

TEGO: A NEW CONCEPT OF TELEDENTISTRY FOR THE ELDERLY THROUGH A WEB PLATFORM AND MOBILE APP IN THE CONTEXT OF THE COVID-19 PANDEMIC.

TEGO: Un nuevo concepto de teleodontología para adultos mayores a través de una plataforma web y aplicación móvil en el contexto de la pandemia del COVID-19.

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ABSTRACT:

Objective: To develop a new concept of teledentistry for the elderly through a web platform and associated mobile application in the context of the COVID-19 pandemic. **Material and Methods:** A new concept for attention via teledentistry of the elderly supported by the web platform/app TEGO (Acronym for Tele-platform of Geriatric and Dental Specialties in Spanish) was developed. Priority and urgent dental care for elderly patients in the context of the COVID-19 pandemic was provided onboard a mobile dental clinic equipped with all the necessary conventional dental care facilities as well as state-of-the-art digital technology. Dental care was carried out in five cities of Chile. For the study, 135 elderly patients were treated. The tele-dental care model includes visit-appointment and remote interconsultation with a staff of specialists. To evaluate patient satisfaction aspects, regarding the service / care provided, a user satisfaction survey was applied. **Results:** A total of 68 questionnaires were completed by patients. The results showed high levels of patients' satisfaction after the priority or urgent dental care, which reached above 75% in all dimensions of the questionnaire (Access to dental care, user treatment, platform, recommendation). **Conclusion:** The generation of a technological ecosystem for teledentistry can provide a series of important advantages in the attention of elderly patients, by optimizing the dental care coverage by different specialists who can provide attention to a population that has limited or no access to them.

KEYWORDS:

COVID-19; mobile applications; dental care; geriatrics; patient satisfaction; teledentistry.

RESUMEN:

Objetivo: Desarrollar un nuevo concepto de teleodontología para adultos mayores a través de una plataforma web y aplicación móvil asociada en el contexto de la pandemia de COVID-19. **Material y Métodos:** Se desarrolló un nuevo concepto de atención vía teleodontología del adulto mayor apoyado en la plataforma/app web TEGO (Teleplataforma de Especialidades Geriátricas y Odontológicas). La atención dental prioritaria y urgente para pacientes de edad avanzada en el contexto de la pandemia de COVID-19 se brindó a bordo de una clínica dental móvil equipada con todas las instalaciones de atención dental convencional necesarias, así como con tecnología digital de última generación. La atención odontológica se realizó en cinco ciudades de Chile. Para el estudio, 135 pacientes de edad avanzada fueron atendidos. El modelo de atención teledental incluye visita-cita e interconsulta remota con un staff de especialistas. Para evaluar los

aspectos de satisfacción del paciente, respecto al servicio/atención brindada, se aplicó una encuesta de satisfacción del usuario. **Resultados:** Los pacientes completaron un total de 68 cuestionarios. Los resultados mostraron altos niveles de satisfacción de los pacientes tras la atención odontológica prioritaria o urgente, que superó el 75% en todas las dimensiones del cuestionario (Acceso a la atención odontológica, trato al usuario, plataforma, recomendación). **Conclusión:** La generación de un ecosistema tecnológico para la teleodontología puede brindar una serie de ventajas importantes en la atención de pacientes adultos mayores, al optimizar la cobertura de atención odontológica por parte de diferentes especialistas que pueden brindar atención a una población que tiene acceso limitado o nulo.

PALABRAS CLAVE:

COVID-19; aplicaciones móviles; atención odontológica; geriatría; satisfacción del paciente; teleodontología.

INTRODUCTION.

Modern countries are experiencing both aging of the population and a rapid advance of technology, which means that the elderly population might be submitted to more medical treatments aided by the use of technology.¹

The implementation of teledentistry in home-assistance programs for the care of the elderly might be a viable tool for the management of oral health among people with limited or no access to dental care attention.² We believe that the systematization of teledentistry processes between a general dentist providing care to an elderly patient and a team of remotely connected specialists would be extraordinarily beneficial. In this context, the generation of a teledentistry ecosystem conceptualized on a technological digital platform and/or mobile application might become the new standard of the elderly dental care, particularly taking in consideration the limitations in mobility imposed by global emergencies such as the current COVID-19 pandemic.

In addition to the advantages related to avoiding visits to health centers, with the corresponding risk of contagion during their multiple appointments, a teledentistry system also allows to remotely monitor and guide the patients and/or their caretakers. The aim of this study was to develop a new concept of teledentistry for the elderly through a web platform and an associated mobile app in the COVID-19 pandemic context.

MATERIALS AND METHODS.

A concept for the attention via teledentistry of the elderly supported by the web platform/app TEGO (Acronym for Tele-platform of Geriatric and Dental Specialties in Spanish) was developed for this study. Priority and urgent dental care for elderly patients in the COVID-19 pandemic context was provided onboard a mobile dental care unit manned by a professional driver, a dental assistant and a general dentist, equipped with conventional as well as state-of-the-art dental care technology (diode laser, intraoral scanner, 3D printer, light-detector to visually

identify abnormalities in early stages of cancer, among others). Dental care attentions were carried out in the following cities: Antofagasta, Maipú, Talca, Concepción, Temuco and Vilcún.

The recruitment of 135 people older than 60 years of age (48 male, 87 female, Mean age: 72) was performed through the communal networks for the welfare of the elderly and SENAMA (National Service for the Elderly).

Patient recruitment

A social worker collaborates in the recruitment and to enter the patients' sociodemographic data into the platform's database (Figure 1).

These data are obtained from the patients or their family via phone call. Once an appointment for dental care is made, the details such as the date and location of the appointment can be sent to the patient through a mobile app linked to the platform that can be installed by the user or family member with their authorization, or via email, thus, the mobile dental care unit will be parked in an area close to the patient's place of residence in order to provide the required care.

Mobile dental care unit

Once the patient is admitted, the general dentist, aided by the dental assistant, enters the dental and medical anamnesis to the platform sequentially, following the instructions on the platform.

These clinical data are structured in a virtual 3D phantom which allows for the representation in different layers of diagnostic information obtained during the extraoral and intraoral examination. In addition, photographs taken during the examination can be uploaded to the platform. Then, the general dentist solves the different dental emergencies that the patient might present.

Remote interconsultation with a specialties unit, digital laboratory and health referral center. A line of communication can be established between the general dentist and a staff of dental specialists in different disciplines (oral pathology, oral rehabilitation, periodontics, oral implantology, temporomandibular disorders and orofacial pain, among others) and/or a geriatrician, who will provide support remotely through synchronous or asynchronous teleconsultations appointed according to the patient's medical requirements (Figure 1).

On a mobile app (Figure 2), the patient and their caretakers have access to relevant data regarding the clinical record, next appointment, and other specialists' indications.

Also possible to access educational short videos whose selection is customized for the patient by the attending professional according to their needs. These videos were prepared by medical and dental specialists and the topics relate to healthy non-carcinogenic diet, indications for the correct cleaning of teeth, indications for the correct cleaning of removable dental prosthetics, exercising for a healthy lifestyle at home in the COVID-19 pandemic context, recommendations related to a correct deglutition of food, homemade artificial saliva to avoid oral dryness, self-examination for the early detection of oral cancer or potentially malignant lesions, among others.

Patients' perception after care

In order to evaluate different aspects of patient's satisfaction regarding the service / care provided, a user satisfaction survey was applied, composed of 8 questions:

1. Was it easy to get the hour of attention?;
2. Did the number of trips to your health center decrease compared to normal urgent dental care?;
3. Was the interaction friendly and polite?;
4. Was the explanation about your health problem clear?;
5. Do you feel that your dental emergency was really resolved?;
6. Did the care of the mobile dental unit staff make you feel confident in their skills and the facilities?;
7. Did the use of technology improve the care received?;
8. Would you recommend this system to your family and friends? (in 4 dimensions (Access to dental care, user treatment, platform, recommendation).

All parameters were assessed on a 6-point Likert scale.

RESULTS.

A total of 68 questionnaires were completed by patients. Of those completing the questionnaires, 74% were female and 26% were male.

For the dimension Access to dental care, 2 questions were considered. When asked if was it easy

Figure 1. TEGO (Tele-platform of Dental and Geriatric Specialists): tele-dental care focused on the patient (digital and human ecosystem).

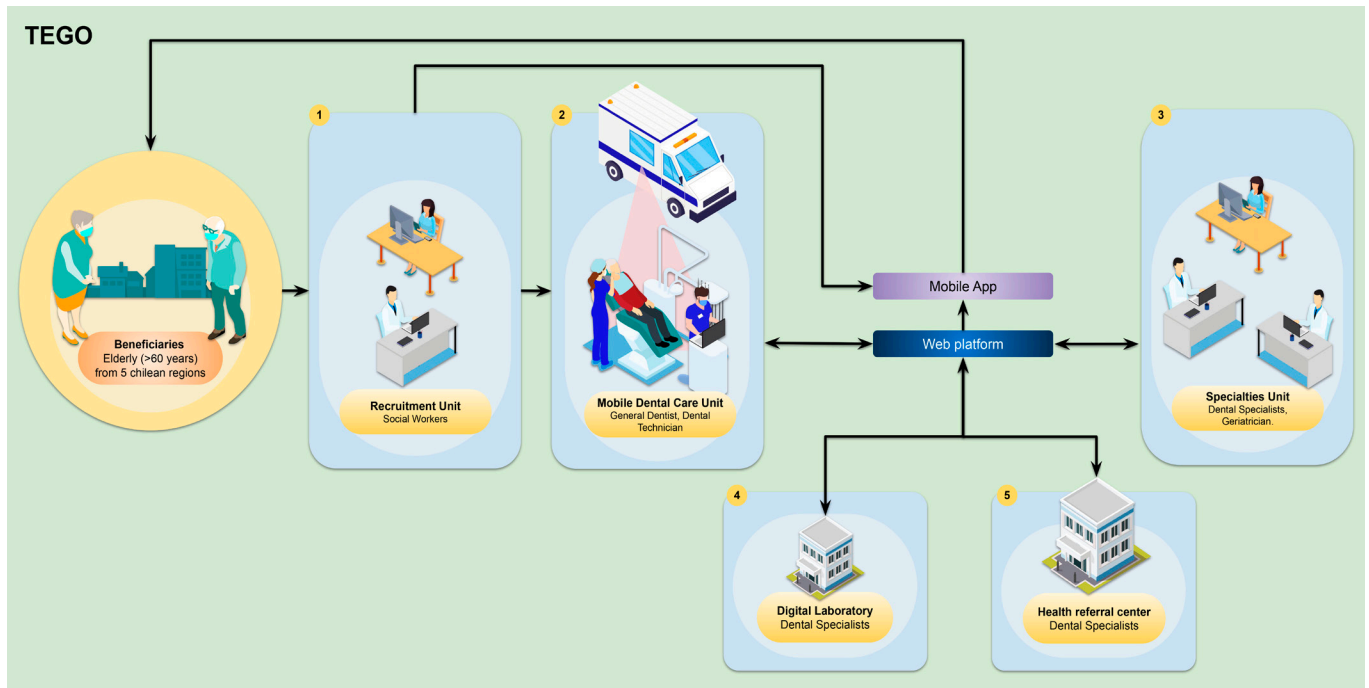
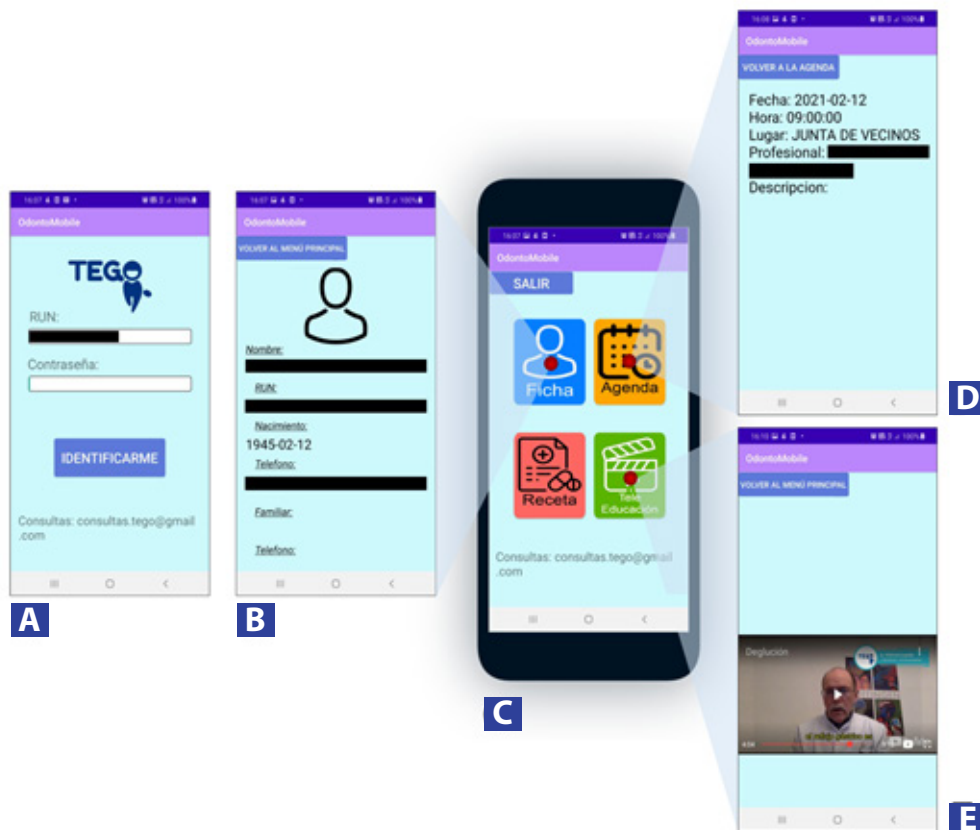
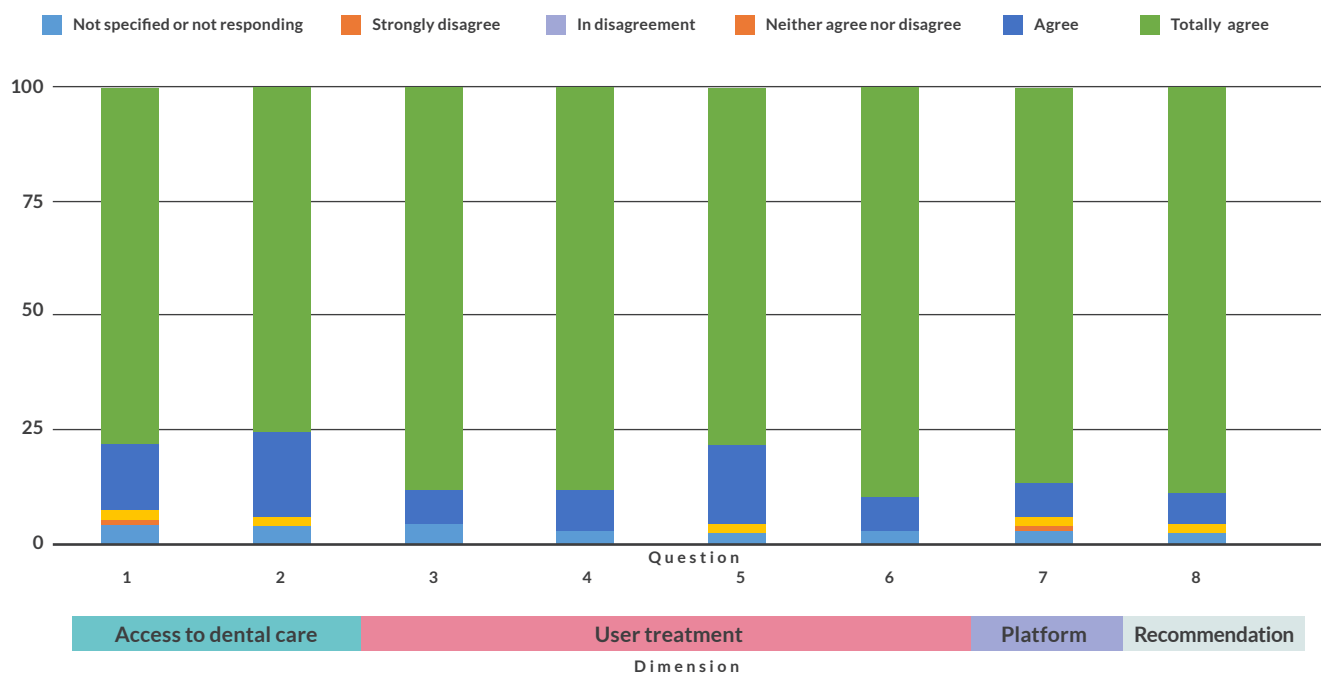


Figure 2. TEGO mobile application schematics.



A. Login interface. **B.** Patient personal information section. **C.** General interface with access to four different sections. **D.** Appointment section interface. **E.** Educational videos section interface.

Figure 3. User Satisfaction Level by dimensions.



to get the hour of attention, 77.94 % totally agreed, 14.71% agreed, 1.47% neither agreed nor disagreed, 1.47% strongly disagreed and 4.41% did not specify or did not respond. With respect to when asked if the service decreased the number of trips to the health center compared to normal urgent dental care, 75% totally agreed, 19.12% agreed, 1.47% neither agreed nor disagreed.

According to the dimension User treatment, 4 questions were included. When asked if the interaction was friendly and polite, 88.24% totally agreed, 7.35% agreed, 4.41% did not specify or did not respond. Regarding the explanation about their health problem, whether it was clear or not, 88.24% totally agreed, 8.82% agreed, 2.94% did not specify or did not respond.

When asked whether the patient felt that their dental urgency was really resolved, 80.88% totally agreed, 14.71% agreed, 1.47% neither agreed nor disagreed, 2.94% did not specify or not respond. About whether the care of the mobile dental unit staff made the patient feel confident in their skills and the facilities, 89.71% totally agreed, 7.35% agreed, 2.94% did not specify or did not respond.

For the dimension Platform, to the technology-related perception, when asked whether the technology improved the care received, 8.76% of the patients totally agreed, 7.35% agreed, 1.47% neither agreed nor disagreed, 1.47% strongly disagreed, 2.94% did not specify or did not respond. Finally, for the dimension Recommendation, when asked if the patient would recommend this system to their family and friends, 88.24% totally agreed, 7.35% agreed, 1.47% neither agreed nor disagreed, 2.94% did not specify or did not respond (Figure 3).

DISCUSSION.

A recent cross-sectional study carried out in Saudi Arabia reported that more than 70% of the surveyed dental health professionals agreed or strongly agreed on the statement that teledentistry would improve dental practice through enhancing communication with peers, guidance and referral of new patients.³

A similar study regarding the perception of different dental specialists about the applicability and reliability of teledentistry in diagnostic dentistry, reported that the majority of these professionals (83%) were confident that teledentistry can improve daily dental

practice in oral radiology, followed by endodontics and oral medicine.⁴

On the other hand, there are few studies that evaluate the elderly patients' perception of teledentistry. In France, a project was developed based on the asynchronous teleconsultation of 135 elderly patients by a remotely located dentist who was assisted by a nurse who remained with the patient during the consultation. The patient's perception of this teleconsultation was then evaluated.

The results showed a negative effect in some patients, which was influenced mainly by fear and nervousness, probably related to technology anxiety, but the patients who did not have this negative predisposition towards technology had a positive experience.¹

Our results showed high levels of patients' satisfaction after the priority or urgent dental care, which reached above 75% in all dimensions of the questionnaire (Access to dental care, user treatment, platform, recommendation). It is important to highlight the fact that these attentions were carried out in the COVID-19 pandemic context (between February and May, 2021), a period of time in which most of the elderly population was confined to their places of residence.

The generation of a teleconsultation system provides improved dental care for elderly patients and facilitates a better relationship between health professionals.⁵ The implementation of technological platforms according to the requirements of the dentistry specialties will facilitate the remote interaction between health professionals by incorporating technological tools that will allow teledentistry to jump to the next level in terms of its reach and expansion.

CONCLUSION.

In conclusion, the generation of a technological ecosystem for teledentistry can provide a series of important advantages in the attention of elderly patients, by optimizing the dental care coverage by specialists who can provide attention to a population that has limited or no access to them.

Furthermore, the associated mobile apps facilitate the patient's monitoring by the dental and medical professionals and also to provide education and guidance regarding oral health.

Conflict of interests:

The authors declare no conflicts of interest.

Ethics approval:

Study protocol approval was granted by the Universidad de la Frontera Ethics Committee, decision 090/20.

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Authors' contributions:

Conceptualization: Beltrán V, von Marttens A, Acuña-Mardones P. Research, methodology and supervision: Beltrán V, von Marttens A, Acuña-Mardones P, Díaz J. Data gathering: Acuña-Mardones P. Data analysis: Alvarado E. Writing—original draft: Beltrán V. Writing—review and editing: Beltrán V, Acuña-Mardones P. Image work: Acuña-Mardones P.

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