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Deposited in *Repositório ISCTE-IUL*:

2022-02-08

Deposited version:

Accepted Version

Peer-review status of attached file:

Peer-reviewed

Citation for published item:

Santos, S. & Oliveira, A. (2021). Health information system in nursing homes. In Gómez Chova, L., López Martínez, A., and Candel Torres, I. (Ed.), ICERI2021 Proceedings. (pp. 7260-7264). Online: IATED.

Further information on publisher's website:

[10.21125/iceri.2021.1627](https://dx.doi.org/10.21125/iceri.2021.1627)

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# HEALTH INFORMATION SYSTEM IN NURSING HOMES

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## Abstract

The use of health information systems can bring benefits to long-term care services. They can help save time, support decisions, as they provide adequate, reliable information and at the right time. The main goal of this article is to model and develop a solution to help caregivers with their daily work and with this, improve the quality and effectiveness of the services provided to their patients. To understand the specific needs, we conducted a focus group study with direct care nursing home employees. Subsequently, a qualitative analysis was performed to define the requirements for the information system. The results obtained revealed the need to record and access health information quickly to make decisions, ensure the flow of information within the team and between shifts and the creation of automatic alerts to ensure procedures execution. After this phase, taking into account the defined requirements, the solution was conceptualized and developed. The evaluation and improvement of the prototype will be presented in a future paper.

Keywords: Information systems, Health care, Nursing homes

## 1 INTRODUCTION

The nursing home is one of the institutions that offers long-term care to the elderly. In Portugal, 80 thousand elderly people currently live in old people's homes, 70% of which are Portuguese Social Solidarity Institutions (IPSS). The waiting lists for entry are long and to respond, homes try to optimize their activity in order to extend their service to as many users as possible. [1]

The presence of several diseases at the same time makes the administration of therapy more complex, as medications administered can cause adverse effects due to their combination. It is necessary to analyze the patient's set of illnesses and the medication they already use before implementing another medicinal treatment [2]. Medication oversights can occur and disrupt patient safety. These errors can be: wrong medication, wrong frequency, wrong patient, not administering, not preparing the medication correctly [3]. In a study carried out in Taiwan, errors in drug dosage and wrong drug were found to be the most common [4].

This type of occurrence can be avoided through adequate communication and updated information, it is important that employees have adequate knowledge so that they can better deal with errors, for example, an error in the frequency of treatment records can be identified in time by the employee when he knows well the properties of the medicine and the patient's health condition. The person in charge needs information about the medications to be administered, eventual updates and preparation methods. These indications are crucial to avoid errors and, when they occur, it is important to inform the other professionals who take care of the user [5]

Finally, as the ERPI work every day without closing, which implies having employees working in shifts, the shift change is one of the most important moments to ensure the transfer of information so that the elderly receive adequate care for their needs [6]. The effectiveness and efficiency of the transfer of information is influenced by the organizational and cultural system, the complexity of the type of information to be transmitted by the means of communication used and the individual characteristics of caregivers [7]

In this passage, there may be the presence of contradictory or dubious data[8], the omission of fundamental information such as the patient's behavioral changes, the lack of accuracy in the information [9] as abbreviations or very poorly defined terms such as for example "medium", illegible handwriting and very technical terms [10] or the scarce time to make this passage [6], all this undermining the quality of the past data and the correct interpretation of them.

The use of information systems for clinical care in these institutions is not a reality in most cases, the associated cost is a barrier to the implementation of IS due to the financial reality of homes. The information is managed in a physical way, being collected and filed in processes, making access to it

difficult. The implementation of a tool that can help daily work is undoubtedly an asset to public health because it will help professionals to have information faster, thus contributing to the improvement of the quality of clinical services provided to the elderly.

## 2 METHODOLOGY

Through the literature review, it was possible to prepare a guide for gathering of the requirements, to understand what the current problems that the nursing homes are facing and to prioritize the needs.

The most relevant questions that integrated the survey we developed for this study were:

1. What do you consider important to include in the IS prototype?
2. What can contribute to improved communication?
3. What can the system include that takes up a greater number of working hours?

The Focus Group technique was chosen so that participants were influenced through their responses to ideas and contributions during the discussion, in order to gather all inputs and considerations in one way and choose and prioritize the system requirements in group.[11] The group was composed of employees who participate directly and indirectly in the home health area, namely: the president of the nursing home, a nurse, a social worker, a manager and a caregiver (N = 5).

The sample included people aged between 35 and 70 years old. With varied education from professional courses to master degrees. In this sense, it was important to have participants who were involved in different parts of the health care process, giving different perspectives on the needs. The meetings were held by video conferencing in the zoom, while interviewing the aim was to ensure that everyone contributed to the discussion and that the focus of the conversation remained on the provision of health care, contextualization of the activity, working conditions, procedures and standards practiced when providing health care

After the discussion, the data was manually processed for categorization, where keywords and categories were chosen to map the requirements. The analysis of the collected data allowed us to identify the main requirements of the system:

User friendly, as the healthcare provider does not take a lot of time to register and requires to be always aware of the surrounding environment, it is important to ensure that the system is easy and intuitive, that the user does not need to have many options but yes simplified screens with yes or no option, answers with options for collecting daily records.

Facilitate communication between employees, bearing in mind that it is often necessary for information to be available to everyone and not lead to my verbal communication. This information vehicle is also important to facilitate communication between the medical team and the healthcare team, thus creating a direct channel between them.

Ensure that the system always has information about who made the registration, is this way, a responsible is identified provide further clarification about the registration.

And finally, the system needs to be always available, as the facility is open 24 hours a day.

In nutshell, the requirements are:

- User friendly
- Patient creation, activity registration, occurrence registration
- Create custom alarms for treatments
- Announcements shared by the team, for the next and current shifts, to ensure that all staff are aware of new precision and risk situations.
- Medication management
- Ensure that the caregiver is associated with all records that are made by him on the platform
- Ensure availability and data protection

### 3 RESULTS

The general objective of the system was to help in the management of healthcare in nursing homes, the conceptualization of this system aims to meet the requirements obtained based on the interview.

#### 3.1 Use Case diagram

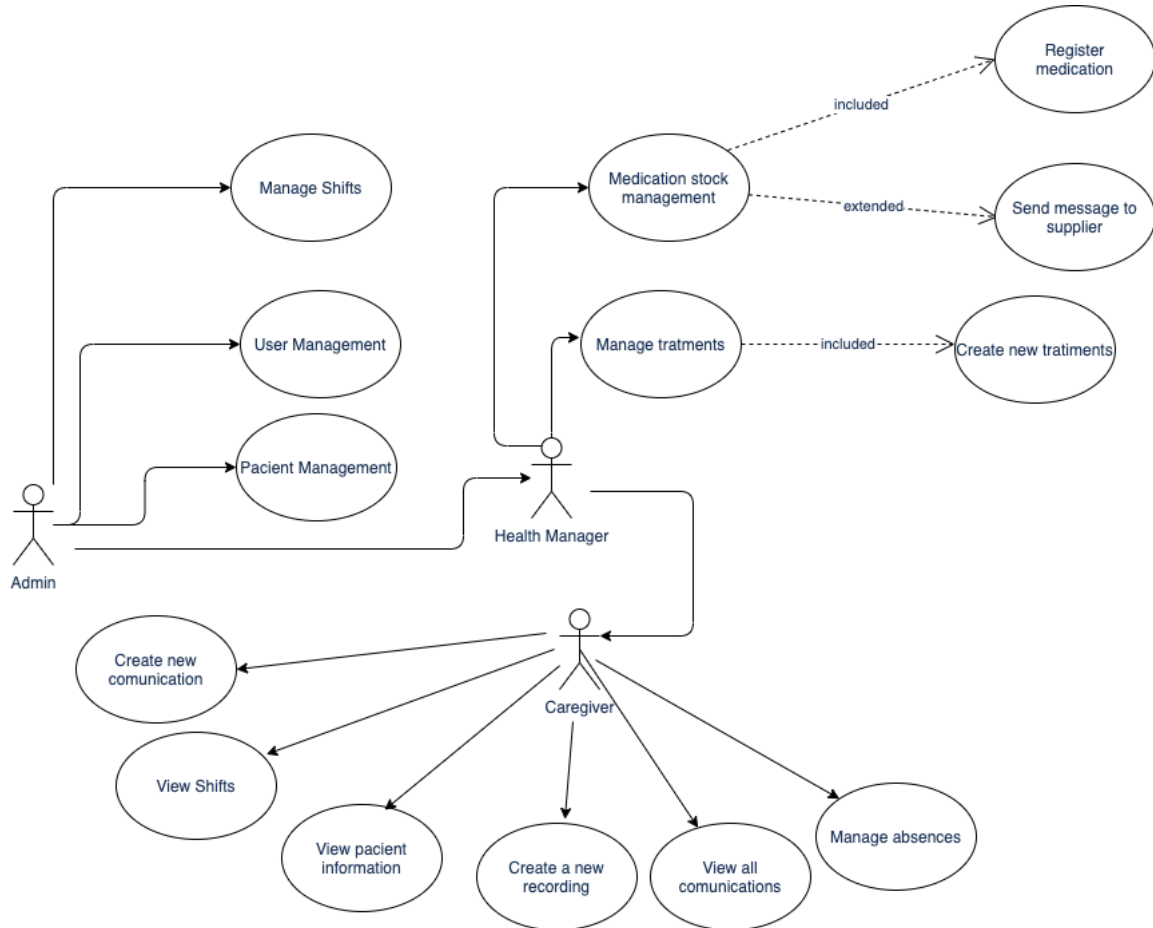


Figure 1. Use case diagram

The use case diagram was created as a result of the focus group to visually represent the relationships between the various actors on the process, in this case the main actors are "Caregiver", which represents all the Health care technician, "Health manager" that is compose by the nurse and doctor and the "Admin" representing the operational manager.

At the access level, the administrator will have access to perform any action in the system, in turn the Health Manager has access to manage medication stock and treatments, this last functionality allows the alarms creation to remind the Care Giver of treatments to be done.

Finally, for the care giver the highlighted actions will be the recording creation, that allows insert information about the temperature, alimentation, medication, blood pressure and general state, the communication actions that allows to share information across the team.

#### 3.2 Prototype development

After modelling the system, a prototype is currently being developed on the bubble platform, which include a front-end and a back-end build in. This option was due to the ease and speed with which the prototype may be made, the possibility of creating a fully customized frond-end user friendly, the ease in creating workflows that would allow for the creation of a more complex system of reminders for the treatments and alarms when certain parameters were met and finally to incorporate a build-in database that could later be transferred to MySQL in a production environment.

## 4 CONCLUSIONS

There are information systems that address the basic needs for health care records, but the systems can help a lot more in the caregiver's daily life, proving useful information at the right time. Given the current needs of nursing homes, we started with the question: How can an information system help in the management of health care?

Based on it, an analysis of the literature was carried out, in order to understand what the caregiver's needs are. In a second phase, a focus group was made with employees of a nursing home, who perform different roles in the health care process. After the requirements gathering, it was possible to verify that the system needed to be user friendly because during the provision of health care the employee would not have time to use a complex system and that the system could be useful to facilitate the communication across the shifts.

Within the requirements raised, it was possible to model a system that responds directly to the collected requirements, taking into account the 3 user profiles: administrator, health manager and caregiver. The activities available are a central module for recording all types of information about the patient available to all users, making it possible in a practical and natural way to move between the type of record and patient or group of patients, in the internal sharing space is possible write messages and share warnings for all members of the group, thus allowing the establishment of communication channels between the various professionals. It is also possible to create alarms to ensure that any abnormal record is detected as soon as a condition is met the alarm is triggered and the current user and health care manager receives a notification.

In addition, health care manager can also schedule treatment to ensure that the caregiver receives notes and instructions on how the mandatory treatment is to be carried out and of course can record whether treatment is carried out and add notes if necessary.

Since the usability and standardization of data requests was the focus, we can conclude that the modeling of the system achieved the objective of facilitating the day-to-day activities of employees and assisting in decision making.

For future work, the prototype in development should be implemented, in order to test and evaluate it. After, a survey should be used to collect new requirements and improve the prototype.

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