Enhancing Telehealth Accessibility for Older Adults in Underserved Areas: A 4M Framework Approach

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Abstract

Background: Telehealth has emerged as a vital alternative to traditional healthcare delivery, particularly for rural and underserved populations. While efforts to enhance telehealth accessibility have primarily focused on technological solutions, the effectiveness of its telehealth and the role of physician training in bridging racial and ethnic disparities in telehealth usage remains underexplored. This study evaluates the impact of a trained-physician-delivered, age-friendly telehealth model on healthcare accessibility and outcomes. **Methods:** A retrospective analysis was conducted on 214 older patients (60+) at an urban primary care facility in Nevada, USA. Patients received telehealth services from either trained or non-trained physicians, with the trained group utilizing a 4M-based telehealth model focusing on Medication, Mentation, Mobility, and What Matters. **Results:** Findings revealed lower exposure to both general and 4M-based telehealth among Hispanic and Asian patients compared to their white counterparts. Telehealth usage did not significantly reduce hospital or emergency department visits overall. However, certain types of 4M-based telehealth, such as What Matters and Medications, reduced hospital and ED visits. **Implications:** The development and implementation of telehealth education curricula for healthcare providers could make telehealth more accessible to minority patients, potentially reducing unnecessary emergency department visits and addressing disparities in telehealth access.

Keywords

4M-based telehealth, disparities, inequality

Introduction

Telehealth, as defined by the World Health Organization (WHO), compasses the delivery of health care services through Health Information Technology (HIT), facilitating diagnosis, treatment, and preventative education about diseases and injuries (World Health Organization, 2010) Its inception aimed at broadening healthcare accessibility for diverse populations, aspiring to mitigate health disparities rooted in ethnic and socioeconomic differences (Brailer, 2004; Chaudhry et al., 2006).

The efficacy of telehealth in enhancing patient engagement and care delivery has been consistently demonstrated. Notably, it has been shown to reduce the incidence of missed appointments, offering patients the convenience of accessing medical services irrespective of geographical barriers or personal mobility limitations (Cubanski, 2020). Beyond basic diagnostic and preventative services,

telehealth extends to occupational therapy and the management of both chronic and acute conditions, underscoring its versatility in healthcare provision (Gray et al., 2020; Harkey et al., 2020; Jacobs et al., 2015).

Despite its potential, the adoption of telehealth has encountered challenges, particularly in rural settings and

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among specific demographics, including older adults, and racial minority communities (Cortelyou-Ward et al., 2020; Ertel et al., 2015; Zulman et al., 2015). This study seeks to address the disparities in telehealth utilization by exploring the efficacy of an age-friendly, primary care-based telehealth model to bridge these gaps, ensuring equitable access to digital healthcare solutions.

Literature Review

The digital divide, characterized by unequal access to technology and home broadband, has been identified as a significant barrier to telehealth equity (Atske & Perrin, 2021; Haynes et al., 2021; Kalicki et al., 2021; van Deursen & van Dijk, 2019; Vogels, 2021). National analyses in the United States involving representative samples of 7,000 individuals have reported that non-white populations are less likely to engage with telehealth services (Pierce & Stevermer, 2020) This disparity is particularly pronounced among older adults, pointing to a compounded challenge of addressing both racial-ethnic and age-related barriers to telehealth access (Haynes et al., 2021; Kalicki et al., 2021; van Deursen & van Dijk, 2019).

In response to these disparities, several scholars advocate for providing affordable digital devices and internet services to underserved population to bridge the telehealth gap (Goldberg et al., 2022; Kalicki et al., 2021; Nouri et al., 2020). There is an optimistic view that the cost of home internet services will decrease, coupled with a generational shift towards greater digital literacy among emerging older adults. Recent studies suggest that the gap in internet access, a critical component of telehealth adoption, has narrowed significantly over the past decades, offering a glimmer of hope for achieving telehealth equity (Campos-Castillo & Anthony, 2021; Goldberg et al., 2022).

While efforts to bridge the digital divide have predominantly targeted older and racial minority patients, the readiness of medical professionals to deliver telehealth services merits equal attention. Training in telehealth has been posited as a crucial element in effectively supplementing traditional in-person care (Papanagnou et al., 2015). A well-structured telehealth curriculum is essential for realizing its full potential benefits, such as enhanced healthcare accessibility, improved patient satisfaction, and potential for reduced hospital and emergency department visits, culminating in more cost-effective care (Chaudhry et al., 2006; Flodgren et al., 2015; Harkey et al., 2020; Papanagnou et al., 2015).

Existing research on telehealth's positive impacts has largely concentrated on patient populations with specific health conditions, with the participating healthcare providers receiving specialized training for telehealth delivery (Bashi et al., 2017; Dalouk et al., 2017; de San Miguel et al., 2013). For example, a randomized controlled trial investigated telehealth's effectiveness in managing older patients with chronic obstructive pulmonary disease (COPD) (de San Miguel et al., 2013). Participants were divided into groups receiving either remote monitoring or information-based services. Findings indicated that the group under remote monitoring experienced fewer hospital and emergency department visits compared to the control group, underscoring the importance of preparatory training for healthcare professionals involved in telehealth.

Telehealth has significantly evolved from its inception (Wootton, 2001), with the COVID-19 pandemic serving as a catalyst for widespread adoption among hospitals and medical professionals (Gray et al., 2020; Harkey et al., 2020). Before the pandemic, a couple of issues utilizing telehealth were identified. For example, one study conducted interviews with 19 patients post-telehealth consultations, revealing a consensus that telehealth was deemed most suitable for non-severe health conditions (Powell et al., 2017). This feedback points to perceived gaps in telehealth's ability to offer comprehensive care, highlighting areas for development in diagnoses and treatment capabilities. Due to the pandemic, the majority of hospitals are now forced to pivot their care with telehealth, yet this rapid pivot reinforced its potential and limitations. One of the scoping papers analyzed 43 articles that examined telehealth and its barriers and services that have been commonly provided. Of those 43, 14 articles were hospitals in the United States. While various services and conditions were treated via telehealth (e.g., mental illness, diabetics, children, and developmental disabilities), the digital divide, especially among older patients, lack of resources and less known about primary care and its sufficient curriculum for all populations were limited (Beheshti et al., 2022). This feedback points to perceived gaps in telehealth's ability to offer comprehensive care, emphasizing areas for development in diagnoses and treatment capabilities (Chike-Harris et al., 2021; van Galen et al., 2019).

Amidst telehealth's growing utilization, the literature indicates a gap in understanding how targeted training for healthcare providers can enhance telehealth services' effectiveness and equitable delivery. Recent efforts to weave telehealth education into primary care training programs mark a significant step towards bridging this knowledge gap.

The Institute for Healthcare Improvement (IHI) introduced an age-friendly health system that conceptualizes delivering key healthcare elements to older adults through telehealth, particularly in rural settings (Cacchione, 2020; Fulmer et al., 2022). The 4M framework offers a comprehensive approach specifically designed to address multifaceted challenges faced by older adults. Unlike other technology adoption frameworks that may focus primarily on the implementation and usage of technology, the 4M Framework emphasizes holistic care that integrates multiple aspects of

patient well-being. This system is grounded in the 4M-based framework, encompassing:

- What Matters: Advance care planning aligned with older adults' preferences
- Mobility: Ensuring safety for those with limited mobility
- Medication: Optimizing medication regimens to avoid polypharmacy
- Mentation: Supporting mental and cognitive well-being

The implementation of this age-friendly model via telehealth emphasizes the imperative for comprehensive training programs aimed at equipping physicians with the necessary skills to deliver high-quality care to a diverse patient population, as outlined in resources like the Nevada Interprofessional Healthy Aging Network (NIHAN) training toolkit (Cacchione, 2020; Fulmer et al., 2022).

The current study aimed to elucidate the role of telehealth, facilitated by physicians trained in specialized telehealth curricula, in bridging racial and ethnic disparities in healthcare access. Furthermore, it seeks to assess the impact of distinct telehealth models, particularly an age-friendly, 4M-based approach, on patient outcomes. Through a series of multivariate regression analyses, this study examines the hypothesis that 4M-based telehealth services would result in better healthcare outcomes for older patients.

Methods

Ethics and Consent

This research received an exemption from the University of Nevada, Las Vegas (UNLV) Institutional Review Board (#1510973).

Study Design

This retrospective analysis encompassed a cohort of 215 patients, all aged 60 years and above, who engaged with telehealth services between July 2020 and September 2021. The study focused on a primary care setting within a public clinic in Nevada, known for its ethnically and racially diverse patient base, representing approximately 5% of the clinic's total patient population during the study period.

In preparation for this study, 14 healthcare providers, including physicians and nurse practitioners, underwent comprehensive telehealth training. This training, delivered through an asynchronous online platform, included four 1-hr sessions covering essential topics: Introduction to the Age-Friendly Health System, Person-Centered Planning, Understanding Mobility and Falls/Frailty, and Recognizing Cognitive and Neurocognitive Decline. To ensure competency, participants were required to complete assessments after each module, with successful completion resulting in certification.

Given the ethical consideration around withholding necessary services, a randomized controlled trial was deemed inappropriate for this context. Instead, a nonexperimental, retrospective approach was adopted. Patients were categorized based on their telehealth interactions: those who received services from providers who had not undergone the specific telehealth training formed the control group, while those who engaged with at least one aspect of the 4M-based care (i.e., Medication, Mentation, Mobility, and What Matters) by trained providers were considered the experimental group.

Outcome Variables

The primary outcomes of interest were the number of hospital and emergency department visits by the patients from July 2020 to September 2021, quantified as discrete counts.

Independent Variables

Two key independent variables were analyzed. The total number of general telehealth sessions utilized by each patient (min = 0, max = 6) and the aggregate count of 4M-based telehealth encounters that involved any components of the 4M framework—What Matters, Mobility, Mentation, and Medication (min = 0, max = 4). Additionally, patient's ethnic and racial backgrounds were categorized into four domains (1 = White, 2 = Hispanic, 3 = Black, 4 = Asian).

Covariates or Control Variables

To control potential confounding factors, the study incorporated a range of covariates. Demographic information included age, sex (1 = male, 2 = female), living situation (1 = living alone, 2 = living with home health) (1 = alone, 2 = home health or daycare, 3 = without home health or daycare), and education attainments (12 = high school diploma, 14 = completed 2 years of college or an associate degree, 16 = Bachelor's degree, 18 = completed a 2-year master's degree).

Cognitive ability was assessed by asking patients whether they had experienced symptoms of memory loss in the past year with response coded as 1 = Yes, 0 = No. Lastly, individual patients' independence level was assessed for the analysis. The level of independence was evaluated through the Katz Index of Independence in Activities of Daily Living (Katz et al., 1970), which measures six functional domains, including bathing, dressing, toileting, transferring, continence, and feeding. Each activity was subjectively reported by patients and coded to indicate the level of assistance required (0 = No supervision, direction, or personal assistance, 1 = With supervision, direction, personal assistance, or

total care), with a cumulative score providing an overall measure of independence (range between 0 and 6).

Statistical Analysis

STATA (Version 18) generated descriptive, frequency, and percentage information for the analyzed variables.

Multivariable regression analysis was performed to examine how patients' ethnic and racial backgrounds, in conjunction with their physical conditions, influenced their utilization of telehealth services. This step was critical in mapping out the direct and interaction effects on these demographic and health-related factors on telehealth engagement.

To deepen the investigation of racial disparities in telehealth access, ordered logistic regression analyses were employed. These analyses were instrumental in pinpointing the disparities in telehealth usage among different racial groups and evaluating the potential of various telehealth models to decrease the frequency of hospital and emergency department visits.

Although negative binomial regression is typically recommended for variables measured as counts, such as the number of hospital and emergency visits, this approach was reconsidered in this context. Given that the count outcomes did not exceed 10 and the data encompassed a blend of categorical variables, ordered regression analysis was deemed more suitable for this investigation (Long & Freese, 2006).

Results

The sample consisted of 95 male patients (44.49%), and most were non-Hispanic White patients (49.3%). Approximately 60% of reviewed patients were living with their family members (e.g., spouse, children, and other relatives) and 20% were living alone, and about 17% were having home health or attending daycare. About 20% of participants had previously had memory loss symptoms (refer to Table 1 for more demographic information).

The distribution of general telehealth sessions and 4M-based telehealth sessions is presented in Tables 2 and 3. Table 2 shows that the majority of patients (92.06%) had at least one general telehealth session. As shown in Table 3, a significant number of patients (39.25%) had at least 4M-based telehealth sessions, and more than 30% held more than two sessions. Additionally, Table 4 provides a breakdown of types of 4M-based telehealth sessions. Most patients engaged in What Matters (89.25%), while Mobility, Medication, and Mentation sessions were less frequent, with 49.53%, 17.76%, and 16.36% of patients participating in each, respectively.

Multivariable regression analysis was performed to examine the overall levels of patients' exposure to telehealth and 4M-based telehealth services by common

Table 1. Demographic of Reviewed Patients (*N* = 214)[a].

Characteristics	*M*	Range	*n* (%)
Age	73.45	65–95	
Gender			
Male			95 (44.39)
Female			119 (55.61)
Race			
White			94 (49.3)
Black			35 (16.36)
Hispanic			48 (22.43)
Asian			37 (17.29)
Education[b]			
High school			61 (28.50)
Two years college			44 (20.56)
Bachelor's degree			10 (4.67)
Master's degree			1 (0.47)
Living situation			
Alone			48 (22.90)
HomeHealth or daycare			37 (17.29)
Without HomeHealth or daycare			128 (59.81)
Katz	1.21	0–5	
Memory loss			
No			169 (78.97)
Yes			45 (21.03)

[a]Valid percentages are reported.
[b]Degree received are reported.

Table 2. Distribution of General Telehealth Sessions.

Number of visits	Number of patients (%)
0	17 (7.94)
1	197 (92.06)

Note. Valid percentage is reported.

Table 3. Distribution of 4M-Based Telehealth Sessions.

Number of visits	Number of patients (%)
0	17 (7.94)
1	84 (39.25)
2	68 (31.78)
3	30 (14.02)
4	15 (7.01)

Note. Valid percentage reported.

covariates (e.g., ethnicity, age, education attainment). The overall diagnostic results were excellent for both telehealth services and 4M-based telehealth (R^2 = .83, F [11, 202] = 24.11; p < .001; R^2 = .64, F [11, 202] = 31.70; p < .001, respectively).

There were noteworthy racial disparities in accessing telehealth services. The result suggested that, compared

Table 4. Distribution of 4M-Based Telehealth by Its Types.

Types of 4M	Number of patients (%)
What matters	
0	23 (10.75)
1	191 (89.25)
Mobility	
0	108 (50.47)
1	106 (49.53)
Medication	
0	176 (82.24)
1	38 (17.76)
Mentation	
0	179 (83.64)
1	35 (16.36)

Note. Valid percentages reported.

to white patients, black patients were less likely to access general telehealth sessions ($\beta = -.33$, 95% CI [−0.63, −0.02]; $p < .05$), and Asian patients also had lower access ($\beta = -.51$, 95% CI [−0.83, −0.19]; $p < .05$). For 4M-based telehealth, black patients were less likely to utilize these services compared to the white patients ($\beta = -.27$, 95% CI [−0.53, −0.01]; $p < .05$). Individuals with longer educational attainment showed a significant increase in utilizing both general telehealth ($\beta = .33$, 95% CI [0.27, 0.39]; $p < .05$), and 4M-based telehealth ($\beta = .06$, 95% CI [0.01, 0.10]; $p < .05$). Importantly, patients needing more assistance with daily life performances (Katz) had increased 4M-based telehealth sessions ($\beta = .50$, 95% CI [0.39, 0.61]; $p < .05$) (Table 5).

Table 6 shows the overall effect of telehealth on hospital and ED visits. The results indicate that there was no significant association was found between general telehealth sessions and hospital or ED visits.

Further, the analysis of individual 4M-based telehealth types revealed important impacts on healthcare outcomes. As Table 7 shows, visits focusing on What Matter were significantly reduced hospital admission ($\beta = -.10$, 95% CI [−0.15, −0.05]; $p < .05$), and ED visits were reduced among patients who utilized 4M-based, focusing on Medication ($\beta = -.10$, 95% CI [−0.15, −0.05]; $p < .05$).

Results of the multivariable analysis showed several racial disparities in using general telehealth services. Black patients were less likely to use telehealth services than of White patients ($\beta = -.32$, 95% CI [−0.62, −0.01]; $p < .05$), and Asians were less likely to use telehealth than White patients ($\beta = -.53$, 95% CI [−0.85, −0.20]; $p < .01$). As expected, patients with longer educational attainment have higher telehealth uses than their counterpart ($\beta = .33$, 95% CI [0.27, 0.39]; $p < .01$).

As for the 4M-based telehealth, Hispanic patients were less likely to use 4M-based telehealth than that of White patients ($\beta = -.27$, 95% CI [−0.53, −0.01]; $p < .05$). Similar to the general telehealth uses, patients with higher educations were more exposed to 4M-based telehealth than their counterparts ($\beta = .06$, 95% CI [0.01, 0.10]; $p < .01$), and patients with higher Katz score were more likely to use 4M-based telehealth than their counterparts ($\beta = .50$, 95% CI [0.39, 0.62]; $p < .01$). See Table 2 for the full report.

There was a possible mediating effect on the relationship between telehealth use and hospital admission by race. As Table 3 shows that the odds of visiting the hospital were higher among Hispanic patients when receiving telehealth than among white patients ($OR = 2.14$, 95% CI [1.05, 4.39]; $p < .05$). Unexpectedly, patients were more likely to visit the hospital when receiving 4M-based telehealth ($OR = 2.21$, 95% CI [1.46, 3.34];

Table 5. Patients' Social and Demographic Background by Telehealth Utilization[a].

Patients' Characteristic	General telehealth[b]	4M-based telehealth[c]
Age	0.01 (−0.01, 0.03)	0.01 (−0.00, 0.03)
Gender[d]	−0.15 (−0.39, 0.07)	−0.07 (−0.25, 0.11)
Race[e]		
Hispanic	−0.27 (−0.61, 0.05)	−0.27* (−0.53, −0.01)
Black	−0.33* (−0.63, −0.02)	−0.22 (−0.46, 0.00)
Asian	−0.51* (−0.83, −0.19)	−0.14 (−0.39, 0.10)
Education	0.33* (0.27, 0.39)	0.06* (0.01, 0.10)
Livings[f]		
HomeHealth/day care	0.10 (−0.39, 0.61)	−0.31 (−0.70, 0.07)
Without HomeHealth/daycare	−0.07 (−0.43, 0.28)	−0.19 (−0.47, 0.07)
Katz	−2.06 (−4.19, 0.07)	0.50* (0.39, 0.61)
Memory[g]	0.20 (−0.23, 0.63)	−0.00 (−0.34, 0.32)

[a]Standardized beta is reported here. 95% Confidence Interval is reported in parentheses.
[b]$R^2 = .54$.
[c]$R^2 = .61$.
[d]Reference group is male.
[e]Reference group is white.
[f]Reference group is living alone.
[g]Reference group is no memory issue.
*$p < .05$.

Table 6. Association Between General Telehealth and Hospital/ED Visits[a].

Patients' Characteristic	Hospital visits[b]	ED visits[c]
General telehealth	0.06 (–0.04, 0.18)	0.10 (–0.03, 0.23)
Age	–0.01 (–0.01, 0.03)	0.04* (0.01, 0.07)
Gender[d]	–0.06 (–0.26, 0.14)	–0.06 (–0.29, 0.17)
Race[e]		
Hispanic	0.10 (–0.18, 0.39)	–0.09 (–0.42, 0.23)
Black	–0.00 (–0.27, 0.25)	–0.05 (–0.35, 0.25)
Asian	0.02 (–0.25, 0.30)	0.04 (–0.27, 0.36)
Education	–0.08* (–0.14, –0.02)	–0.12* (–0.19, –0.05)
Living situation[f]		
HomeHealth/day care	–0.03 (–0.39, 0.47)	0.04 (–0.45, 0.53)
Without HomeHealth/day care	–0.06 (–0.37, 0.23)	–0.04 (–0.40, 0.30)
Katz	0.33* (0.21, 0.45)	0.44* (0.30, 0.58)
Memory[g]	0.12 (–0.24, 0.49)	–0.10 (–0.53, 0.31)

[a]Standardized Beta is reported here. 95% Confidence Interval is reported in parentheses.
[b]$R^2 = .38$.
[c]$R^2 = .52$.
[d]Reference group is male.
[e]Reference group is white.
[f]Reference group is living alone.
[g]Reference group is no memory issue.
*$p < .05$.

Table 7. Association Between Types of 4M-Based Telehealth and Hospital/ED Visits[a].

Types of 4M	Hospital visits	ED visits
What matters	–0.10* (–0.15, –0.05)	–0.05 (–0.10, 0.00)
Mobility	0.00 (–0.05, 0.05)	0.05 (0.00, 0.10)
Medication	–0.05 (–0.10, 0.00)	–0.10* (–0.15, –0.05)
Mentation	0.05 (0.00, 0.10)	0.00 (–0.05, 0.05)

[a]Standardized beta is reported; Confidence interval is reported in parenthesis.
*$p < .05$.

$p < .05$). There were no other significant findings with telehealth and hospital admission.

The frequency of emergency department visits showed a similar outcome. Hispanic patients exposed to general telehealth were more likely to visit the emergency department than White patients ($OR = 2.05$, 95% CI [1.03, 4.06]; $p < .05$). Patients being exposed to 4M-based telehealth had a higher likelihood of admitting emergency department ($OR = 3.11$, 95% CI [2.04, 4.76]; $p < .05$). Surprisingly, within patients accessing 4M-based telehealth, emergency department visits were lower among Hispanic patients than White patients ($OR = .46$, 95% CI [0.22, 0.95]; $p < .05$) (See Figure 1).

Discussion

The findings from this study reveal an intriguing aspect of telehealth usage. Engaging with both general and 4M-based health services did not lead to a decrease in hospitalization and emergency department (ED) visits, a deviation from previous research indicating telehealth's potential to reduce such healthcare utilization. Previous studies have often concentrated on patients with chronic conditions where telehealth services, primarily focused on monitoring, play a critical role in mitigating unnecessary hospital visits and follow-ups (Dalouk et al., 2017; Kubes et al., 2021; Shah et al., 2022). In contrast, the current study broadened its scope to include primary care services delivered via telehealth to a mixed patient population, encompassing both chronic and non-chronic conditions. Within this context, telehealth often served as a conduit for referral services, with a notable frequency of recommendations for in-person evaluations to enable comprehensive examinations and diagnoses (Hardie et al., 2022; Lillicrap et al., 2019; McQuown et al., 2023). This dynamic in primary care settings may elucidate the observed paradoxical increase in hospital visits among patients utilizing telehealth services.

The analyses revealed significant racial and ethnic disparities in the utilization of telehealth services. Specifically, non-white patients, including Hispanic, black, and Asian, demonstrated lower engagement with both general telehealth and specialized 4M-based telehealth compared to their white counterparts. This pattern aligns with existing research that highlights the barriers faced by older racial and ethnic minority
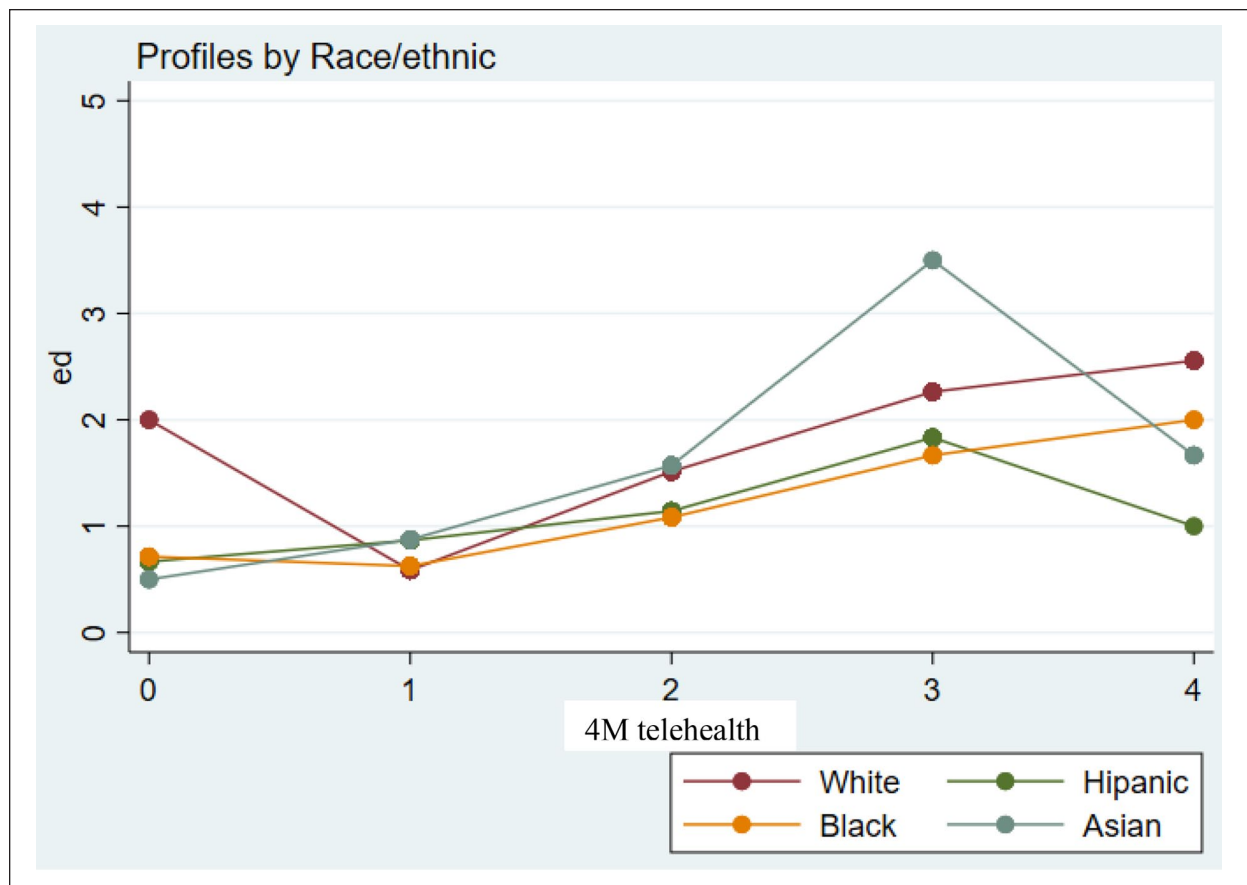
Figure 1. 4M-based telehealth and the emergency visit by racial and ethnic background.

populations in accessing telehealth technologies (Chang et al., 2021; Chike-Harris et al., 2021; Kubes et al., 2021; Kvedar et al., 2017). Contrary to the anticipated positive outcomes of telehealth in reducing hospital and emergency department visits, the findings from this study indicate no significant association between general telehealth sessions and hospital or ED visits. However, certain types of 4M-based telehealth sessions showed potential benefits, such as visits focusing on "What Matters," which were significantly associated with reduced hospital admissions, and sessions focusing on "Medication," which were linked to reduced ED visits. This outcome challenges the prevailing narrative in telehealth research, which often suggests uniform benefits across all telehealth modalities, and reinforces the need for a deeper examination of how telehealth is integrated into patient care, particularly in diverse populations.

The absence of a significant association between general telehealth sessions and hospital or ED visits suggests that the type and content of telehealth interactions are critical factors in determining their effectiveness. These findings imply that the mere availability of telehealth services does not guarantee their effective use and the realization of their potential benefits.

A noteworthy insight from this study is the higher propensity for patients needing assistance with daily activities to engage with 4M-based telehealth services, a trend not observed with general telehealth. This suggests that telehealth programs grounded in a structured curriculum and comprehensive training may be more accessible and beneficial to patients facing physical and mobility challenges. These specialized telehealth services offer a potential strategy for older adults to enhance accessibility and ensure that telehealth interventions are tailored to meet their unique needs.

Implementing telehealth programs emphasizing the 4M-based approach, focusing on What Matters, Mobility, Medication, and Mentation, can significantly improve healthcare delivery for vulnerable populations. This approach ensures that telehealth services are aligned with patient needs, effectively expanding their full potential benefits. These findings highlight the importance of integrating targeted and structured telehealth programs into standard healthcare practice to achieve better health outcomes and address specific patient needs comprehensively.

This research enriches the dialogue on mitigating telehealth disparities through the targeted training of healthcare providers. It underscores several critical

considerations for healthcare administrators and practitioners in the delivery of telehealth services:

- Cultural Competence: It is imperative for physicians to cultivate cultural sensitivity, particularly in offering recommendations that aim to safeguard patient well-being and mitigate unnecessary hospital and ED visits. Such an approach is critical in ensuring that telehealth services are equitable and responsive to the diverse needs of patients (Beach et al., 2017; Collins et al., 2002; Rodriguez et al., 2020).
- Enhanced Communication: The gap between the intimacy of in-person consultations and the impersonality of virtual interactions can be narrowed through improved interactive communication skills and telehealth competencies among healthcare providers (Lillicrap et al., 2019; Shah et al., 2022; van Galen et al., 2019).
- Interdisciplinary Approach: The findings indicate that primary care-based telehealth alone may not suffice in reducing hospital visitations, suggesting the need for a more holistic, interdisciplinary approach to telehealth that extends beyond basic care provisions (Appleman et al., 2022; Chike-Harris et al., 2021; McQuown et al., 2023; Uscher-Pines et al., 2021).
- Policy Considerations: There is a pressing need to revisit reimbursement and insurance policies related to telehealth to ensure they adequately compensate providers while facilitating patient access to these vital services
- Reimbursement and insurance policies on telehealth services must be reviewed carefully to compensate physicians and ensure patients access such services (Chang et al., 2021; Goldberg et al., 2022).
- Implications for Technology Design: Effective telehealth technology should be user-friendly, especially for older adults who may not be as comfortable using such technologies. The design should include features such as larger text, intuitive navigation, and easy access to technical support. Additionally, integrating telehealth platforms with electronic health records (EHRs) can streamline information sharing and improve continuity of care (Poonsuph, 2022). Secure, reliable internet connectivity is also critical to ensure seamless telehealth interactions (Bokolo, 2021).

Implementing the outlined recommendations has the potential to significantly enhance the effectiveness of telehealth services, thereby reducing unnecessary medical costs associated with hospital and emergency department visits. A recent study within the US Department of Veterans Affairs demonstrated the efficacy of integrating 4M-based framework telehealth services alongside traditional in-person care, emphasizing telehealth's

substantial role in providing essential medical support to patients in need (McQuown et al., 2023). This evidence further reinforces the value of telehealth as a critical component of healthcare delivery.

It is essential to foster an environment of continuous learning and training in telehealth among medical professionals, ensuring that patient care is both equitable and effective. By embracing an age-friendly, curriculum-based telehealth model, especially one centered around the 4M approach. This innovative practice can be distinguished from traditional telehealth methods, and its distinction places trained clinicians at the helm of telehealth education and strategic implementation in clinical settings, ensuring that telehealth continues to evolve as a vital resource in patient care.

While the study offers important insights into the implications of telehealth services, it is important to acknowledge its limitations. Firstly, the study's retrospective design, lacking a controlled experimental group, necessitates a cautious interpretation of the results. Although patients and physicians were categorized based on the type of telehealth services received, enabling comparative analysis, the absence of a control group limits the ability to draw causal inferences. Additionally, this study did not assess patient satisfaction; instead, it focused on evaluating two distinct telehealth models and their potential impact on racial and ethnic disparities in healthcare access. The exclusion of patient satisfaction from the analysis represents a missed opportunity to delve into the underlying factors that may influence hospital and emergency department visits post-telehealth engagement. Further research should incorporate patient satisfaction measures to gain a comprehensive understanding of the patient experience with telehealth services. Such studies could elucidate the reasons behind continued hospital and emergency department visits following telehealth consultations, thereby contributing valuable insights into optimizing telehealth delivery for diverse patient populations.

Conclusion

Racial and ethnic disparities in accessing healthcare services present a significant societal challenge within the United States, a disparity that extends to the realm of telehealth (2019 National Healthcare Quality and Disparities Report | Agency for Healthcare Research and Quality, 2021; Campos-Castillo & Anthony, 2021; Chang et al., 2021; Haynes et al., 2021; Lillicrap et al., 2019; Truong et al., 2022; Uscher-Pines et al., 2021). Telehealth was envisioned as a means to democratize access to healthcare, aiming to mitigate such disparities by offering widespread, equitable services (Brailer, 2004; Chaudhry et al., 2006). Despite these aspirations, evidence indicates that telehealth's research remains constrained, particularly in underserved and rural communities (Mishori & Antono, 2020; Nouri et al., 2020).

Telehealth promises to transcend traditional healthcare delivery boundaries, offering more than just rudimentary follow-ups. It has the capacity for comprehensive patient care through recommendations, monitoring, and educational initiatives, potentially averting unnecessary hospital and emergency department visits. Developing a targeted telehealth curriculum, coupled with interdisciplinary collaboration among healthcare professionals, emerges as a pivotal strategy in bridging the telehealth divide. Embracing such an approach could enlighten hospital administrators and healthcare providers about telehealth's role in enhancing patient well-being, promoting cost-efficiency, and reducing avoidable hospital admissions. By confronting the existing barriers and actively working towards an inclusive telehealth framework, there lies an opportunity to recognize telehealth's potential as a significant of equitable healthcare delivery in the digital age.

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