurology residents at East Avenue Medical Center (EAMC), enabling early assessment and coordination of patient transport to the emergency department (ED). Upon arrival, patients undergo imaging (CT scan, with MRI as indicated), followed by rapid decision-making for acute stroke management, including thrombolysis, and subsequent admission to



BHWs (Figure 1). While respondents had high stroke (75.5%) and telestroke knowledge (85.5%) and favorable attitudes (mean = 4.37), only 31.1% reported telestroke utilization. This indicates that high levels of knowledge and positive attitudes do not necessarily translate into implementation.

Although overall knowledge scores were high, only 31.2% of respondents correctly identified common stroke symptoms, suggesting that knowledge may be more conceptual than operational. Similar findings have been reported in Philippine studies, where awareness does not consistently translate into effective clinical recognition.⁸

These findings are consistent with previous local studies. Roxas and Carabal-Handumon⁸ reported high awareness with gaps in stroke knowledge, while Taburnal⁶ showed that training is associated with improved BHW competence. In the present study, however, telestroke utilization remained low despite high knowledge and favorable attitudes, indicating that additional factors influence implementation.

The observed gap is consistent with limitations of the KAP model, where knowledge does not necessarily translate into practice.⁵ In this study, telestroke familiarity was significantly associated with higher telestroke knowledge and more favorable attitudes, while stroke-related training and years of experience were significantly associated with higher telestroke utilization. These findings suggest that familiarity, training, and experience may play a more direct role in utilization than knowledge alone, supporting recommendations emphasizing structured training and system orientation for effective telestroke implementation.^{2,3,4}

The most frequently reported barriers were lack of training and poor internet connectivity, consistent with broader challenges in stroke care in the Philippines.^{9,10} As a community-based

system, the QC Telestroke Network relies on barangay-level activation and depends on frontline providers and communication infrastructure. As shown in Figure 2, the multi-step workflow required for telestroke activation may contribute to variability in implementation. The gap between knowledge and utilization may therefore reflect challenges in executing this process in actual practice.

LIMITATIONS

This study has several limitations. First, the cross-sectional design limits the ability to establish causal relationships between knowledge, attitudes, training, and telestroke utilization. Second, data were self-reported and may be subject to recall and social desirability bias. Third, the study was conducted within a single telestroke network, which may limit generalizability to other settings with different infrastructure or organizational structures. Additionally, while associations with familiarity, training, and experience were identified, other potential factors influencing utilization—such as organizational support and real-time system accessibility—were not directly measured. Despite these limitations, the study provides relevant insights into barriers affecting telestroke implementation at the community level.

CONCLUSION

BHWs demonstrated high levels of stroke and telestroke knowledge and favorable attitudes; however, telestroke utilization remained low. This gap between knowledge and practice highlights the influence of factors beyond awareness. Telestroke familiarity, stroke-related training, and years of experience were significantly associated with utilization, while lack of training and poor connectivity were the most commonly reported barriers. These findings suggest that improving training, strengthening system familiarity, and addressing infrastructure limitations may enhance telestroke implementation in community-based settings.

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