

# ICT Use in Family Caregiving of Elderly and Disabled Subjects

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**Abstract.** This study examined the use of ICT in caregiving as assessed by family caregivers of disabled or elderly subjects (N = 53). The results showed limited current use of ICT-based technologies either for on-site or remote assistance. However, perceived usefulness was evaluated as high when these technologies were used. The factors for the use of ICT were different for on-site assistance or remote assistance. The data obtained can be used in the development of future ICT and IoT –based assistive technologies.

**Keywords:** Caregiver, assistive technology, remote care, eHealth, ICT, IoT.

## 1 Introduction

Persons with disabilities use assistive technology to increase, maintain, or improve their functionality and performance in daily tasks and activities. Assistive technology can be a service, device, application or tool that helps the elderly, disabled person or their caregiver to maintain functional ability of the care recipient [1], [2], [3]. Assistive technology can consist e.g. of mechanical and electrical devices, sensors, IoT applications, and cloud services. Assistive technologies have been found to have ability to improve user's activity and participation, and also to reduce the functional decline of the user [2], [4], [5].

Assistive technologies can also be seen as a solution to reduce caregiver's burden. ICT devices and applications can decrease the demands related to care and supervision of the care recipient. In addition, those can be used to monitor any unexpected needs of assistance, i.e. accidents and injuries [2], [6]. Caregivers, either family members or others who provide care for those who need supervision or assistance in illness or disability [7], are seen as a valuable resource for elderly care in their unpaid contribution for the ageing society [8].

ICT and IoT solutions might be increasingly valuable in assisting elderly and disabled persons in future. The aim of this study was to examine to what extent the family caregivers utilize ICT-based assistive technologies in their caregiving work, and what are the needs for and perceived usefulness of assistive technologies.

## 2 Materials and Methods

An online survey was implemented through the Finnish Society for Caregivers (Omaishoitajat ry) webpage. The survey was open for responses from September 30th to October 25th 2015 and at the same time it was advertised through social media as well. A pilot survey was carried out with two caregivers and one researcher before the implementation. The caregiver answered both to the questions for him/herself and to the questions related to the care recipient.

The survey consisted of five main categories: Background, Assistive technologies and tools, Time utilization, Burden, and Coping. The response to the questions related to Assistive technologies and tools are presented in this paper (Table 1).

**Table 1.** Questions related to background information and assistive technology and tools.

Content
<i>Caregiver and care recipient characteristics</i>
Demographics of the caregiver
Relationship between the caregiver and the care recipient
Demographics of the care recipient
Need of assistance
Caregiver's contribution on care
<i>Assistive technologies and tools</i>
Use of ICT equipment to help the care recipient from distance
Use of ICT equipment while assisting
Other assistive technologies and tools used as help when assisting
Most common assistive tools and ICT equipment used by the caregiver or by the care recipient
Experience with telemonitoring (i.e. door alarm, GPS tracking device, fall detector)
Willingness to use telemonitoring application
Need of assistive tools or devices
Pre-agreed terms for caregiving
Availability (times of day) when the caregiver could give remote help if technology existed

The survey contained both qualitative and quantitative questions. Qualitative methods were used for questions about assistive tools and ICT equipment to collect information about the needs and expectations assigned for the technology.

Five-point Likert scale was used to score the perceived usefulness of assistive tools and ICT equipment as a Perceived Usefulness Score (PUS), 1 referring to Never, 2 to Rarely, 3 to Sometimes, 4 to Quite Frequently and 5 to Nearly always. The respondent was allowed to list and score a maximum of 5 tools or equipment for evaluation.

Results are expressed as mean  $\pm$  standard deviation (SD). Statistical analysis were performed in IBM SPSS 22.

### 3 Results

In total there were 53 caregiver respondents, mostly female (n=46), with average age of 54.3 years. Characteristics of the caregivers and care recipients are presented in Table 2. There were 31 male and 22 female care recipients with an average age of 48.7 years. Most of the care recipients lived with the caregiver and only three of them lived alone. Forty-seven of the caregivers had made informal care agreement. Seventy percent of the care recipients needed assistance around the clock and 26% daily. Assistance was also needed when moving outdoors or indoors. Caregiver's contribution on care were typically between 81 and 100% of the total care need.

**Table 2.** Characteristics of the caregiver and care recipient (N = 53). N (%) if not otherwise stated.

Characteristics	
<i>Demographics of the caregivers</i>	
Age $\pm$ SD (range) (years)	54.3 $\pm$ 13.5 (27-82)
Female	46 (87%)
Caregiver agreement	47 (89%)
<i>Relationship to care recipient</i>	
Spouse	25 (47%)
Parent	20 (38%)
(Grand-) Children	7 (13%)
<i>Demographics of the care recipients</i>	
Age $\pm$ SD (range) (years)	48.7 $\pm$ 29.9 (3-92)
Female	22 (42%)
Living alone	3 (6%)
Living with caregiver	49 (92%)
<i>Need of assistance</i>	
Around the clock	37 (70%)
Daily	14 (26%)
When moving outdoors	48 (91%)
When moving indoors	39 (74%)
<i>Caregiver's contribution on care</i>	
81-100% of total care need	35 (66%)
61-80% of total care need	10 (19%)
41-60% of total care need	6 (11%)
20-40% of total care need	2 (4%)

SD standard deviation

The care recipients had also need for help in bathing (53 respondents; 100%), using the toilet (48; 91%), getting dressed (53; 100%), cooking (53; 100%), and keeping contacts (e.g. using telephone or computer) (49; 92%). Caregivers mentioned that care recipients may also need help with medication (48; 91%), daily chores (24; 45%), eating (43; 81%), hobbies or school (38; 72%), communicating, or in social situations (32; 60%).

Fifteen (28%) of the respondents used ICT equipment to help care recipient from distance (teleassistance), whereas 12 (23%) had used ICT equipment when assisting on-site. Tablets and other devices with internet access had been used to search

information, to study (e.g. Papunet, papunet.net), to stay in touch with friends and relatives, and to support and learn communication skills (e.g. DialoQ, www.dialoq.com).

Caregivers had also used other assistive technologies and tools when assisting. Wheelchair was mentioned as the most used when asked for listing five most common technologies (Table 3). Perceived usefulness as scored by the caregivers ranged from 5.0 to 3.6 (scale 1-5) for different assistive tools and equipment.

**Table 3.** Most common assistive tools and ICT equipment listed by the caregivers and the Perceived Usefulness Scores (PUS). (Open question, N = 53)

Tools	N	PUS
Wheelchair / Stroller	16	4.9
Lifting device / subsidies	12	4.5
Computer / Tablet	11	4.2
Hospital bed	10	4.9
Mobile phone / Security phone	10	4.2
Washing / Shower chair	9	4.7
Rollator	6	3.6
Toilet rack	5	5.0
Electric / Bedsore mattress	4	4.9

Eight caregivers (15%) had some experience with telemonitoring their care recipient (i.e. door alarm, GPS tracking device, fall detector). Additional 14 (26%) would be willing to use telemonitoring applications. Personal emergency response systems, fall detectors, security phones, baby monitors, motion sensors and radar light had been used so far. GPS tracking devices, door alarms and security or web cameras seemed to be most requested in future.

Thirty-four (64%) of the caregivers were unwilling to use telemonitoring applications because they felt there was no need, such applications would not help them, they were not familiar with the applications, or the care recipient needed caregiver's physical presence.

From the respondents seven (13%) had a pre-agreed terms about caregiving, for example about allowing care recipient to do as much as possible on his/her own and assisting only when needed. Also there were terms about the responsibilities, such as who will take care of finances, groceries and medication. Occasionally terms and assistance were dependent on the schedules. Table 4 presents the times of day when the caregivers could help their care recipient from distance, assuming that suitable technology existed.

**Table 4.** Times of day for the availability of the caregiver for teleassistance (i.e. by computer or phone) if the technology existed (N = 23).

Hours	6-9	9-12	12-15	15-18	18-21	21-24	24-3	3-6
Available	78%	78%	78%	87%	100%	87%	74%	74%
Limited availability	17%	4%	4%	4%	0%	9%	4%	4%
Not available	4%	13%	13%	9%	0%	0%	17%	17%

Table 5 presents factors related to ICT use in on-site and remote caregiving. The factors partly differed between on-site assistance and remote assistance. E.g. physical disability and mid-age of the care recipient were related with increased use of teleassistance.

**Table 5.** Factors related to ICT use in on-site and remote caregiving.

Factors	N	Have used ICT while assisting on-site	Have used ICT for teleassistance
<i>Caregiver's age (years)</i>			
30-39	7	17%	7%
40-49	13	8%	33%
50-59	11	33%	33%
60-69	15	25%	27%
70-79	5	17%	0%
80-	1	0%	0%
<i>Care recipient's age</i>			
1-9	7	33%	33%
10-29	11	33%	17%
30-49	7	0%	43%
50-69	12	25%	33%
70-89	12	25%	0%
90-100	4	0%	0%
<i>Primary disability</i>			
Memory Disorder	12	23%	23%
Mental retardation	9	40%	10%
Old age	1	0%	0%
Physical disability	6	0%	57%
Parkinson's disease	3	17%	0%
Brain injury	5	33%	17%
<i>Need of assistance</i>			
Several days (4-6) in a week	2	0%	50%
Daily	14	7%	50%
Around the clock	37	30%	19%
<i>Caregiver's contribution on the care</i>			
20-40%	2	0%	50%
41-60%	6	33%	33%
61-80%	10	0%	60%
81-100%	35	29%	17%
<i>Another work of the caregiver</i>			
Has other work	19	21%	42%
Has no other work	34	24%	21%

## 4 Discussion

This survey presented limited current use of ICT of assistive technologies by family caregivers of disabled or elderly subjects. However, perceived usefulness was

evaluated as high when these technologies were used. Additionally, there was some willingness to use assistive technologies if those existed or were available. The factors for the use of ICT were partly different for on-site assistance or remote assistance, e.g. physical disability and mid-age of the care recipient being related with increased use of teleassistance. The data obtained can be used in the development of future ICT and IoT –based assistive technologies.

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