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Telemedicine informatics application for nutritional support surveillance of institutionalized persons in nursing homes from a hospital pharmacy service

Aplicación informática de Telemedicina para la vigilancia del soporte nutricional de personas institucionalizadas en residencias de ancianos desde un servicio de farmacia hospitalaria

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Abstract

Introduction: Institutionalized patients who require nutrition support regularly visit the Unit of Nutrition Support of the Hospital Pharmacy Service. During these visits, prior to establishing a nutrition regime and follow-up scheme, an initial nutritional status assessment is performed. Telemedicine and Telepharmacy have expanded in recent years for remote monitoring of institutionalized persons.

Objective: To evaluate the implementation of a Telemedicine informatics application for nutritional support surveillance of institutionalized persons in nursing homes from a hospital pharmacy service.

Method: A multidisciplinary team led by the Hospital Pharmacy Service was created. Data of institutionalized persons in nursing homes needing artificial nutritional support was extracted from the SILICON prescription system and the internal records of the hospital pharmacy service. Nursing homes were selected on the basis of their previous experience using the Telemedicine informatics application TELEA. The following nutritional

Resumen

Introducción: Los pacientes institucionalizados que requieren soporte nutricional artificial acuden de forma periódica a las consultas de la Unidad de Soporte Nutricional del Servicio de Farmacia. En ellas se realiza una valoración nutricional inicial, a partir de la cual se establece la pauta nutricional y el plan de seguimiento. La Telemedicina y la Telefarmacia se han expandido en los últimos años para la monitorización remota de personas institucionalizadas.

Objetivo: Evaluar la implementación de una aplicación informática de Telemedicina para la vigilancia del soporte nutricional de personas institucionalizadas en residencias de ancianos desde un servicio de farmacia hospitalaria.

Método: Se formó un equipo multidisciplinar liderado por el Servicio de Farmacia. Los datos de pacientes institucionalizados que requieren soporte nutricional artificial se obtuvieron del programa SILICON y de los registros internos del Servicio de Farmacia. Se eligieron las primeras residencias candidatas según la experiencia previa en el manejo de la aplicación infor-

KEYWORDS

Telemedicine; Informatics application; Nutritional support surveillance; Institutionalized persons; Nursing homes; Hospital pharmacy service; Telepharmacy.

PALABRAS CLAVE

Telemedicina; Aplicación informática; Vigilancia del soporte nutricional; Personas institucionalizadas; Residencias de ancianos; Servicio de farmacia hospitalaria; Telefarmacia.



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support variables were assessed: score on Mini-Nutritional Assessment questionnaire; a 24-h food record; pressure ulcer control; and laboratory parameters. The existing information flow between nursing homes and hospital specialists was analyzed. The functionalities available on TELEA were considered.

Results: In 2021, over 300 institutionalized persons from 28 nursing homes were included for nutritional support surveillance program of the hospital pharmacy service. The project was implemented in two nursing homes serving 38 patients, although only 13 were involved in the nutrition surveillance program of the Nutrition Support Unit. Nutritional status assessment and nutritional support surveillance reports were adapted to the Telemedicine informatics application. Paper reports were replaced with electronic data or online questionnaires available on the informatics application. An information flow protocol was established. An instantaneous messaging and alert system was activated, which allowed continuous communication. Some Telepharmacy requests were categorized as preferential when the clinical status of the patient so required. All the information generated during the nutritional status assessment and nutritional support surveillance process was integrated into the electronic medical history of each patient.

Conclusions: TELEA-based nutritional support surveillance facilitates the continuum of care by enabling direct communication between nursing homes and secondary care for institutionalized persons. This model makes it possible to record nutrition-related data on the electronic medical history of patients through a Telepharmacy process. This model also eliminates paper prescriptions and medical reports, and unnecessary travels. A nutritional status profile should also be made available to facilitate nutrition surveillance in institutionalized persons with chronic diseases. That would be the first step for a new integrated healthcare informatics application for frail/polymorbid elderly patients.

Introduction

The Quality Scheme of the Spanish Health System supports the use of information and communication technologies (ICTs) to guarantee excellence in healthcare. For that purpose, the regional health systems that compose the National Health System have given priority to the development of courses of action in this field¹.

The 2020 Strategy developed by the Health System of Galicia (SERGAS) establishes 20 courses of action, of which the sixth is focused on the promotion of knowledge management and innovation. Based on awareness that polymedicated elderly patients with chronic diseases are the main healthcare users, the SERGAS developed the telehealth platform TELEA².

TELEA makes it possible for patients to consult their treating physician from home, which enables immediate control and improves disease monitoring. The information obtained is automatically recorded on the electronic medical record of the patient. This technology-based platform reinforces SERGAS commitment to consolidating Telemedicine as another healthcare service.

Patients or caregivers have secure private access to TELEA, where they record the biological measurements, parameters, and questionnaires determined by their medical team. This platform provides a unique opportunity for interaction among patients, caregivers and health professionals. TELEA promotes information sharing, facilitates close monitoring of disease course, and makes it possible to anticipate chronic-disease exacerbations. In addition, this platform allows physicians to update treatments in real time, thereby avoiding unnecessary travels^{3,4}.

The consensus document "SEFH positioning on Telepharmacy: Recommendations for its implementation and development" identifies a set of Telepharmacy activities, including, clinical reporting, drug therapy monitoring, and coordination between intra and extra-hospital health professionals, to name a few (<https://revistafarmaciahospitalaria.sefh.es/gdcr/index.php/th/article/view/11515>).

Nursing homes (NHs) have special relevance in the area of health team coordination, continuity of care, and the multidisciplinary management of patients.

Nutrition surveillance is one of the most important aspects of integrated care in frail polymorbid elderly patients. In this age group, malnourishment

mática de asistencia domiciliaria. Se analizaron las variables de soporte nutricional necesarias para el seguimiento nutricional: Mini Nutritional Assessment, recordatorio de ingestas de las últimas 24 horas, control de úlceras por presión y parámetros analíticos. Se analizó el flujo de información existente entre las residencias sociosanitarias y la atención hospitalaria y se valoraron las opciones disponibles a través de la plataforma tecnológica de asistencia domiciliaria.

Resultados: El Servicio de Farmacia realizó seguimiento nutricional a más de 300 pacientes institucionalizados en 28 residencias sociosanitarias en el año 2021. El proyecto se implantó en dos residencias sociosanitarias que cuentan con 38 pacientes institucionalizados, aunque solo 13 pacientes estaban en seguimiento por la Unidad de Soporte Nutricional. Todos los registros generados en la valoración y seguimiento nutricional se adecuaron a la aplicación informática de asistencia domiciliaria, se cambiaron los registros en papel por información incluida en la plataforma o cuestionarios *online* facilitados a través de la misma. Además, se protocolizó el flujo de información generada y se activó un sistema de mensajería con alertas que permite una comunicación continua. En caso de que la situación clínica del paciente lo requiera se puede programar una teleconsulta preferente. Toda la información generada en el proceso de valoración y seguimiento nutricional de cada paciente se integró en la historia clínica electrónica.

Conclusiones: El seguimiento nutricional a través de la aplicación informática de asistencia domiciliaria facilita la continuidad asistencial por el establecimiento de una comunicación directa entre las residencias sociosanitarias y la atención hospitalaria, permitiendo la integración de la información nutricional de los pacientes en la historia clínica electrónica mediante un proceso de Telefarmacia. Se han eliminado las prescripciones en papel, informes clínicos impresos y los desplazamientos innecesarios. El desarrollo de este perfil podría ser extensible al seguimiento nutricional de pacientes con patologías crónicas, y ser el precedente de un nuevo programa de cuidado integral del paciente anciano frágil o pluripatológico.

is a risk factor for the development of dependency and is associated with comorbidity, frailty, and increased mortality⁵. In February 2021, the Health Area of Vigo set up the first Multidisciplinary Unit of Nutrition Support (UNS) in Galicia, Spain. The initiative was jointly conceived by the Hospital Pharmacy and the Unit of Endocrinology. The mission of the Unit is meeting the nutritional needs of patients with different conditions or health problems and maintaining or attaining an adequate nutritional status, whatever the level of healthcare (secondary or primary care).

In our Health Area, institutionalized patients needing artificial nutrition support (ANS) regularly visit the Unit of Nutritional Support (UNS) of the Hospital Pharmacy Service. During these visits, prior to establishing a nutritional regime and follow-up scheme, an initial nutritional status assessment is performed.

A high proportion of UNS patients are nursing home residents, most frequently dependent, who need to be accompanied by a caregiver and/or require adapted transport to attend their appointments. This led the Hospital Pharmacy to suggest using TELEA for seamless communication between the UNS and NHs. This would eliminate paper-based communication, thereby facilitating coordination of the multidisciplinary team. The SARS-CoV-2 pandemic prompted the development of the project, since workflows had to be adapted to the limitations of the new work environment without compromising the safety and quality of pharmaceutical care provided to UNS patients and outpatient HP users^{6,7}.

The purpose of this study was to evaluate the utility of the telehealth platform TELEA for nutrition surveillance in patients residing in nursing homes.

Methods

A multidisciplinary team was created involving NHs, a panel of experts in the implementation of TELEA, specialists from the Unit of Endocrinology and the Hospital Pharmacy, and the Medical Director of the Health Area of Vigo.

Regular work sessions were scheduled to analyze the pathway for referral to the UNS of nursing home residents needing enteral nutrition support, patients at risk of malnourishment, malnourished patients, or patients with dysphagia.

A review of the following UNS processes –from ANS prescription to dispensation– was performed.

- ANS prescription: all pathways by which the UNS receives new ANS prescriptions.
- Nutritional status assessment: an evaluation was conducted of all nutritional status assessment tests, food intake records, pressure ulcer control, and laboratory parameters tested by the UNS.
- Nutrition surveillance: an evaluation was conducted of the periodicity of nutritional status assessments performed to institutionalized patients.
- ANS dispensation: an evaluation was conducted of the periodicity of dispensations to NH residents.
- Records and communications with the NH: an evaluation was conducted of electronic and paper-based records and the flow of information between NHs and hospital specialists.

Data of institutionalized patients who already received or needed ANS or beverage thickeners was extracted from the SILICON® electronic prescription system and from the local records of the HP UNS.

The main requirement for inclusion of candidate NHs to inclusion in the telematic nutrition surveillance program was having used TELEA during the COVID-19 pandemic.

Prior authorization from SERGAS was required for the caregivers designated by the center to be granted access to patient profile on TELEA.

Results

In 2021, over 300 institutionalized patients from 28 nursing homes were included in the nutrition surveillance program of the Hospital Pharmacy.

This telehealth nutrition surveillance program for institutionalized patients was implemented as a pilot project in two centers in our Health Area serving a total of 38 users, of whom 13 were on follow-up by the UNS.

Workflow processes before and after the implementation of TELEA are described below.

Baseline situation

The following processes related to nutritional status assessment and nutrition surveillance pathways for NH residents were identified:

ANS prescription

The pathway for submission of new ANS prescription was as follows:

- Secondary care: patients discharged with an ANS prescription after hospitalization.
- Primary care: family doctor submits a nutritional status assessment and nutrition surveillance request to the UNS through e-consultation.
- Secondary care: ambulatory patients referred from secondary care.

Nutritional status assessment

All nutritional status assessments performed to nursing home residents consisted of:

- Nutritional status assessment questionnaire for elderly patients: a paper-based mini-nutrition assessment questionnaire was delivered to the NH representative, who completed and returned it to the HP.
- 24-h food intake reminder and presence/absence, stage and site of pressure ulcers. This information was requested in written to the NH without a standard report format.
- Laboratory parameters: laboratory tests, including proteins, albumin, pre-albumin, CRP, cholesterol, and lymphocytes.
- Prescription: the nutrition regimen was established in the existing ANS prescription format.

All this information (prescription, nutrition information request and laboratory test request form) was delivered to the NH representative, who monthly visited the HP for ANS dispensation.

Nutrition surveillance

Nutritional status assessment was performed by the pharmacist and a nurse during the first visit. Follow-up visits were scheduled every 6 or 12 months, based on the clinical stability of the patient and after any event requiring hospitalization or a worsening of the clinical status of the patient.

Dispensation

On a monthly basis, ANS was dispensed to the NH representative in single visit. All dispensations were recorded on the SILICON® platform.

Records and communication with the nursing homes

The HP recorded the clinical course, nutritional status and follow-up scheme of nursing home residents with an ANS prescription on the electronic medical history system IANUS®. NHs received a standard ANS prescription, where a nutrition regimen was established.

Communication with NHs was over the phone or through paper reports.

Current situation with TELEA

All previous workflow processes were adapted to the TELEA platform.

Artificial nutrition support prescription

UNS admission pathways for nursing home residents with an ANS prescription remained the same, as explained above.

Nutritional status assessment

Nutritional status assessment was performed as usual, although the paper questionnaires and records generated were adapted to the TELEA platform.

- Nutritional status assessment questionnaire for elderly patients; 24-h food intake reminder; ad presence/absence, stage, and site of pressure ulcers: the NH was asked to fill in an online questionnaire to gather all this information. The questionnaire included the Mini-Nutritional Assessment questionnaire, a food intake questionnaire, pressure ulcer data, and information about drug administration. Access to this questionnaire was provided via the internal messaging system of the TELEA platform. Then, the treating physicians automatically received real-time results via the corporate electronic mail.
- Laboratory parameters: the laboratory analysis request continued to be generated in paper, since the NHs needed it for laboratory analysis.
- Prescription: both, the nutrition regimen and potential adjustments to be performed were reported to the NH electronically via the TELEA messaging system, which eliminates paper prescriptions.

Recording of anthropometric measurements (weight, height and body mass index) was performed at 6-month intervals (depending on the clinical stability of the patient). An automatic alert system was established for weight variations. This alert system is based on a color code that indicates the severity of weight variation.

Nutrition surveillance and artificial nutrition support dispensation

Nutritional status assessment and nutrition surveillance protocols were not modified after the implementation of TELEA. Likewise, the frequency of dispensation was not modified.

Records and communication with the nursing homes

As it occurred prior to the implementation of the TELEA system, the HP recorded all information in the clinical course on the electronic medical history of the patient, and on the SILICON® system. Paper prescriptions were eliminated, and the ANS regimen was reported via TELEA messaging system.

When an alert was generated or there was a message notification, the physician considered the need for a consultation (preferably-virtual).

Discussion

To the best of our knowledge, this is the first telehealth project addressed at nursing home residents that involves nutrition surveillance. In a literature review, we found studies including telematic nutrition interventions for patients with diabetes mellitus type 1^{8,9}; pediatric patients with diabetes, patients on weight control^{10,11}; and patients with cancer¹². The telehealth system played a crucial role during the pandemic caused by SARS CoV-2. TELEA enabled the follow-up of patients with active disease at home, close contacts, and patients living in small nursing homes where medical services were not available¹³. In the context of patient/caregiver

education and information interventions, numerous experiences have been reported on the use of telehealth for nutrition surveillance. Arauco Lozada *et al.*¹⁴ assessed the impact of a telematic nutrition education intervention in community-dwelling elderly adults on the risk for depression and malnourishment.

For the purposes of the study, patients were asked to answer the Mini-Nutritional Assessment Questionnaire and Geriatric Depression Scale (GDS-SF) at baseline and at the end-of-study visit. The patients in the experimental group improved their nutrition knowledge, as compared to the control group, although differences were only significant in the area of food safety. Although nutrition knowledge is unlikely to improve in our study population due to their clinical status, it is expected to improve in caregivers and NH staff.

An increasing number of telehealth-based initiatives are being launched and emerge as a useful tool for improving the nutritional status of nursing home residents. Thus, telehealth is effective in helping overcome barriers, improving quality of life, and reducing costs¹⁵ related to the transfer of patients from home/nursing home to the hospital, among other. In our case, the use of TELEA for elderly patients using UNS services will reduce travels and result in significant cost savings.

Telehealth platforms facilitate the monitoring of parameters directly measured by NHs, which can be reviewed by the attending physician in real time. Multiple studies have proven that telehealth applied to elderly chronic polymorbid patients improves healthcare quality and relief caregiver burden. A Telemedicine-based multidisciplinary approach was adopted in the one-year follow-up study conducted by Maresca *et al.*¹⁶ in elderly patients. Thus, the nutritional status of patients was assessed based on anthropometric and laboratory parameters, along with factors related to quality of life and depression. This study revealed significant differences between the baseline and final scores obtained on assessment scales, as well as in the laboratory parameters analyzed in some patient subgroups. Although baseline and final data that enable comparison are not yet available in our study, telehealth-based interventions are expected to improve some of the nutritional status indicators established by the UNS.

When a new telematic monitoring platform is incorporated, compliance with key aspects of drug therapy monitoring is essential. The positioning statement of the Spanish Society of Hospital Pharmacy (SEFH) establishes the essential leadership and management activities to be performed in a Pharmacy teleconsultation (<https://revistafarmacia-hospitalaria.sefh.es/gdcr/index.php/fh/article/view/11515>). Our new Telepharmacy program complies with all these recommendations. ANS prescriptions are made by the endocrinologists and hospital pharmacists of the UNS through different pathways (hospital discharges, outpatient units, primary care). All prescriptions are reviewed and validated in accordance with the general recommendations and protocols established by the UNS. The implementation of Telepharmacy represents a step forward in improving patient understanding of their treatment. Communication with NHs (both, with the nursing staff and caregivers/family) was very limited, over the phone or through paper prescriptions. The TELEA platform broadens the range of options available for reporting changes or providing ANS-related information to the NH. Although UNS teleconsultations are focused on nutrition surveillance, other interventions related to drug therapy or patient stratification can be performed. Although these activities are not preferential for the UNS, this experience may be the first step for the implementation of a new integrated care program for elderly polymorbid nursing home residents, with a clear leadership of HPs. For HP physicians, being included in the UNS facilitates the reporting of events, proposing changes and the implementation of drug therapy interventions, while issues are approached from a multidisciplinary approach. This patient-centered approach proves that UNS activity is aimed at demonstrating the role that adequate ANS plays in the treatment and prevention of complications in elderly patients. HP indicators are generally used to

assess treatment adherence. In this patient population, nutritional status assessment indicators should also be used.

This project illustrates a new scope of application of the TELEA platform. Thus, in our study, instantaneous messaging and online questionnaires with automatic transfer of responses via e-mail were employed. This opened a new channel that allows direct communication between the UNS and NHs. The UNS established a protocol to report changes in ANS prescription, provide nutrition counseling, and give recommendations about drug administration or the suitability of a formulation. Likewise, NHs use this communication channel to provide requested information, report nutrition/clinical status variations or consult the UNS. Obviously, the use of the TELEA platform is not the preferred or most convenient option but, as the project progresses and more patients are included, an update of this platform is expected.

As the use of TELEA is more generalized, it is necessary that specific nutrition assessment variables can be included on this platform. It would be useful that a specific nutrition profile was incorporated to TELEA that includes anthropometric and laboratory data, scores on Mini-Nutrition Assessment and other scales, intake reminders, or pressure ulcer stage. ANS prescriptions already recorded on the electronic prescription system SILICON® and the electronic medical history system IANUS® should also be included in the TELEA nutrition profile. Thus, all the information generated during the nutrition surveillance process would be recorded on the corporative systems TELEA, IANUS® and SILICON®. This procedure eliminates paper documents and provides access to nutrition-related data of these patients to all their treating physicians.

With regard to NHs, a national healthcare protocol for nursing home residents has not been established due to the different organizational models in Spain (private, state-funded, and public). The diversity of organizational models is a limitation to the generalization of the use of new telehealth surveillance projects.

Future studies are warranted to assess health outcomes in telehealth programs and patient satisfaction with healthcare quality and usefulness of the tool.

TELEA-based nutrition surveillance facilitates the continuity of care by enabling direct communication between NHs and hospital specialists. This model makes it possible to record nutrition-related data on the electronic medical history of patients. This model also eliminates paper prescriptions and medical reports and unnecessary travels. A nutritional status profile should also be made available for nutrition surveillance in patients with chronic diseases. This would be the first step for a new integrated care program for frail/polymorbid elderly patients.

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Conflicts of interest

No conflict of interest.

Contribution to the scientific literature

Telehealth platforms provide offers an innovative nutrition surveillance model for nursing homes.

Telepharmacy improves process and pathway quality and increases the visibility of hospital pharmacists.

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