

# Telemonitoring for Assisted Living Residences: The Medical Specialists' View

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***Abstract:*** Telemonitoring is regarded as a means to maintain a relatively high quality of life for independently living elderly. This paper discusses a requirements study of a system to, foremost, telemonitor activities of daily living (ADL) of the elderly. The study utilizes literature and in-depth interviews with medical specialists. From the interview results can be concluded that, besides from elderly's own input, monitoring different aspects of movement, food consumption and sleep pattern are regarded as most beneficial to the medical specialists..

## 1. Introduction

The growth of the elderly population and the exponential increase of medical expenditure [1] have presented society and health care institutes with a challenge. Elderly and policy makers desire to sustain the elderly's independence from care as long as possible, while preserving the accustomed quality of life. To this end, medical specialists may use telemonitoring systems to gather and analyze information about the elderly's activities of daily living (ADL). Deviations in these ADL reveal information that may lead to preventive measures. However, there is no consensus on the importance of the various ADL. This study focuses on the needs and requirements of a telemonitoring system that is aimed at collecting information of the elderly's ADL. Via performing extensive interviews with the medical specialists and having a glance at current technology, the boundaries of the system for the present domain are set.

## 2. Related work

ADL are considered as one of the main constructs of elderly disease diagnostic and widely utilized by medical specialists [2]. Additionally,

every medical specialist has their own approach towards ADL. Geriatrics and physiotherapists for instance, make use of ADL in order to determine whether the elderly in question are active enough and still able to perform their daily tasks on a regular basis. Occupational therapists on the other hand, pay more attention to how these activities are executed and whether the elderly face difficulties in performing their tasks. Furthermore, it has also been established that the ADL are not all equally affected by the aging process and mostly depend on the type and severity of the disease [3].

Studies conducted with this specific aim, cover a wide variety of technology used to monitor the elderly ADL, such as technology based on accelerometers [4], vision-based systems [5], and wearable systems for physical activity monitoring [6]. Other noticeable studies were based on pattern recognition and data-mining techniques [7]. Other issues with regard to telemonitoring for the elderly are the following: (1) privacy and information sharing [8] and (2) maintaining the elderly's dependence [9].

### 3. Methodology

This study used semi-structured in-depth interviews. and aimed the following: (1) To investigate the underlying reasons for hospitalization and their relation to ADL, (2) to determine the changes in ADL as a result from ageing, (3) to select a number of ADL which are considered most important for monitoring.

The group of participants consisted of 11 medical specialists from various fields in elderly care. This group of interviewees included physiotherapists, geriatrics, occupational therapists, speech therapists and domiciliary care professionals to cover a wide variety of perspectives on elderly care and disease diagnostics. The interviews consisted of a series of open questions relevant to the main question, our focus mainly being the importance of monitoring ADL and lifestyle changes. During the interviews the participants were also provided with a list of ADL which they rated on a Likert scale and valued the necessity of each to be monitored.

### 4. Results

The rating of the ADL as illustrated in Figure 1, indicates that monitoring different aspects of movement (functional transfers) and eating habits (food consumption, cooking) were considered more relevant than monitoring a single specified ADL, such as toilet visits. As for the changes in ADL, the medical specialists suggest that the deterioration process in the lifestyle of the elderly considerably affects mobility and cognitive abilities. Also

hospitalization is in most cases caused by negative changes in cognitive abilities which pose a danger to the elderly's life or their surroundings.

According to the majority of the interviewees, monitoring the sleep pattern can play a notable role in assessing their overall well-being and should be performed alongside monitoring ADL. Also, all medical specialists confirmed that involving the elderly in the diagnostic procedure is essential to establish a correct diagnosis. Unlike the hospitalized elderly, the independently living elderly are often capable of explaining their needs; a finding which corresponds to a study by Rogozea *et al.* [11].

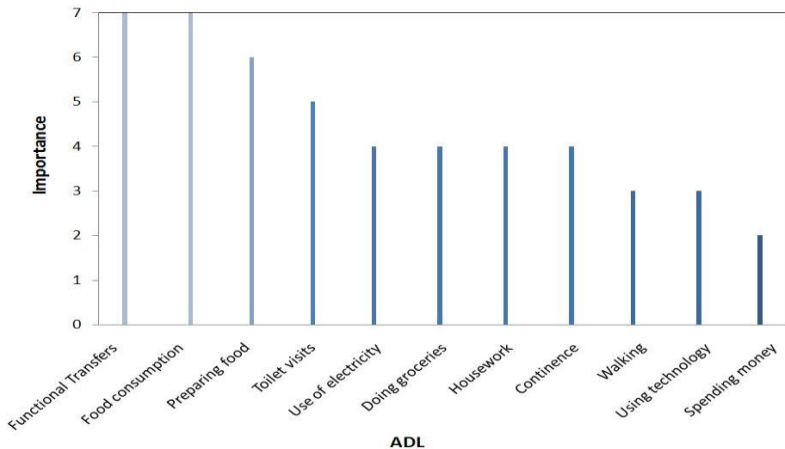


Fig.1 Importance of ADL

## 5. Discussion

Results indicate that monitoring ADL is relevant for the medical specialists. The focus should be set upon a select number of ADL. It was suggested to foremost concern a focus on consumption of food, functional transfers, and being extended by information on the elderly's sleep pattern as additional input. It was proposed that the desired telemonitoring system acts solely as a medium which gathers and analyzes data; interpretation and further analysis of the gathered data should be a task performed by the medical specialists themselves, though, naturally, with the assistance of automated techniques. The main purpose of such monitoring system would be determining the relevant aspects in the elderly's lifestyle and notifying the medical specialists when deviations occur. The desired telemonitoring system should also encourage the deployment of medical specialists in the earlier stages of changes in the elderly's lifestyle.

## 6. Conclusions and future work

Based on the study, it can be concluded that monitoring ADL can be a substantial asset to medical specialists. Via telemonitoring, the medical specialists will have the opportunity to go one step beyond the traditional diagnosis and notice the gradual changes in the elderly lifestyle as they happen. However, it is evident that telemonitoring does not provide the means to replace medical specialists, therefore the emphasis should be laid on the informative functions. For future work, we recommend studying acceptance of telemonitoring within the elderly living environment. In this regard, co-design methods that involve elderly during the design process may be instrumental.

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