

Oral health promotion via teledentistry for homebound and bed-ridden patients in Thailand: case reports exploring feasibility and user satisfaction

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Evidence on teledentistry for oral health promotion in developing countries remains limited. This report presents a series of case reports from a pilot teledentistry programme implemented for homebound and bed-ridden patients in Thayang District, Phetchaburi, Thailand. Twenty-three patients (mean age 74.2 years; range 57–92) who were registered under the local home-visit service participated in the programme. These cases illustrate how teledentistry was incorporated into routine care to support oral health assessment, education, and follow-up.

Of the 23 cases, 20 patients (87%) successfully used the Teledent system with assistance from caregivers, village health volunteers, dental hygienists, or independently. Pre- and post-test oral health education results showed improvement across all three oral-condition groups, although the tests were descriptive and used solely to support case documentation. User satisfaction was high, with an average score of 6.49 out of 7 on the Thai Telehealth Usability Questionnaire (T-TUQ). The most common challenges reported were technical limitations and unfamiliarity with the technology.

These case reports demonstrate that teledentistry can be feasibly integrated into routine home-visit services to enhance oral health promotion for homebound and bed-ridden patients. The findings highlight practical considerations for implementation and suggest that teledentistry may be a promising supplementary approach in underserved settings.

Keywords: health access, special care dentistry, teledentistry

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Introduction

Telemedicine has been increasingly used in Thailand since the COVID-19 pandemic. Similar to teledentistry, it was defined as “a dental service which transfers and communicates dental health information from a dental care provider at a virtual clinic from place to place via the electronic method” [1]. Teledentistry in Thailand is also a part of telemedicine,

which could help patients communicate with dental professionals officially adopted and utilised via the Line Application during 2020-2021, with the teledentistry guideline from the Thai Dental Council [2, 3]. This could help with consultations for preventive or referral for emergency care. Following the COVID-19 pandemic, the Thai government identified teledentistry as a potential approach to help the population access dental services,

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particularly for screening or consultation. The Ministry of Public Health (MoPH) has officially launched teledentistry within its system, integrating the existing application “Mhor Prom” under MoPH regulation. This service offers both synchronous and asynchronous modes [4]. Some local areas in Thailand also provide teledentistry services, which could be grouped into 3 services, including 1) follow-up symptom (home visit, oral health education, and promotion), 2) emergency consultation, and 3) screening service [5].

In Thayang district, Phetchaburi, Thailand, there are a total of 195 bedridden patients covered by Thayang Hospital. However, the bedridden and homebound patients had limited access to healthcare due to various barriers[6]. Therefore, these patients have inaccessibility to oral health examinations and education on oral health care. Consequently, the Care Plans, which are the treatment plans for each bedridden patient, do not include oral care plans. The oral health problem of bedridden patients may have a significant cause, one of which is the inability to access dental services. Additionally, in 2024, the group of home-bound bedridden patients became one of the driving issues for the District Quality of Life Development Committee (DQLDC) of Tha Yang district. Both the DQLDC and Tha Yang Hospital have a policy to introduce the Teledentistry system to increase access for bedridden patients [7]. Furthermore, there is a plan to develop Tha Yang Hospital into a dental hospital, which is expected to enable the recruitment of more staff, including dentists and dental personnel, to provide more comprehensive care for patients.

This pilot programme aims to explore the feasibility of teledentistry utilisation, establish the workflow as well as the database for bedridden patients, and increase oral health knowledge in caregivers for bedridden patients.

This report is based on cases derived from routine hospital services on a group of patients (n=44) who registered and utilised healthcare services in the Universal Coverage Scheme in Thayang District, Phetchaburi province, Thailand. All patients normally had home-visit by Thayang Hospital, Phetchaburi. All participants agreed and gave their consent by themselves and their caregivers. The consent obtained was part of the standard clinical consent process for routine care and education-related health services within the hospital. As the cases were collected as part of routine service work and not through a research protocol, a separate human research ethics approval was not required. All identifiable patient information has been removed to ensure confidentiality. This study has been a part of the normal Thayang Hospital service and community extern field for 6th year students, Faculty of Dentistry, Mahidol University.

Case reports

All cases were managed according to the teledentistry workflow illustrated in Figure 1. Each step in the process was followed consistently as part of routine service delivery. This ensured standardisation across all cases.



Figure 1 Teledentistry service via Mhor Prom application.

First home visit

Patients who registered as bedridden patients were listed from the dental public health clinic at Thayang Hospital in February 2024. Patients who refused to participate in this pilot were excluded from the pilot programme, but were still able to have a normal home visit as they had. Patients were examined for their oral health, assessed their dependent status via the Barthel index, which indicated Activities of Daily Living level (ADL) by the Thai version of the Activities of Daily Living level (ADL) [8] screening test, and conducted pre-tests on the knowledge of oral care for bedridden patients and oral cancer screening. Additionally, the dental care team also conducted oral health education sessions, including individualised instruction on daily oral hygiene, denture care where applicable, recognition of early oral lesions, and guidance for caregivers on performing routine oral care for bedridden patients. The in-depth interview for the barriers to dental and health care services for each patient.

Service Plan management

The dental care team studied information and discussed the barrier issues with the Primary Health Care Service team (PHC) and the integrated team of Tha Yang Hospital, Phetchaburi, Thailand, to define the target group using teledentistry. After the survey, the team developed an action plan based on the PRECEDE-PROCEED framework [9] and the Ottawa Charter [10] for teledentistry with the local healthcare team.

The teledentistry system was introduced, including download “Mhor Prom” application and instructions for using the service, especially how to make an appointment with dental personnel to virtually follow-up and online consult as part of the dental service (Figure 2), following the goal of the teledentistry programme from MOPH.

1st Virtual follow-up visit

After the first home visit for 1 week, patients who booked appointments for teledentistry would be video-called via the “Mhor Prom application”. The video call sessions provided the follow-up of oral health care instruction and oral health status via using the mobile phone’s camera.

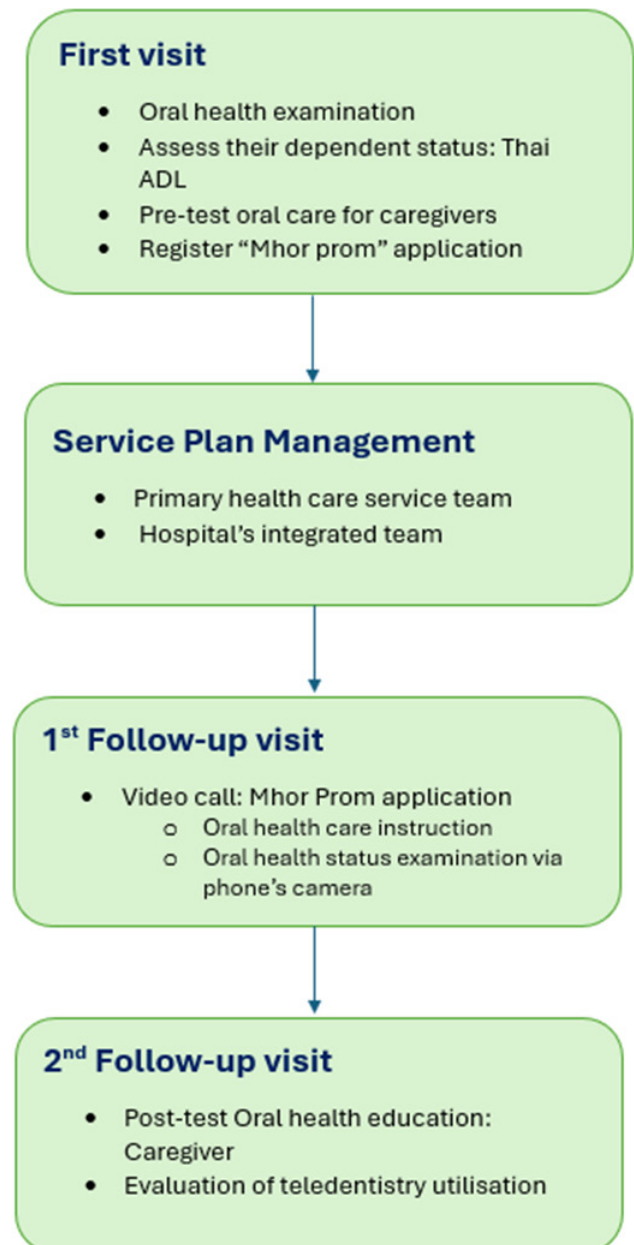


Figure 2 Case management flow

2nd Virtual Follow-up visit

After the follow-up visit, the post-test of oral health education (1-week follow-up) for caregivers and the evaluation form for teledentistry utilisation were distributed. For satisfactory evaluation, the evaluation form used in this project was adapted from the research titled "Evaluation of Psychometric Properties of Thai Version Telehealth Usability Questionnaire (T-TUQ) [11]. This questionnaire has undergone validity and reliability testing. It consists of 21 questions divided into 5 categories: Usefulness (3 questions), Ease of use (6 questions), Effectiveness (5 questions), Reliability (3 questions), and Satisfaction (4 questions). The assessment is conducted using a Likert scale ranging from 1 to 7, with 1 indicating strong disagreement and 7 indicating strong agreement. The in-depth interview was conducted.

Characteristics of participants

Twenty-three participants gave their consent to participate in this pilot system (response rate = 52.3%) and had an average age of 74.2 years (max=92, min = 57). The majority of participants were female (52.2%). The social assessment in Stage 1 of PRECEDE-PROCEED model found the factors impacting on quality of life, which were 1) inaccessibility of dental services, 2) toothache, 3) difficulties in food consumption following the tooth loss, and 4) insufficient nutrient intake. The epidemiological assessment showed some participants (n=3) were unable to clean their own teeth and lack of awareness on oral health.

Most of the oral health problems were dental caries, including retained root, tooth mobility, and edentate. Additionally, participants had plaque and fungal infection (n=3), as well as wearing dentures, participants reported incorrect maintenance of dentures.

According to the in-depth interview, most participants mentioned the difficulties of travelling to the hospital, which were related to health status and financial burdens due to indirect costs for utilising services. Participants also reported no oral health problems and a lack of knowledge in oral hygiene.

Feasibility of teledentistry among participants and caregivers

From the evaluation, it was found that out of all 23 bedridden patients, 20 were able to successfully make calls through the Teledent system with the patient or caregiver, accounting for 87%. The remaining 3 patients who could not use Teledent due to one patient who passed away before the team could perform Teledent, and the other 2 were unable to participate in the Teledent project because they did not have mobile devices, and it was inconvenient for the village health volunteers to use the system at home. Among all 20 successful participants, 2 operated it independently, 7 used it with the assistance of caregivers, 2 with dental hygienists, and 9 with village health volunteers (VHVs)."

Evaluation of oral care education for bed-ridden patients

The knowledge assessment was conducted through Pre-test and Post-test evaluations, with the scores being compared. The Post-test was administered in two stages: the first immediately after the knowledge was provided, and the second one week later, when the developer called the patients via the Teledent system.

The test was divided into three versions to match the oral conditions of the patients: patients without teeth and without dentures, patients without teeth but with dentures, and patients with teeth. The results were shown in Table 1.

Table 1 Summary of Pre-test and Post-test Questions and Knowledge Improvement Across Patient Groups

Patient Group	Q No.	Question Content	n	Pre-test: Number Correct	Post-test: Number Correct	Notes
Edentulous without dentures	Q1	Method for cleaning gums and soft tissues	5	2	5	All improved
	Q2	Frequency of cleaning the oral cavity	5	1	5	All improved
	Q3	Importance of cleaning tongue and mucosa	5	2	5	All improved
	Q4	Identifying normal vs. abnormal mouth changes	5	3	5	All improved
	Q5	Early signs of oral lesions needing referral	5	3	5	All improved
Edentulous with dentures	Q1	Daily oral care routine for denture wearers	3	1	3	All improved
	Q2	Proper denture-cleaning technique (not toothpaste)	3	0	3	None correct before education
	Q3	Storing dentures correctly overnight	3	1	3	All improved
	Q4	When to replace or adjust dentures	3	1	3	All improved
	Q5	Recognizing oral lesions at risk for oral cancer	3	1	2	1 still incorrect post-test; corrected during Teledent follow-up
Dentate patients	Q1	Correct toothbrushing technique	9	4	8	Improved overall
	Q2	Importance of interdental cleaning	9	3	7	Improved overall
	Q3	Causes of common oral diseases	9	3	7	Improved overall
	Q4	Recognizing signs of poor oral hygiene	9	5	8	Improved overall
	Q5	Identifying early warning signs needing dental care	9	4	7	Slight decrease at 1-week follow-up

In the group of patients without teeth and without dentures (5 patients), it was found that after the knowledge was provided, all patients answered all three questions more accurately. In the group of patients without teeth but with dentures (3 patients), it was found that all patients answered all three questions more accurately after the knowledge was provided. Question 2, which concerned the cleaning of dentures, had no correct answers before the knowledge was provided, as patients typically cleaned their dentures by rinsing with water or using toothpaste. For question 5, which was about identifying oral lesions that are at risk of developing into oral cancer, one patient still answered incorrectly after the knowledge was provided. This was further explained during the Teledent session, and all patients answered correctly during the follow-up call. In the group of patients with teeth (9 patients), it was found that after the knowledge was provided, the number of correct answers increased.

Knowledge comparison between the pre- and post-tests showed improvement across all three oral-condition groups. In the group without teeth and without dentures ($n=5$), all five participants demonstrated increased scores. In the group without teeth but with dentures ($n=3$), all participants improved, particularly in denture-cleaning questions,

where none answered correctly before the education session. In the group with teeth ($n=9$), most participants showed increased correct responses; however, some experienced a slight decline at the one-week follow-up. For bedridden patients who could not answer independently, the caregiver responded on their behalf.

Although 20 patients successfully used the Teledent system, only 17 completed the post-test because 3 patients were not available or were unable to respond during the follow-up assessment.

Satisfactory evaluation

According to Evaluation of Psychometric Properties of Thai Version Telehealth Usability Questionnaire (T-TUQ, it was found that the average score across all five categories was 6.49 out of a possible 7 points ($SD = 0.23$). The mean scores and standard deviations across the five T-TUQ categories were as follows: usefulness (6.60 ± 0.30), ease of use (6.50 ± 0.35), effectiveness (6.60 ± 0.28), reliability (6.18 ± 0.42), and satisfaction (6.59 ± 0.33) (Figure 3), indicating that most patients were satisfied with the Teledent system. However, the category of reliability had the lowest average score, which may be due to some users feeling that certain aspects of the system were still difficult to understand, challenging to use, and that they were unsure how to resolve issues when they encountered problems using the system.

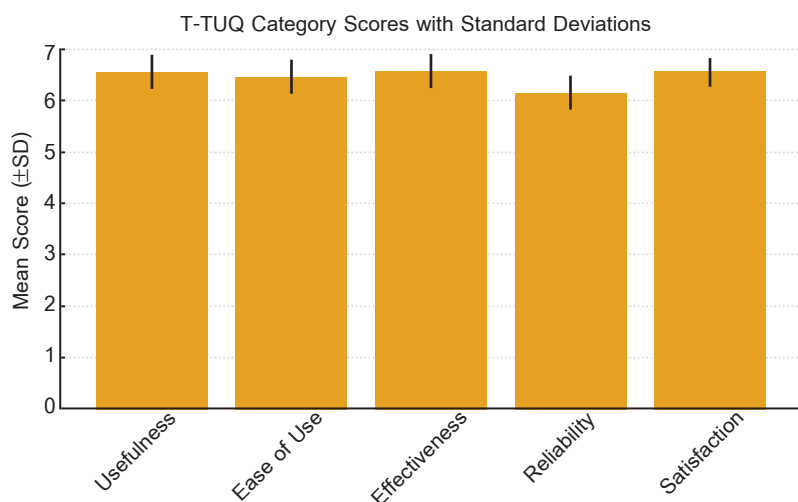


Figure 3 The average of score in each category from T-TUQ ($n=23$).

Discussion

The findings from this pilot study provide valuable insights into the feasibility and potential impact of implementing a teledentistry system for bedridden patients in Thayang District, Phetchaburi, Thailand. The study highlights the critical need for accessible dental care services among bedridden patients, who are often marginalized due to their limited mobility and other barriers to healthcare access. The integration of teledentistry into the existing healthcare system via Teledent in Mhor Prom application demonstrates a promising approach to addressing these challenges.

Feasibility and Implementation

The study revealed that teledentistry is a feasible option for most bedridden patients, with 87% successfully using the system to communicate with dental professionals. This high rate of successful participation indicates that teledentistry can be effectively integrated into home-based care for bedridden patients, provided that the necessary technology and support are available. However, the 13% of patients who could not participate due to a lack of access to mobile devices or difficulties with system use underscore the importance of addressing the digital divide and ensuring that

vulnerable populations have the necessary tools and support to benefit from telehealth services. Vulnerable patients could not switch between the back and front camera as well as the position of the camera also affects the image that healthcare professionals would see. Additionally, the internet connection issue was instability, resulting in low-quality images and on-and-off signal (Figure 4).

Knowledge Improvement and Educational Impact

The knowledge assessments conducted before and after the educational intervention show that teledentistry can significantly enhance the understanding of oral health care among patients and their caregivers. The improvement in correct responses across all patient groups, particularly in those without prior knowledge of proper denture care or oral cancer risks, suggests that targeted education through teledentistry can lead to better oral health outcomes. The slight decline in correct answers observed in the follow-up Post-test for some patients with teeth indicates a potential need for repeated reinforcement of key oral health messages over time to ensure long-term retention of knowledge. Additional reinforcement was therefore required, and the developer provided further explanations during the teleconsultation session



Figure 4 Example of video call problems: low-quality image, uncooperative patient, incorrect positioning for videocall.

Patient Satisfaction and System Reliability

Overall, patient satisfaction with the teledentistry system was high, with an average score of 6.49 out of 7 across all categories. This indicates that the majority of participants found the system useful, easy to use, effective, and satisfactory. However, the lower score in the reliability category suggests that there are areas of the system that need improvement. Some users found parts of the system difficult to understand and use, which could lead to frustration and hinder the system's overall effectiveness. Future development of the teledentistry system should focus on enhancing user-friendliness and providing additional support for troubleshooting common issues.

The benefits of Teledent project could be seen distinctly in follow-up examination after the treatments, patients' motivation in oral health education, oral hygiene instruction, and communication with patients. Dental examination could initially screen such as retained roots, anterior teeth, and large pathological areas.

Implications for Future Practice

The successful implementation of teledentistry in this pilot program has several important implications for future practice. Firstly, it demonstrates that teledentistry can be a viable solution for increasing access to dental care for bedridden and homebound patients, who might otherwise have limited or no access to such services, which is already piloted in Singapore [12]. This approach could be scaled up to other regions and integrated into broader telemedicine initiatives to provide comprehensive care to marginalized populations. However, the workflow should be prepared and continue to develop overtime (Figure 5).

Secondly, the findings suggest that continuous education and follow-up are crucial for maintaining the effectiveness of oral health interventions delivered via teledentistry. Healthcare providers should consider implementing regular follow-up sessions and refresher courses to reinforce important oral health messages and ensure long-term benefits for patients [13].

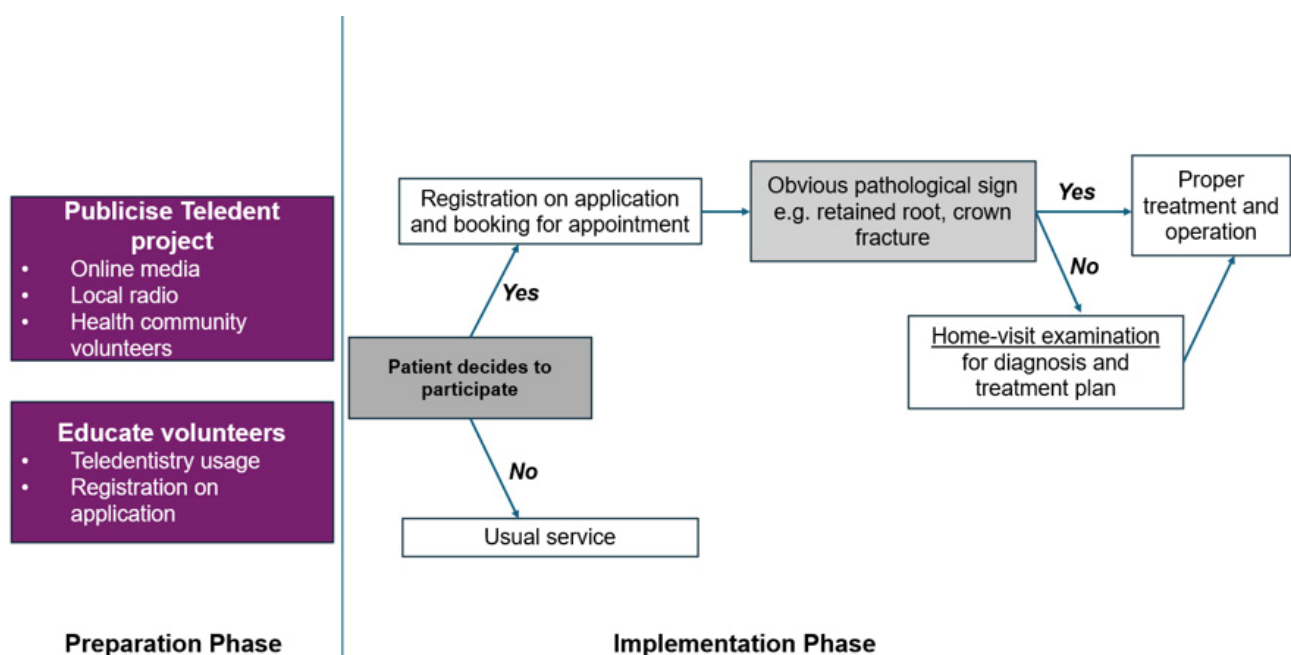


Figure 5 Workflow for the implementation of the teledentistry service.

Lastly, the study highlights the importance of addressing the technological barriers [14] that some patients face. Ensuring that all patients have access to the necessary devices and that they are comfortable using them is essential for the success of teledentistry programs. This may involve providing training for patients and caregivers, as well as offering technical support to help them navigate the system effectively.

Conclusion

This pilot study demonstrates the potential of teledentistry as an innovative and effective solution for improving access to dental care among bedridden patients in Thailand. The high level of patient satisfaction and the significant improvements in oral health knowledge underscore the value of this approach. However, addressing challenges related to system reliability and access to technology will be crucial for the successful scaling and sustainability of teledentistry programs. With continued refinement and support, teledentistry could play a pivotal role in enhancing the quality of life for vulnerable populations by providing them with the dental care they need, regardless of their physical limitations.

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