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To cite this article: Acarima Nanthanasit, Luma Tabbaa, Chee Siang Ang, Siwaporn Sukittanon & Chalati Siewattana (26 May 2026): Exploring the design & deployment of social media to support community-based rehabilitation in rural areas, Behaviour & Information Technology, DOI: [10.1080/0144929X.2026.2672588](https://doi.org/10.1080/0144929X.2026.2672588)

To link to this article: <https://doi.org/10.1080/0144929X.2026.2672588>



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Exploring the design & deployment of social media to support community-based rehabilitation in rural areas

Acarima Nanthanasi^a, Luma Tabbaa^a, Chee Siang Ang^a, Siwaporn Sukittanon^b and Chalati Suewattana^c

^aUniversity of Kent, Canterbury, UK; ^bChiang Mai University, Chiang Mai, Thailand; ^cSansai Hospital, Chiang Mai, Thailand

ABSTRACT

While Community-Based Rehabilitation (CBR) programmes have demonstrated efficacy in urban settings, rural regions grapple with challenges in infrastructure, funding, and expertise. This is particularly concerning given that 60% of people in low-income nations reside in rural areas, many with pressing rehabilitation needs. In this paper, we sought to understand the needs and challenges in accessing rehabilitation in rural Thailand and the evaluation of social media in CBR delivery from key stakeholders' perspective (patients, families, healthcare professionals, and volunteers). We found that social-media-based CBR serves as a multifaceted tool, not only disseminating vital rehabilitation information but also fostering a sense of community through shared narratives, offering comfort and motivation. Social media also supports the empowerment and recognition of a village-centred approach to rehabilitation, although concerns surrounding digital safety, privacy, and trust remain critical. We contribute to the research community with design and deployment directions for social-media-based CBR support in rural areas.

ARTICLE HISTORY

Received 20 June 2024
Accepted 4 May 2026

KEYWORDS

Community-based rehabilitation; social media; HCI for development; rural areas

1. Introduction

As of 2023, approximately 2.4 billion individuals worldwide live with a health condition requiring rehabilitation care (World Health Organization 2023). Whilst there are many reasons why individuals would require rehabilitation (i.e. paediatric conditions such as cerebral palsy, skin conditions such as burns and diabetic ulcers, and neurological conditions such as spinal cord injury and traumatic brain injuries), stroke is the third leading cause of disability around the world, leading to a range of physical, cognitive, and emotional impairments, which can have a negative impact on the individual's quality of life if rehabilitation needs were not met (Singh 2021).

Providing access to rehabilitation services through traditional means (i.e. hospitals, clinics, etc.) can be expensive, labourious, and require immense infrastructure (Bernhardt et al. 2020), especially when considering rehabilitation as a continuous process of active change and improvement, in opposition to other healthcare services, which can be more discrete

(Bernhardt et al. 2020). To address this challenge, the World Health Organisation (WHO) introduced a strategic approach referred to as Community-Based Rehabilitation (CBR) (World Health Organization 2017b). CBR is a participatory community-based programme, implemented through the joint efforts of patients, their families, volunteers, professionals, and the broader community. CBR aims to improve the functioning and independence of people with disabilities, enhance the quality of life of people with disabilities and their family members through addressing their needs and promoting their active participation in local decision-making and governance. CBR also aims to encourage the wider community to build awareness, understanding, and foster positive attitudes towards people with disabilities (World Health Organization 2017b). Despite the positive outcomes CBR programmes have reaped in many countries, most CBR programmes are located in urban areas (World Health Organization 2017a, 2017b). In fact, many strategic approaches, including CBR, are still not feasible in Low and Middle-Income Countries (LMICs) and rural areas due to the lack of

infrastructure, funding, and shortages of trained professionals based in these areas (Douthit et al. 2015; World Health Organization 2023). The inability to implement CBR in rural areas may have a negative impact on patient's recovery, wellbeing of family members, and overall quality of life, especially when considering that approximately 60% of the population in LMICs live in rural areas (Department of Economic and Social Affairs 2021).

Researchers in the Human-Computer Interaction (HCI) community have investigated various technologies and how they could be used for rehabilitation assessment and training. These include wearable technologies (see a review in Patel et al. 2012), Ploderer et al. (2016), Georgiou, Holland, and van der Linden (2016), and Holden et al. (2015), robotics (Li, Tyson, and Weightman 2021; Vandermaesen et al. 2014), and gaming technologies (Jung et al. 2020). Studies have shown positive rehabilitation outcomes, as these technologies offer users autonomy and independence by tailoring the therapy to their individual needs. However, some of these technologies are expensive to source without significant remodelling or alteration (Demofonti et al. 2021) and require infrastructure (i.e. network connectivity), which may pose a barrier to implementation in LMICs and rural areas. In fact, most healthcare literature in HCI in the context of rural areas has utilised simpler technologies such as mobile phones to deploy their interventions (Okolo et al. 2021; Saleh et al. 2018; Wang, Kale, and O'Neill 2020). This is primarily attributed to the low cost of mobile phones compared to more advanced technologies, availability in the consumer market, and the users' familiarity with such technology, minimising the need for training. Such studies have examined the use of social communication applications to offer nurse-patient support for fertility treatments (Wang, Kale, and O'Neill 2020), explored AI-empowered mobile applications to support community health workers for disease diagnosis (Okolo et al. 2021), and investigated the use of mobile health tools to enhance healthcare accessibility and health outcomes for individuals with noncommunicable diseases in rural areas and refugee camps (Saleh et al. 2018).

In the context of rehabilitation care in rural areas, some researchers discussed the potential of mobile phone applications to facilitate video and phone-based consultations (Van Den Broek et al. 2022), deliver practical training (Brunner, Rietdijk, and Togher 2022), and share rehabilitation-related information (Brunner et al. 2019). While a growing body of research highlighted the myriad benefits of digitally delivered CBR (Balikudembe and Reinhardt 2020) –ranging from enhanced information access to addressing the scarcity of the

rehabilitation workforce – there remains a gap in our understanding of its application in rural contexts. The unique challenge of rural settings, with their specific socio-cultural characteristics and infrastructural constraints, call for tailored strategies to ensure the acceptability and usability of digital CBR interventions. Moreover, the holistic nature of CBR requires a comprehensive engagement strategy that encompasses all key stakeholders, including people with disabilities, their families, healthcare professionals, and community volunteers.

As such, this study aimed to design, deploy, and evaluate the use of low-cost and easily accessible digital medium (i.e. social media) within rural areas as means to facilitate digitally delivered CBR. The study took place in Chiang Mai, Thailand, where stroke is the leading cause of disability and early death rates, with more than 250,000 yearly new stroke cases (Suwanwela 2014). Despite the immense efforts made by the Ministry of Public Health (MPH) to improve the accessibility of healthcare services, the shortage of healthcare professionals, low retention rates of staff in rural areas, and the geographic mal-distribution of healthcare facilities pose a barrier to the successful accessibility and deployment of healthcare services in general and rehabilitation care in specific (Siripanumas et al. 2022). Such barriers would have serious consequences on the public's health and wellbeing, especially when it is estimated that 47.84% of Thailand's population resides in rural areas (Statista Research Department 2023b).

Through this study, we aimed to:

- Examine the needs and challenges experienced by key stakeholders (i.e. post-stroke and spinal cord injury patients, their families, healthcare professionals, and community volunteers) in accessing and delivering rehabilitation care in rural areas.
- Explore how traditional CBR could be translated into an online digital medium. We seek to scrutinise the features and limitations of social media for facilitating CBR.
- Layout the design and development opportunities and challenges associated with digitally delivered CBR, aiming to enhance its deployment and dissemination in the future.

This paper aims to contribute to the HCI and healthcare research. First, we aim to highlight the design needs of key stakeholders, as it is the first pillar towards successful deployment and adoption. Second, we hope that the findings of this study can point out the nuances associated with deploying digital interventions in rural areas, including technology, society, and culture.

Finally, we contribute to the domain of social media intervention design (i.e. platform, content, interaction mechanisms, etc.) for a digitally-delivered CBR in rural areas, addressing the unique requirements of key stakeholders.

2. Related work

2.1. Community-based rehabilitation

Rehabilitation plays a crucial role in a patient's recovery, involving physical therapy (i.e. exercise training), speech and language training, and psychological therapy (i.e. distress management, treatment of depression, etc.) (World Health Organization 2023). In rural areas within LMICs, most people with disabilities struggle to attend rehabilitation support appointments due to the geographical distances between villages and the closest healthcare facility, making access to rehabilitation more costly and time-consuming for patients and their family caregivers (Georgakakos et al. 2022). The absence of active and continuous rehabilitation can cause health complications such as pressure ulcers, joint issues, pneumonia, and recurring strokes (Langhorne et al. 2017). Furthermore, it has been recognised in the body of literature that rehabilitation goes beyond the physical aspect of it; although improved motor functioning and increased independence are good markers of progress in rehabilitation, people with disabilities and their family caregivers also need further support to maintain motivation and manage behavioural, emotional and mental repercussions of life-altering injuries (Pitthayapong et al. 2017). Finally, the importance of raising awareness and seeking active engagement from the surrounding community cannot be understated, as it enhances the social inclusion and participation of people with disabilities in the community, promotes equalisation of opportunities, and fosters positive attitudes towards people with disabilities, which all ultimately contributes to an improved quality of life for people with disabilities and their families (World Health Organization 2017b). In efforts to meet all the physical, emotional and mental needs of people with disabilities and their families, with the support of all key stakeholders and the wider community, the WHO introduced CBR as a strategic, participatory, community-based approach (World Health Organization 2010, 2017b). This approach involves the active engagement of patients, their families, volunteers, professionals, policymakers, businesses, health providers and the broader community.

Despite successful implementation in urban and high-income areas, CBR remains unfeasible in rural

regions. The WHO highlighted several reasons why it is still challenging to implement CBR in rural areas, including the high demands in such areas, lack of infrastructure, and insufficient policies and legal frameworks to support these programmes (World Health Organization 2017b) and World Health Organization (2017a). The inability to implement CBR in rural areas is caused by a multitude of factors, including the lack of infrastructure, prioritisation, funding, policies, limited availability of services, insufficient public transportation, and shortages of trained professionals and resources (Douthit et al. 2015; World Health Organization 2023). The inability to implement CBR in rural areas, coupled with the costly and sometimes impossible access to healthcare services, can negatively impact rehabilitation outcomes and, ultimately, the wellbeing and quality of life of people with disabilities and family members.

As such, digitally delivered CBR may be able to mitigate the shortcomings of the conventional CBR (Balikudembe and Reinhardt 2020). A digitally delivered CBR may increase the impact of CBR on people with disabilities and their families through overcoming the geographical limitations, address the shortage of rehabilitation professionals in rural areas through online outreach, enhance the access and exchange of information between healthcare professionals, people with disabilities, their families and other members of the community, and social satisfaction through peer support and the support of other stakeholders such as community volunteers.

2.2. Towards the holistic deployment of digitally delivered CBR

Research within the HCI community has explored and developed various technologies to support rehabilitation care. For instance, some studies have focussed on the physical aspect of rehabilitation, such as restoring motor functions using neural stimulators (Martin et al. 2009; Popović and Popović 2011) and robotics (Demofonti et al. 2021; Li, Tyson, and Weightman 2021) and enhancing the engagement and motivation to continue with rehabilitation exercises using virtual reality (Peng, Yin, and Cao 2021), augmented reality (Leong et al. 2022), and tangible media (Kirk et al. 2016). Other works of research have offered technological solutions to improve autonomy through independent health monitoring using wearable technologies (Patel et al. 2012) and the use of 'robotic companions' (Li, Tyson, and Weightman 2021). In the context of rehabilitation in rural areas, one study explored the use of robotics as home-based intervention to support

the delivery and monitoring of rehabilitation in the rural areas of the USA (Cherry et al. 2017), while other studies explored low-resource environments in Mexico and the USA (Johnson et al. 2017; Valles et al. 2016). Another study investigated the use of virtual reality to train stroke management healthcare professionals in rural Wales (Maltby et al. 2023). However, much of these technologies can prove difficult to access in LMICs especially in rural areas due to their high cost and technical and infrastructural requirements. In addition, some technologies would require specialist skills and knowledge for set up, administration, and maintenance, to which, shortages in skilled personnel who are based in rural might pose a barrier to the deployment of such interventions. Furthermore, the lack of accessibility and familiarity of novel technologies in rural areas may impede the acceptance and usability of interventions, and ultimately, the effectiveness of such interventions. In fact, studies found that the technological anxiety and perceived risk people residing in rural areas experience can negatively influence the acceptability technology-based healthcare services (Kamal, Shafiq, and Kakria 2020).

When considering the context of delivering healthcare services in rural areas in a practical and realistic manner, most research done in this domain has focussed on using mainstream technologies such as mobile phone applications to bridge the geographical gap between healthcare professionals and patients and their families. Such research has looked into offering phone and video-based reproductive health consultations in rural Nepal (Parajuli and Doney 2017), fostering peer support for women undergoing fertility treatments through instant messaging applications in rural China (Wang, Kale, and O'Neill 2020), and empowering autonomy through app-based health trackers in rural Pakistan (Sajjad and Shahid 2016). Studies concluded that digitally delivered interventions can increase the accessibility of healthcare support, reduce expenses through the reduction of commute time and cost, reduce apprehension towards seeking consultation and advice, as well as reduce the cultural barriers around seeking healthcare in rural areas.

Whilst we recognise some similarities between the design and deployment needs between rehabilitation and other healthcare domains in the context of rural areas, however, there are many reasons why rehabilitation presents with unique requirements, challenges, and opportunities. First, rehabilitation is a lengthy recovery process; therefore, sustainable solutions (including a digitally delivered CBR) are needed to ensure those who need rehabilitation care can access it

for as long as needed. Second, rehabilitation is a family matter, as it disrupts the lifestyle, work, responsibilities, and finances of the entire family (Herbert 1989); therefore, taking into consideration the needs of patients and their family members is imperative. Finally, a digitally delivered CBR may be able to overcome some of the challenges conventional CBR face in rural areas, such as the shortages of rehabilitation workforce, through connecting healthcare professionals who are at a distance and empowering the local force of family caregivers and community volunteers with knowledge, information exchange, and training (Balikuddembe and Reinhardt 2020). Hence, there is a pressing need to understand how to holistically design and deploy digitally delivered CBR in rural areas, ensuring it is both acceptable and usable while addressing the needs of all stakeholders, from people with disabilities and their families to healthcare professionals and volunteers as well as the broader community.

2.3. Online patient support communities

Online Patient Support Communities (OPSCs) are virtual spaces often hosted on social media platforms, forums, or specialised health websites or applications. These communities enable patients and caregivers to connect and share practical knowledge (Greenberg et al. 2017). Such solutions may offer advice on managing symptoms, navigating healthcare systems, or accessing resources (Eysenbach et al. 2004 May). OPSCs have also been used effectively to promote peer support among patients (Nambisan 2011; Wright et al. 2024). Previous research has shown that OPSCs can help mitigate rural-urban health disparities by allowing rural users to receive social support from urban participants, who often act as primary suppliers of support (Goh, Gao, and Agarwal 2016). However, OPSCs face several challenges. For instance, protecting community members' personal information is essential to fostering a safe and trustworthy environment where users feel comfortable sharing their data, including sensitive health information (Bussone et al. 2020; Cerón-Guzmán et al. 2022). Additionally, the risk of spreading misleading or inaccurate information poses a significant concern (Eysenbach et al. 2004 May). User engagement also poses a significant challenge, as encouraging patients to subscribe and actively participate in OPSCs depends on factors such as their background characteristics, perceived need, and the platform's reliability (Aarts et al. 2013).

Furthermore, the deployment of OPSCs in rural areas brings additional complexities. Limited digital

literacy among rural residents, as many may lack the skills needed to effectively navigate online health platforms, may hinder their participation and engagement (Almond, Cummings, and Turner 2019). Furthermore, healthcare providers may lack the necessary training and experience to manage and support online patient communities effectively (DeHart et al. 2021). Additionally, the shortage of healthcare professionals who are familiar with the cultural and societal norms within these rural areas can restrict the support and moderation required for online communities (Leader et al. 2023).

As such, it is unclear how to effectively implement and sustain OPSCs in rural areas, given the combined challenges of limited digital literacy, inadequate provider training, and a shortage of healthcare professionals to provide the necessary support and moderation. In this respect, there is a need to investigate the potential benefits, challenges, and accessibility of a digitally enabled CBR to improve its deployment and dissemination in rural areas. Through a qualitative, human-centred approach, we i) conducted focus groups and workshops to understand the need and challenges in accessing rehabilitation care in rural areas, ii) carried design workshops for a social-media-based CBR intervention, and iii) gained an in-depth evaluation over the design, use, perceived benefits, pitfalls and considerations of social media as a medium to disseminate digitally delivered CBR through semi-structured interviews with key stakeholders. Finally, we hope to contribute to the research community with design and deployment directions for social-media-based CBR support in rural areas.

3. Methodology

The study undertakes a qualitative approach through focus groups, design workshops, and interviews, as such an approach allows for a comprehensive exploration of the experiences, perceptions, and context-specific insights that are difficult to extract otherwise. Ten focus groups with key stakeholders (100 participants) were carried out to understand and reflect upon the needs, challenges, and struggles that stakeholders face in providing and accessing rehabilitation support in rural areas in Thailand. Then, 7 experts in rehabilitation healthcare and 3 HCI experts attended and engaged in 3 design workshops to form the digitally delivered CBR intervention. Finally, one month after active engagement with the intervention, semi-structured interviews with 23 participants were conducted to evaluate the perceived benefits, pitfalls, and concerns of a digitally delivered CBR.

3.1. The context of rural Thailand

3.1.1. Access to healthcare in rural Thailand

It is approximated that 47.84% (~64 million) of the Thai population resides in rural areas (Statista Research Department 2023b). With a focus on Chiang Mai, the northeastern province has 2066 villages with a population of 1.76 million over an area of 20,170 km² (Chiang Mai Governor Office 2015). The concentration of healthcare services in Thailand is unbalanced across the urban and rural provinces; there are 1.77 doctors for every 1000 people in Bangkok, but only 0.35 doctors for every 1000 people in the rural northeastern region (Ikai et al. 2016). In response, many solutions have been supported and funded by the Ministry of Public Health (MPH), such as the introduction of mobile clinics (Sritart et al. 2021), the establishment of medicine schools outside the capital to tackle the shortage of medical professionals in rural areas (Suphanchaimat et al. 2013), and the increase worker's capacity through the recruitment of paid community volunteers or what is typically referred to in Thailand as Village Healthcare Volunteers (VHVs). Specifically, 1.04 million VHVs are recruited by the MPH through the local community to collect data and promote health education. Managed and delivered by the MPH, VHVs engage in primary healthcare training (~30 hours) and further specialised training (~70 hours) focussing on caregiving tasks, physical rehabilitation, and emotional support (Narkvichien 2020).

3.1.2. Stroke & rehabilitation care in rural Thailand

In Thailand, stroke is the leading cause of disability and early death rates, with more than 250,000 yearly new stroke cases and 50,000 deaths caused by stroke every year (Suwanwela 2014). Despite the introduction of the Universal National Health Service (2002) (National Health Security Office 2002), people residing in rural areas seek care at a higher expense due to the unaffordable cost and time constraints (Arcury et al. 2005; Barber et al. 2016; Limwattananon et al. 2015), which can be determinant against seeking healthcare (Sungbun et al. 2020; Thoresen and Fielding 2011). As a result, many stroke patients residing in rural areas opt for early hospital discharge and are unable to attend frequent rehabilitation sessions or follow-ups afterwards (Pandian et al. 2016). In response to tackle this challenge, the 'Rehabilitation Phase Care' is a programme introduced by the MPH to support rehabilitation care in rural areas for six months post-stroke (Health Service Plan Development Subcommittee and Health Administration Division 2019; Strategy Office of the Permanent Secretary (OPS), Ministry of Public Health (MOPH) and

Planning Division (SPD) 2017); aiming to optimise functioning, reduce disability, and enhance the quality of life of stroke patients (Disability and Rehabilitation Team 2015; O'Sullivan, Schmitz, and Fulk 2019). Before discharge, patients and family members are given verbal instructions and written materials (i.e. brochures, pamphlets), with little support given to training the family members on the physical (i.e. exercises and physical care such as feeding and bathing, etc.) and the emotional (i.e. coping with the drastic change in lifestyle and family dynamics, lack of motivation to engage in rehabilitation, maintaining dignity, etc.) aspects of rehabilitation.

3.2. Ethics

All participants were recruited voluntarily through the rehabilitation department of Sansai Hospital and its networking community hospitals (Maetang Hospital, Phrao Hospital, Chiang Dao Hospital, Wiang Haeng Hospital, Samoeng Hospital, and Watchan Hospital) in rural Chiang Mai, Thailand. All participants read the participant information sheet, had the opportunity to ask questions, and signed a consent form prior to the study.

As for the disseminated content (i.e. videos, photos, etc.) featuring doctors, patients, family members, VHV's or other groups of key stakeholders, all individuals have volunteered for content production and did not participate in the study as participants. All individuals featured in the disseminated content have provided signed consent. Ethical approval was obtained from the

Central Research Ethics Advisory Group (REAG) at the University of Kent -- United Kingdom (Ref: CREAG070-04-23).

3.3. Intervention design

In order to identify the design and deployment requirements of key stakeholders over a social-media-based CBR intervention, we first sought to identify the challenges they face when accessing and delivering rehabilitation support in rural areas in Thailand. Ten focus groups (2-3 hours each) were conducted at the participating hospital. A total of 100 attendees, including patients ($n = 18$), family caregivers ($n = 19$), VHV's ($n = 24$), and healthcare professionals including physiotherapists ($n = 13$), occupational therapists ($n = 11$), and nurses ($n = 15$), engaged in at least one focus group. To stimulate discussion, motivate reluctant attendees, and help produce a group outcome that all attendees feel they own, the moderator wrote down every thought on a sticky note, posted it on a large board, and structured the information as they progressed in their discussions (Peterson and Barron 2007). After all materials (i.e. sticky notes) were collected and digitised, three design workshops were carried out to translate the outcomes from the focus groups into design and deployment requirements to form the digitally delivered CBR intervention. Each workshop (2-3 hours long) was attended by healthcare professionals in rehabilitation ($n=7$), experts in HCI ($n = 3$), an expert in mass communication in digital media ($n = 1$), and content designers ($n = 3$). While we did invite patients and family

Table 1. Summary of focus groups' key outcomes & their corresponding design implications.

Focus Group Key Outcomes & Design Workshops Outcomes (Design Implications)	
Accessibility & Costs: Attendees commented on the lack of finances to pay for the digitally delivered CBR intervention, as well as their concern about the patchy network connection in rural areas. However, most of the attendees mentioned owning a smartphone.	Facebook ¹ page was deemed suitable for the intervention (See Figure 1 for our Facebook page and posts); Facebook is widely used in Thailand (93.3% market penetration rate (Statista Research Department 2023a)), free to use, and offers Facebook Lite; a stripped-down version designed for unstable connection that also operates well on low-specification phones.
Lack of Knowledge, Training & Motivation: Family caregivers and VHV's commented on the lack of learning and training resources. Most patients and family caregivers highlighted their struggles to find the motivation to achieve their rehabilitation goals.	Through active engagement with participating healthcare professionals, the content was curated to address rehabilitation information and caregiving techniques ($n = 19$), motivational stories ($n = 25$), and text-based tips (at least twice a week). Content from external resources was to be shared whenever suitable. (See 3.3.1.3 for details)
Dissemination & Sustainability: Most family caregivers highlighted that verbal instructions shared at the hospital are often forgotten and can pose a challenge when multiple family members care for their loved one.	Content on Facebook can be shared with others (within and outside Facebook) in multiple formats such as links, photos, or videos. The shared content is not limited by storage or file size limits, and they do not have an expiry period (except for stories).
Ability to Identify Trustful Resources: Concerns were also raised about the false medical information available online and the need for reliable health information sources.	The participating hospital's name was to be added to the Facebook page title, aiming to increase the page's credibility. Further information about the page credentials was to be added in the "About" section. The participating hospital was to be credited in all disseminated content.
Live Advice: Some family caregivers and VHV's expressed the need for asking questions "on the spot."	Facebook Messenger ² feature was to be enabled for 1-1 interactions with page followers, facilitated by the admin team. (see 3.3.1.1 for details)
Language: Most family caregivers commented on how hard it was to follow instructions from online media using medical terminology, especially since most resources are in English.	All content and communications on the page were to be disseminated in Thai, using low medical terminology that is easy to understand.

Note: ¹<https://www.facebook.com/> ²<https://www.messenger.com/>

members to participate in the design workshops, none were able to join due to work commitments (e.g. could not take a leave off their jobs), transportation issues (e.g. commute is too far, commute scheduling frequency is too poor), and financial constraints (e.g. too expensive for a commute arrangement). Table 1 summarises the key outcomes identified in the focus groups, and the design implications discussed and agreed upon in the design workshops.

3.3.1. Content design

After the main parameters have been identified (see Table 1 for details), the design workshops shifted focus to content design; what kind of topics does the intervention need to cover, how to best communicate each type of information (i.e. content writing, scripting, storytelling, etc.), and what is the best format to communicate each type of information (i.e. infographic, video, motion graphic, text, etc.). After consultation with workshop attendees, content designers produced mockups and storyboards, and presented them in a later workshop. During the content production process, the participating healthcare professionals were responsible for ensuring the accuracy of the information conveyed in each design. Workshop attendees provided feedback, each based on their expertise, and in return, content designers proceeded to execute these designs. The design team also obtained final approval before handing it over to the page administration team.

3.3.2. The social media intervention

3.3.2.1 Page Administration Team. The page was mainly managed (informally referred to as ‘page admins’) by HCI designers ($n = 2$); this included

interaction with followers and moderating discussions, responding to direct messages, scheduling, releasing content on time, and associating content with appropriate captions and hashtags. The page was also managed by a doctor ($n = 1$), a physiotherapist ($n = 1$), and an occupational therapist ($n = 1$); to curate frequent text-based posts (e.g. tips, bite-size information, etc.) and interactions (i.e. polls and open-box questions). To assist the HCI admins in addressing as many enquiries as possible, a regularly updated private document was created to include answers to frequently asked questions. Whenever needed, healthcare admins would directly interact with page followers. Overall, comments and direct messages were responded to within a 12-hour timeframe.

3.3.2.2 Followers attraction strategies. The page was advertised to healthcare professionals within the rehabilitation departments of the participating hospitals through emails and word-of-mouth. Furthermore, the page was shared with other relevant (rehabilitation or stroke-related) Facebook groups (private and public). A core component of WHO’s CBR approach is the integration of the wider community, aiming to promote the inclusion and participation of people with disabilities in all aspects of their social and professional lives (World Health Organization 2017b). As such, Facebook ads were utilised to target a wider audience within the region, beyond those who are affected by disability.

3.3.2.3 Curated Content & Audience Engagement. On average, 6 posts were released every week including videos, bite-size infographics, and text-based posts. Whenever it was available, external content from

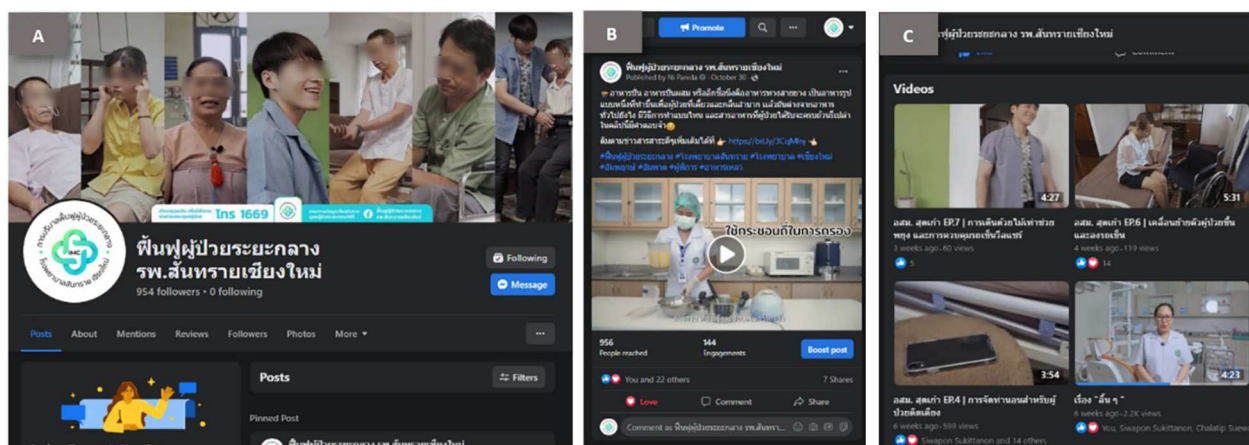


Figure 1. (a) The Facebook Homepage ‘Rehab Phase Care -- Sansai Hospital Chiang Mai’ (b) a sample video post on how to prepare ‘Blended food’, and (c) a sample video playlist showcasing a variety of content related to rehabilitation care. Notes: All individuals featured in the videos have volunteered for the sole purpose of content production and did not participate in the study as participants. All individuals featured in the disseminated content have provided signed consent.



Figure 2. (a) an infographic describing examples of fluid-to-solid food levels for people with dysphasia, (b) a visual post inviting page followers to ask questions to healthcare professionals, (c) a video that demonstrates physical rehabilitation exercises, and (d) a video interview with a stroke survivor who has successfully engaged in rehabilitation and yielded positive outcomes. Notes: All individuals featured in the videos have volunteered for the sole purpose of content production and did not participate in the study as participants. All individuals featured in the disseminated content have provided signed consent. The figure is a collage of four pictures. The first picture on the left is an infographic describing examples of fluid-to-solid food levels for people with dysphasia. In the middle section, the picture shows a visual post inviting page followers to ask questions to healthcare professionals. The top right picture is a screenshot of a video demonstrating physical rehabilitation exercises. Finally, the last picture on the bottom right side shows a screenshot of a video interview with a stroke survivor who has successfully engaged in rehabilitation and yielded positive outcomes.

reliable sources was shared on the page, such as other rehabilitation care centres and public health organisations. Additionally, interactive questions were posted about once a week, encouraging followers to share their experiences and ask questions (see Figure 2 for examples of different types of posts). The time of the scheduled content release was regularly examined and altered according to the peak activity time of followers, a metric provided by the Facebook Meta Business Manager.¹

3.4. Analysis & evaluation

The Facebook page was active for a total period of 10 months. Descriptive statistics were extracted from the Facebook Meta Business Manager to provide an overview over followers, interaction, and overall engagement.

In order to capture an in-depth understanding over the intervention, the nuances of better deployment, and how it works for different stakeholders, semi-structured interviews were conducted with a sample of intervention users. After at least one month of joining and interacting with the Facebook page, semi-structured interviews with patients and family caregivers aimed to reflect on their (i) experience during rehabilitation, (ii) health information seeking, and (iii) experience

using a social-media-based CBR intervention. Interviews with VHVs and healthcare professionals aimed to reflect on their (i) experience caring for rehabilitation patients and (ii) opinions social-media-based CBR intervention.

A total of twenty-three participants participated in interviews. All participants were involved in the 'Rehabilitation Phase Care' programme developed by the MPH and carried out by the participating hospital. Four patients (female ($n=2$), male ($n=2$)), aged between 43 to 68 years, diagnosed with stroke ($n=3$) and spinal cord injury ($n=1$) and 6 family caregivers (female ($n=5$), male ($n=1$)), aged between 23 to 59 years engaged in 1-1 interviews. In addition, professional and non-professional healthcare workers were also interviewed, including physiotherapists ($n=3$), occupational therapists ($n=2$), nurses ($n=2$) and VHVs ($n=5$). All interviews were conducted by two HCI researchers, audio-recorded, and lasted 30–45 minutes.

All interviews were conducted by two HCI researchers, audio-recorded, and lasted 30–45 minutes. All interviews were transcribed verbatim and translated from Thai to English for analysis. The findings were drawn from the interviews using thematic analysis, a method used for identifying, interpreting, and reporting patterns within datasets (Braun and Clarke 2006). To

answer the research questions, transcripts were read through multiple times by two researchers in HCI aiming to identify patterns in the data, which were then coded (e.g. 'confidence', 'no access') and then refined into initial themes (e.g. 'information sharing', 'motivation'). Finally, to further refine and verify the themes, two researchers in HCI, one expert healthcare professional in the field of rehabilitation and three experts in HCI for healthcare critically discussed and reviewed each theme and underlying codes together.

4. Findings & discussion

Through this study, we aimed to answer the following research questions: (i) Examine the needs and challenges experienced by key stakeholders (i.e. rehabilitation patients, their families, healthcare professionals, and VHV's) in accessing and delivering rehabilitation care in rural areas, (ii) Explore how traditional CBR could be translated into an online digital medium. We seek to scrutinise the features and limitations of social media for facilitating CBR, and (iii) Lay out the design and development opportunities and challenges associated with digitally delivered CBR, aiming to enhance its deployment and dissemination in the future. While previous research has explored the design of online communities for healthcare, these studies have primarily focussed on patient peer data sharing and perceptions, particularly in specific stigmatised conditions such as Human Immunodeficiency Virus (HIV) and cardiovascular disease (Bussone et al. 2020; Cerón-Guzmán et al. 2022). In contrast, this study examines the design and deployment of CBR through social media, incorporating not only patients but also family members, healthcare professionals, and VHV's. Furthermore, we address the specific geographic context of rural environments, considering the unique cultural, infrastructural, and logistical challenges inherent in such settings. In order to gain an overall understanding of the activity and interactions received on the Facebook page, we first present an overview of the page demographics and other content-related analytics. Then, we proceed to present the findings extracted from the interviews. Quotes were occasionally used from the transcribed interviews to provide context and illustration of the findings.

4.1. Intervention demographics & analytics overview

The Facebook page obtained a total of 1,028 followers. 4% of the audience was 18–24 years of age, followed by 21% aged between 25–34, 39% between 35–44, 19.3% between 45–54, 11% between 55–64, and 5.7% were 65 years or older. Of which, 71.7% of the followers were female, compared to 28.3% males. Such skew in gender distribution is not surprising, especially when considering the context of rural areas; it has been reported that approximately 65% of caregivers in rural settings are females due to cultural norms and traditional gender roles within households (S. A. Cohen et al. 2024). In terms of geographical location, the majority of the audience (72.5%) is based in Chiang Mai, followed by 19.8% in Bangkok and 7.7% from other areas.

The overall page reach (i.e. the number of individual accounts that viewed at least one piece of content from the page) was 74,298. A total of 77 posts were published. The disseminated content yielded a total of 2949 reactions (i.e. likes, love and other reactions). Table 2 provides details of the four content types: (i) video posts, (ii) infographic posts, (iii) Q&A posts (where followers were invited to ask questions for the doctor or where frequently asked questions were shared), and (iv) general posts (featuring casual conversations, interesting news, or health tips).

Table 2 shows that video posts received high traffic and interest in comparison with other post types, achieving the highest impressions (i.e. the number of times content from our page appeared on a screen), reach (i.e. the number of people who saw content from our page), and engagement (i.e. actions such as likes, shares, and comments). The video with the highest engagement featured a true story illustrating the rehabilitation journey of patients (who were recruited for the sole purpose of the production and were not involved in the study as participants), achieving 26,821 impressions, a reach of 21,888, and 406 engagements. The second video portrayed real patient experiences from the perspectives of various stakeholders, with 21,774 impressions, a reach of 12,338, and 465 engagements. The third video was about speech therapy exercises had 11,580 impressions, reached 10,073 profiles, and received 263 engagements.

Table 2. The average impressions, reach, and engagement of our Facebook page post types.

Post Type	Impressions	Reach	Reactions	Comments	Shares
Video	8920.0	7042.6	152.6	13.1	53.2
Infographic	419.2	372.0	15.0	1.5	23.5
Q&A	85.2	72.6	6.2	2.0	10.2
General	61.7	50.3	7.6	0.8	2.6

Infographic posts performed moderately, with notable shares despite lower impressions. For instance, one post talked about welfare benefits for patients with a disability identification card and received 369 impressions, 308 reach, and 38 shares. Another infographic post was about acupuncture for the treatment of stroke patients, garnered 95 impressions, 79 reach, and 27 shares. Q&A posts generated a fair level of engagement, with the most popular post receiving 89 impressions, 75 reach, and 29 engagements. Lastly, general posts had the least impact, with minimal impressions and limited audience interaction.

4.2. Thematic analysis

Our general observations resonate with existing literature, which underscores the disparities between urban and rural healthcare, with the latter often grappling with limited resources, infrastructural constraints, and deep-rooted cultural beliefs which can hinder the efficacy of rehabilitation care (Arcury et al. 2005; Barber et al. 2016; Limwattananon et al. 2015; Sungbun et al. 2020). As we analysed key stakeholders' experiences in using and interacting with the social-media-based CBR through an inductive approach of thematic analysis, four main themes emerged: i) The Multifaceted Role of Social Media in CBR, ii) Narrative Healthcare for Affirmation, Comforting & Motivation, iii) A Village-Centred Approach: Recognising All Stakeholders in The Rehabilitation Journey, and iv) Safety, Privacy & Trust in a Digitally Delivered CBR.

4.2.1. The multifaceted role of social media in CBR

We found that social media, in the context of CBR, can act as a platform with multifaceted roles; not only it can provide practical medical knowledge, but it can also foster community engagement, offer emotional and mental insights, and help navigate the challenges of digital literacy and accessibility, while addressing the socio-cultural nuances of rural settings. One of the primary roles of social media in CBR is to disseminate knowledge about disability and rehabilitation, catering not only to patients and family members but also reaching the broader community (World Health Organization 2017b). This is particularly valuable since traditional handover methods often fall short, where reliance on verbal communication (Hill et al. 2016), demonstrations, or pamphlets can inundate patients and their family caregivers with complex medical jargon, leading to information overload (Hoek et al. 2020; Kim 2020).

We have pamphlets and small booklets about rehabilitation produced by the Office of Public Health Physical

Therapy. However, these publications have unclear pictures and hard-to-understand text, which makes them ineffective. [HP2]²

Such clinical handovers are standard procedures in a formal hospital care environment (i.e. shift change handover) to ensure the continuity of care and patient safety (Raeisi, Rarani, and Soltani 2019). However, we found that in our study, informal handovers occurred very frequently, which can impact the rehabilitation journey of patients.

Sometimes, we have taught this patient's family member already, but the patient has many relatives, and the caregiving duties get shifted among them all the time. The lack of a primary caregiver in the rural household causes many issues, which can complicate the recovery of the patient. [HP3]

In rural CBR settings, the caregiving responsibility often shifts among various family members due to the strong family ties and shared breadmaking duties typical of rural Thai society. This frequent rotation can complicate the patient's recovery journey. Social media could offer a solution to these challenges. It serves as a centralised hub for informal handover and information sharing. The ability to share resources, revisit content, and engage with a community provides family members with a reliable and consistent source of information, bridging the gaps left by traditional methods.

I usually come across bits and pieces of information all over the internet, but the vast variation in content makes it difficult to pick out the trustworthy ones. Your Facebook page conveniently provides lots of information in one place. [FC6]

Most of the medical videos on YouTube³ are too academic and boring. I also have to search for the meaning of medical words on Google. [FC2]

Indeed, navigating the vast digital landscape for medical information can be likened to the difference between open-source and walled garden ecosystems. Unlike the open-ended ecosystem of the broader internet, a dedicated social media page for CBR may act as a beacon, offering a curated space where information is vetted and consistently presented. This 'walled-garden' approach may foster trust and encourage users to engage more deeply with the content, showcasing one of the many roles social media can play in the rehabilitation journey.

However, it is essential to recognise the diverse preferences of users. While social media offers a centralised hub, some participants still lean towards traditional search engines when seeking healthcare information (De Choudhury, Morris, and White 2014). Their inclination underscores the dominance of search engine

algorithms and points to an area where social media platforms might need to enhance their search capabilities.

I find it easier to search for specific health topics on Google. [FC2]

The role of Social media in CBR extends beyond merely disseminating practical knowledge. While hospitals typically provide information centred on the tangible aspects of care, such as feeding and exercise, our findings highlight the role of social media in delving into the emotional and mental facets of rehabilitation. Family caregivers emphasised the invaluable insights they gained from the social media intervention, particularly regarding the emotional and psychological challenges their loved ones face. This comprehensive approach is especially crucial for caregivers of stroke and brain injury patients, who often grapple with understanding the profound shifts in their loved one's mood, personality, and preferences (Dwan and Ownsworth 2017; Ferro and Santos 2019; Svensson, Much, and Exner 2021).

...I've learned [through the Facebook page] that he is emotionally unstable because of his illness. So, I try my best to understand the disease and how it affects his emotions. When he acts out, I now try to stay calm and avoid scolding him. [FC3]

Furthermore, VHV's also found it helpful being able to signpost patients and family caregivers to particular resources on the Facebook page that answered their enquiries, provided demonstration, and left them with a reference they could go back to even after VHV's visit had ended.

This Facebook page is very convenient for me. When I am working in the village, I can just open the page and show the content to other people without wasting time googling. [VHV1]

In examining the multifaceted role of social media in CBR, it is essential to recognise not just its potential but also the barriers to its effective use. While our findings showed that many patients in the focus groups had accounts on popular social media platforms like Facebook, Line, and Facebook Messenger (Statista Research Department 2023a), their actual engagement levels were notably low. This discrepancy underscores the diverse challenges patients face in navigating the digital landscape. Some patients expressed basic usability concerns, such as only knowing how to scroll through the news feed without deeper interaction. Others felt uncertain about the unwritten rules of social media, fearing they might inadvertently commit a faux pas. This highlights the importance of user education and guidance in

maximising the benefits of digital CBR tools. Additionally, the reliance on family members for information sourcing points to the broader role of social media: it is not just a tool for patients, but a resource for their entire support network. However, the most poignant feedback came from patients whose disabilities hindered their use of technology, reminding us of the emotional impact of rehabilitation and the need for accessible digital solutions.

I don't feel like using Facebook because it reminds me of my disability in my hand. Actually, I avoid using any technology, including not answering calls from friends. [PT2]

This feedback underscores the importance of understanding and addressing all stakeholders' diverse needs and challenges in the CBR process, further emphasising the multifaceted role of social media in this context.

4.2.2. Narrative healthcare for affirmation, comforting & motivation

Rehabilitation often involves a more intense and prolonged journey compared to other health conditions. The process of regaining lost functions, adapting to new limitations, and the continuous effort required make the shared experiences in digitally delivered CBR particularly poignant. The stories of progress, setbacks, and resilience can deeply motivate patients and their family members on similar paths. This could be especially valuable when patients and family members are geographically isolated from those who are undergoing similar challenges. In that respect, narrative healthcare underscores the therapeutic benefit of shared stories and experiences in recovery and maintaining the rehabilitation continuum. Within the framework of conventional CBR, this narrative approach fosters a sense of community, support, and affirmation (World Health Organization 2017b). Engaging with others who have undergone similar journeys not only provides comfort and motivation but also serves as a testament to the resilience and shared human experience (Honary, McNaney, and Lobban 2018; Lockhart et al. 2014). Our digitally delivered CBR intervention tapped into this narrative essence, offering individuals a platform to connect, share, and find solace in collective stories.

I feel connected with these people [on the Facebook page] because they have the same condition as me. I am glad they recovered. I feel hope. [PT2]

Furthermore, the stories of caregivers are as vital as those of the patients. Rehabilitation is not an isolated journey; it weaves into the fabric of families, disrupting routines, work, responsibilities, and finances. Our study

echoes the broader literature, highlighting the multifaceted stressors family caregivers face, from the physical demands of caregiving to financial burdens (Lai and Leonenko 2007), time constraints (Steenfeldt et al. 2021), and the emotional tolls (Bakas and Burgener 2015), these responsibilities bring. These challenges are amplified in rural settings where support systems might be sparse or inaccessible (Ehrlich et al. 2015; Kipp et al. 2007). Narratives shared on platforms like our Facebook page become essential in this context. They offer caregivers a mirror to their own experiences, allowing them to see their struggles and triumphs reflected in the stories of others.

I was anxious and depressed at the beginning, which negatively impacted my own health. [FC3]

Interestingly, most caregivers mentioned the comfort, sense of unity, and connection they experienced through their interactions on the Facebook page.

I felt comforted knowing there are other people in the same situation as ours. [FC1]

We also realised the therapeutic value of stories, not just in understanding one's journey but also in validating one's experiences and choices. For caregivers, this validation often comes from seeking and sharing knowledge. Our study found that many participants turned to the social media platform to affirm their knowledge and ways of caregiving practices. Even when they were already informed, the narratives and interactions on the page served as an anchor, helping them navigate the emotional complexities of caregiving. These digital narratives provided a space for caregivers to compare, reflect, and reassure themselves of their caregiving approaches.

I have been seeking online health information about my son's condition to comfort myself and see if I am treating him the same way as others. When I watch more video clips, ask questions, or see other people's comments, I understand better and feel more confident about my caregiving. [FC3]

Such confirmation and reassurance were also recognised by VHVs. Despite their pivotal role in community-based care, VHVs often grapple with confidence issues stemming from their feelings that their training is insufficient. Their narratives reveal gaps in their training, where large group sizes and limited resources hinder effective learning.

During the training, many people were present, which made it difficult for us to ask questions or see the demonstration clearly when the doctors were explaining something. [VHV1]

This challenge has been observed in the wider research community; research indicates that the quality of training is generally low, the frequency of available courses is lacking, and post-training resources are limited for such healthcare volunteers (Javanparast et al. 2012). Engaging with the content and the digital community on the social media platform has provided VHVs with a renewed sense of assurance. These digital stories and demonstrations serve as a continuous learning tool, allowing VHVs to revisit, reflect, and refine their skills.

I never had the courage to clean a patient's wound, but now I find it very easy to follow what you did [in the content provided on the Facebook page], and I can rewatch this part over and over. [VHV2]

One aspect that was not raised through the focus groups and design workshops, is the socio-cultural barriers faced when delivering rehabilitation care. In many rural settings, cultural narratives dictate a stoic response to hardships, often discouraging open expressions of emotional distress or vulnerability (Magnus and Advincula 2021). This cultural narrative can inadvertently hinder active engagement in rehabilitation, impacting not just the patient but also their surrounding loved ones.

...but he [the patient, their loved one] is unaware of his condition, He thinks that he will recover by himself without rehabilitation. Everyone in my family feels stressed out and anxious about his future. [FC2]

Similarly, the narrative of traditional medicine, deeply rooted in the cultural fabric of rural Thailand, often clashes with the narratives of Western medicine (P. T. Cohen, Lyttleton, and Phatcharanuruk 2022). This divergence in health narratives can lead to resistance in embracing prescribed rehabilitation methods, as seen in the stories shared by family caregivers.

All my father's life, he has only sought traditional medicine such as herbal remedies. After he had a stroke, I had to deal with his temper to convince him to take the doctor's prescription. [FC6]

In that respect, further investigation is required to understand how social media CBR can be designed to overcome such cultural barriers in a careful and respectful manner.

Through embedding narrative healthcare into the social media CBR intervention, we can foster a sense of comfort, motivation and affirmation, not only for the patients themselves, but also for other stakeholders in the caregiving process, such as family

members and VHVs. As such, weaving the stories and narratives of patients and their family members into every aspect of the social media intervention is crucial.

4.2.3. A village-centred approach: recognising all stakeholders in the rehabilitation journey

In the rural context, it literally takes a village to support the patients with rehabilitation needs who are on their journey to recovery. Whilst CBR is considered a collective effort of patients, their families, volunteers, professionals, policymakers, businesses, health providers and the broader community, throughout the interviews, it was prevalent that patients and family members struggle to see all components of CBR as a formal and valid form of care. For instance, VHVs are often overlooked despite their significant contributions to the success of CBR; VHVs in our study conveyed their personal account of the challenges faced in attaining trustworthiness and credibility within the community.

Some people do not cooperate with us because we are not doctors. They wouldn't trust our advice and they wouldn't let us treat them. But we still show up every day, anyway, hoping we will convince them. [VHV1]

Such a barrier to the effective deployment of CBR has been previously reported in the body of literature; patients and family caregivers exhibit poor confidentiality and trust towards VHVs due to their lack of 'formal positioning' in the healthcare system, lack of professionalism a doctor may portray, and the lack of robust and visible support of VHVs from healthcare professionals and clinics (Grant et al. 2017; Sripad et al. 2021). Such barriers could be detrimental to the success of CBR; due to the shortage of healthcare professionals, financial constraints and geographical barriers, doctors and healthcare professionals rarely see their patients (whether at the hospital or through house visits), whilst VHVs are able to visit patients' multiple times a week. Whilst the use of technology on its own does not automatically bridge this trust gap, our results show that representation in the social-media-based CBR intervention may help VHVs feel recognised and supported. Some of the video content shared on the Facebook page portrayed a VHV caring for a patient, something that VHVs commented on, mentioning it may help patients and family members recognise the role of VHVs in CBR.

I felt good to see VHVs being represented in the content because I think it can influence patients and family members to gain more understanding about who we are and what we do, and therefore, become more cooperative and allow us to help them better. [VHV5]

Our study shows that the act of portraying VHVs caring for patients on a platform like Facebook is not just informational; it is an act of validation. Such narratives can serve as cultural mediators, challenging and reshaping these biases by offering alternative, positive portrayals of VHVs. Furthermore, it might be the case that the role of VHV is not necessarily underestimated, but it could be misunderstood. As such, by sharing narratives that depict VHVs in their professional capacity, the social media CBR intervention may demystify their role in the CBR ecosystem.

By sharing these narratives, the social media CBR platform acknowledges the crucial role VHVs play in the healthcare ecosystem. This validation can be empowering for VHVs, as it offers them a sense of professional identity and worth. In fact, several VHVs highlighted their pride and sense of belonging to the CBR ecosystem, especially when the page was advertised and managed under the participating hospital's name, hence, receiving such recognition from a formal healthcare body.

I love how you represented VHVs' duty. I feel proud, and it gives me the motivation to keep caring for patients. [VHV3]

Similarly to prior research, the importance of recognising and acknowledging the hard work of VHVs (Narkvichien 2020; Tripathy, Goel, and Kumar 2016) is essential to keep the CBR ecosystem running, enabling patients and families to recognise the role of VHVs in the rehabilitation process, allowing them to make the most of the VHVs visit and therefore, enhance rehabilitation outcomes.

4.2.4. Safety, privacy & trust in a digitally delivered CBR

In a digitally mediated intervention, it is critical to consider the ethical, safety and privacy implications of engaging in a sensitive dialogue and sharing healthcare-related information online. The safety and privacy concerns related to the use of social media for health purposes have been widely discussed in the body of literature, especially regarding the risks to patients' privacy and confidentiality [see review in Chen and Wang 2021]. Such concerns are exacerbated in Thailand; research shows that as of 2021, the value of economic damage caused by internet-related fraud equals 214,488.2 million Thai Baht or £5685.12 million Sterling Pound. Furthermore, due to the popularity of Facebook in Thailand, with a market penetration rate of 93.3% (Statista Research Department 2023a), Facebook is ranked as the number one online platform with the total value of financial damage caused by fraud among

any other online platform in Thailand, highlighting that Facebook users in Thailand are more likely to be harmed by online scams than users of any other social media platform (Kraiwanit and Srijaem 2021).

As a result, several approaches were undertaken during the design workshops to enhance the credibility and trustworthiness of the Facebook page. For instance, as part of our engagement strategy, we employed various methods to attract followers, including word of mouth (i.e. healthcare professionals and VHVs endorsing the page to patients, family members, and other VHVs), sharing the page with other relevant (rehabilitation or stroke-related) Facebook groups (private and public), and Facebook. Among which, participants mostly commented on finding the page credible because it was endorsed by their healthcare professional.

I trust your Facebook page because my doctor recommended it to me. [FC1]

Another approach that was taken was to include the participating hospital's name as part of the page title, include further information about the project and its relationship with the hospital in the 'About' section of the Facebook page, and credit the participating hospital in every piece of content produced. Something that was noticed by our participants. Such commentary aligns with previous research that highlighted the efficacy of leveraging the authority of hospitals or governmental bodies in designing interventions, mentioning that such interventions are more likely to be accepted by LMICs in general and rural communities in specific (Mustafa et al. 2020).

I trust your Facebook page because a famous hospital manages it. [FC4]

Nonetheless, several participants were still wary of interacting on the Facebook page due to their fear it would put them or their friends in harm's way. Participants explained that the reason behind their reluctance was due to their lack of understanding of how Facebook works, so it is easier to not interact "just in case" or because a public page means there will be people whom they are not familiar with, and therefore, could be malicious.

I'm hesitant to comment on anything on Facebook; I'm concerned that my personal data on Facebook could be used for scams or manipulated to deceive my friends. I can't determine who is a scammer or not, or what I should or shouldn't do to protect myself and my friends. So, I simply surf through Facebook without interacting with any of its content. If I really need to, I opt for private messaging on Facebook Messenger. [PTR7]

Participants also highlighted another concern, highlighting the relationship between trust and the discoverability of the page on search engines. Previous research has shown that individuals who frequently use search engines for their searches tend to trust the sources displayed on the first page of the search results (Wu, Kelly, and Sud 2014). Considering that Facebook pages typically rank low on search engine searches, without strategies such as Search Engine Optimisation (SEO) to enhance its visibility on the first page of search engines, the page might be perceived as less trustworthy.

...If the doctor had not told me about it [the Facebook page], I would not have known this page had existed. [FC2]

Furthermore, some participants commented on how the appeal of shared links from Facebook to other platforms may affect the trust of the receivers. Several participants commented that when they shared a Facebook post or video outside Facebook, the content is shared as a plain long link (unlike Instagram,⁴ for instance, which shows a thumbnail, title, hashtags and links), deeming such display looks suspicious, causing the message receiver hesitant to click to view the content. Such concern is justified, given that prior research emphasises the significance of thumbnails and advocates for the development of an automated thumbnail system to enhance its efficacy (Shimono, Kakui, and Yamasaki 2020; Yuan, Ma, and Zhu 2019).

Our work becomes much easier through the distribution of educational content to patients and their families. However, when I share the content through Line,⁵ the links appear as long text without a title or thumbnail. This presentation diminishes their visual appeal and makes them appear untrustworthy. [VHV1]

Another concern raised in previous literature regarding the use of social media platforms for healthcare purposes was the concern of privacy and confidentiality (see a review in Chen and Wang 2021). Many studies raised concerns about the risks accompanied by users disclosing their medical information online, fears about the lack of confidentiality when posting or interacting with medically-related pages, concerns related to the 'social etiquette' of doctor-patient communication when interacting with patients, family members, doctors and all key stakeholders in a social media health-related intervention. In our study, patients and caregivers did not particularly raise concerns about their own privacy and confidentiality; however, healthcare professionals indicated their concerns regarding the privacy implications of utilising Facebook for work-related activities.

Typically, I don't add co-workers or patients as friends on Facebook. [HP4]

In a digitally delivered CBR, safety, trust, privacy is multifaceted, involving not just healthcare providers but also the digital platforms themselves. As such, further research is required to better understand how we can transfer the principles of safety, trust, and privacy in conventional CBR to a digital platform.

5. Design implications

The use of social media platforms as a means to deliver CBR, especially in rural settings, offers many opportunities and presents unique challenges. Our study comprehensively explores the nuances of a digitally delivered CBR for rural areas, and sheds light on key design implications, in attempts to build a holistic CBR support system that caters to the needs of all key stakeholders in rural areas. Unlike prior work (Kraut et al. 2012), which emphasises general principles of online engagement, our findings highlight the critical importance of designing for the socio-cultural and infrastructural realities of rural communities. Specifically, we emphasise the need for accessible and shareable digital resources that align with the collaborative caregiving dynamics involving family caregivers and VHV. Furthermore, we propose reimagining social media features—such as enhanced search mechanisms, emotion-sensitive suggestion systems, and privacy-preserving multi-role systems—to support the complex needs of rural healthcare stakeholders. Our findings also underscore the power of narrative-driven approaches, cultural integration, and gamification to motivate and sustain engagement within a social media-based CBR system.

Through this study, it became evident that central to CBR is the distinctive caregiving dynamic inherent to rural settings. Caregiving is a collaborative effort within familial and communal contexts, with VHV holding a pivotal position in providing essential care for rural rehabilitation, highlighting the need for digital resources that are not only accessible but also seamlessly shareable. Such resources should be designed with flexibility in mind, ensuring that every caregiver, irrespective of their entry point into the patient's journey, is equipped with consistent, reliable and high-quality information. Furthermore, we found that content needs to be catalogued into a well-designed structure to enable users to find and navigate easily. This has been an ongoing investigation in many social media platforms; 'topics' and 'hashtags' are used in Facebook groups to organise content, YouTube offers

'playlists' that are organised by the account owner, and Instagram offers 'highlights'; a collection of stories under a particular title, all organised at the top of the page. As such, there's a need to re-imagine the design of social media platforms and the features they offer when used in healthcare context. Such tailored features should prioritise the flexibility of information transfer among key stakeholders, credibility, accuracy, and accessibility of rehabilitation-related content, while still preserving the community-driven essence of social media.

Furthermore, we found that the challenges of the digital landscape are multifaceted. Even when access to digital platforms such as social media has increased in rural areas (Devi and Venugopal 2022), the ability to effectively navigate and utilise these platforms varies significantly among key stakeholders. Our findings indicate a spectrum of digital literacy levels. Many users feel overwhelmed by the vastness of online information, the plethora of sources, and the challenge of discerning reliable content from misinformation. One solution future research could examine is enhancing the search mechanisms on social media platforms; as they fall short of the precision and specificity required for health-related queries in comparison to search engines such as Google (Huang et al. 2020). For instance, a user searching for rehabilitation exercises on social media might be inundated with a mix of professional advice, personal anecdotes, and potentially misleading information, rather than a clear, curated list of medically approved resources. As such, there is a need to enhance such search engine mechanisms on social media platforms to access better quality and relevant content, pages, or people. On the opposite end, instead of users actively searching for content, future research could explore smarter suggestion systems on social media, such as using emotion recognition algorithms. For instance, social media designers could provide more personalised and empathetic support by gauging the emotional state of users based on their interactions (e.g. comments, keyword searches, time spent engaging with content, etc.) and suggest suitable content accordingly.

Another aspect of enabling caregivers to play an active and effective role in CBR, is to recognise and empower their role in the CBR ecosystem. In the case of VHV, despite their dedication and contributions, they often face hurdles in gaining the trust and recognition they deserve from the community (Grant et al. 2017; Sripath et al. 2021). This trust gap, if not addressed, can hinder the effectiveness of the CBR ecosystem. Digital platforms, like social-media-based CBR, can play a transformative role here; by showcasing the work of VHV, validating their efforts, and positioning them

as integral components of the CBR ecosystem, these platforms can help bridge the trust gap and elevate the status of VHVs in the eyes of the patients, their families and the community.

We also found the power of narratives in the rehabilitation process cannot be overstated. Shared narratives, particularly those that resonate with personal experiences, can be deeply motivating, comforting, and affirming. They not only provide information but also emotional and psychological support, helping individuals navigate the complexities of rehabilitation. These narratives act as beacons of hope, showcasing the resilience of individuals on similar journeys and offering comfort in the knowledge that one is not alone in their struggles. In addition, cultural narratives, deeply interwoven into rural communities, play a pivotal role in shaping health behaviours and perceptions. We believe that such a narrative-driven approach needs to be woven into the entire strategy of the social media CBR intervention, explicitly and implicitly. Such integration includes the thoughtful execution and design of disseminated content, whether those were pre-curated (i.e. videos or pictures) or spontaneous (i.e. live streaming), the language and approach used by admins when interacting with followers, interactive activities such as polls and open box questions, and the promotion and moderation of user-generated content. Another approach that could be investigated in the future is 'branched narratives'; where content evolves based on user choices. Such an approach may offer opportunities for overcoming socio-cultural barriers and personalised learning and training in the context of CBR. Furthermore, integrating elements of gamification can serve as motivational, community-building and narrative-strengthening tools, rewarding users for their active participation and CBR-related achievements within the social media CBR. Whilst Facebook introduced some interaction-based badges, such as 'top fan' and 'conversation storyteller', in a social media CBR, these could include rewards for sharing their stories, achieving certain milestones in their rehabilitation process, or engaging with others in the community.

Anonymity and privacy are other aspects we found crucial to consider in a social media CBR. While platforms like Facebook offer limited anonymous posting capabilities within groups, most other platforms lack this feature without creating a separate account. Bearing in mind that social media platforms originally intended to connect users with family members, friends and their loved ones, there is a need to investigate solutions on how the representation of individuals would look like when engaging in a healthcare or rehabilitation intervention online, without compromising their privacy,

professionalism, or anonymity in a social media platform. For instance, a multi-role system could be embedded in a social media platform to allow healthcare professionals have an 'informal' role and a 'formal' role, where in each role, the profile overview, connections, comments, and conversations are separate. This may help maintain a healthy doctor-patient and colleague relationships without breaking social boundaries. Similarly, family members might want a 'caregiver' version of their account where their comments and interactions are masked from appearing on their friends' and families' profiles. If such multi-role dynamics were to be introduced, users could also benefit from a personalised dashboard based on their role on the page, providing them with the most relevant information.

6. Conclusion

This paper describes a study that explored the design, use, and deployment of social media as a means to digitally deliver CBR support in rural areas. The study was limited due to the small sample of interviewed participants, which was due to the logistical limitations in reaching out to patients and their families in rural areas. The study was also limited by the length of the intervention deployed in, as such, a more large-scale, longitudinal study is required to examine the long-term effects of digitally delivered CBR and the design and deployment implications that come with it. The study was also restricted by a single setting; only Facebook was used to deliver the digital CBR intervention. While Facebook offers wide reach and engagement features, other platforms may reach to different demographics, deliver content in a range of modalities, and offer a variety of features that can enhance the engagement and effectiveness of digitally delivered CBR. Nonetheless, the study presents a comprehensive view of the challenges and barriers key stakeholders face in accessing, receiving, and delivering rehabilitation care in rural settings. The study also highlights the potential of social media as a means to deliver digital CBR, aiming to bridge the gap where conventional CBR is out of reach or unfeasible in rural areas. We believe this paper contributes to the HCI community with design needs and opportunities towards digitally delivered CBR to support those who need it in rural areas.

Notes

1. <https://business.facebook.com/>
2. [Interview Source: PT=Patient, FC=Family Caregiver, VHV=Village Health Volunteer, HP=Healthcare professional]

3. <https://www.youtube.com/>
4. <https://www.instagram.com/>
5. <https://line.me/en/>

Acknowledgments

We acknowledge the Faculty of Public Health at Chiang Mai University and Sansai Hospital and its networking community hospitals for providing the support to conduct this research. Finally, we would like to thank all participants for their time and efforts in contributing to this research.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the National Research Council of Thailand (NRCT) under The Social Sciences Spearhead Project under Grant number 30124.

ORCID

Acarima Nanthanasit  <https://orcid.org/0009-0001-3264-5087>

Luma Tabbaa  <http://orcid.org/0000-0002-0947-4988>

Chee Siang Ang  <https://orcid.org/0000-0002-1109-9689>

Siwaporn Sukittanon  <https://orcid.org/0009-0002-6198-0164>

Chalutip Suewattana  <https://orcid.org/0009-0003-9800-9854>

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