






# A concept analysis of health communication in a home environment: Perspectives of older persons and their informal caregivers

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## A concept analysis of health communication in a home environment: Perspectives of older persons and their informal caregivers

**Background:** Health communication (HC) is a vast research field focusing on changing health behaviours, and rapidly evolving technology is creating different ways and possibilities to reach target groups and audiences. In the context of home care, a deeper understanding of HC is lacking, specifically for older persons with care needs and their informal caregivers. The aim of this concept analysis is to identify and construct the meaning of HC from the perspective of older persons in need of care in the home environment and their informal caregivers.

**Materials and methods:** This study utilised Rogers' (2000) Evolutionary Concept Analysis Method (EMCA) to create and construct a meaning of the concept of HC. The EMCA was based on a systematic literature review of scientific articles, using CINAHL, Pubmed and Inspec (2000–2017). A total of 29 articles were retrieved and analysed.

**Results:** The identified attributes of the concept were as follows: resources of the recipient, influence on decisions and advantages of tailored information. HC was described as both contributing to knowledge as well as being overwhelming where habits and resources influenced the use of information. The attributes led to the following descriptive definition of HC: 'Tailored HC, based on needs and resources of the recipient influence care decisions'. The home environment influenced HC by habits and interactions between older persons and their informal caregivers.

**Conclusions:** The home environment influenced HC in terms of social aspects of interactions and habits and between the older person and the informal caregiver. Tailored information with the use of technology contributed to knowledge in care of older persons and their informal caregivers. HC was shown to contribute to improve care for older people in their home environment.

**Keywords:** health communication, home environment, informal caregivers, older persons, technology.

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## Introduction

Health communication (HC) is a rapidly growing research field that identifies communication as an intervention to improve health outcomes (1). The concept of HC is multidisciplinary and has been influenced by areas such as health education, medicine, psychology, marketing and social sciences (2,3). These influences have contributed various definitions emphasising aspects of health-related communication activities, such as exchange of information, increased knowledge, behaviour change, well-being and empowerment (2,4,5). This study adopted Ratzan et al.'s (6) definition of HC: 'the art and technique of

informing, influencing, and motivating individuals, institutional, and public audiences about important health issues' (p. 362). The concepts of health issues, health motivation, health influencing and disease prevention were also included in this definition.

HC is increasingly moving away from traditional paper-based channels and being mediated by digital health technologies, such as electronic health (eHealth) and mobile health (mHealth), viacomputers and touch-screen devices, such as tablets and smartphones, producing technology-based HC (7–10). With today's ageing population, the introduction of these technologies gives rise to issues of trust regarding the benefits of new technology within healthcare coupled with concerns about its use (11,12). Research has shown that using technology for communication purposes can both contribute to positive outcomes and present challenges for older persons (13–15).

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Older persons are susceptible to developing chronic diseases and finding themselves in situations that require care, assistance or support from a caregiver (16). Informal caregivers – those who do not participate in a formal network of organised care and usually include family members and friends – often become involved in caring for older persons and play an important role in assisting and supporting them in performing various tasks (17,18). Asymmetrical relationships can develop during this care delivery, but when using HC purposefully, the care can be delivered as a partnership (19). According to Silva et al. (20), informal caregivers need information, knowledge and professional support, which they can obtain through various forms of communication. Thus, HC may enhance informal caregivers' management of complex caring situations for older persons with chronic conditions in the home environment (21). Using technology to communicate can support social interaction, but many older persons have expressed fear that technology will replace personal encounters, which they value (22). According to the World Health Organization (WHO), social, community and physical factors impact health care within the home environment for both older persons and informal caregivers (23). Therefore, these perspectives were central to this study, where both the individual and interpersonal perspectives of HC were emphasised (1,24). Using a systematic literature review and a concept analysis, the aim of this study was to identify and construct the meaning of HC from the perspectives of older persons in need of care in the home environment and their informal caregivers.

## Method

In the rapidly evolving field of HC, we determined that the evolutionary model of concept analysis (EMCA) (25,26) was the most appropriate method with data based on scientific studies for clarification and providing a foundation for further development of the concept.

### Data collection

The first three steps of the EMCA consist of identification of the concept, identifying sample and setting, and data collection (25,26). In the first step, the concept was identified along with surrogate terms and associated expressions. In the second step, the sample and setting for data collection were determined via a search for scientific articles exhibiting a caring perspective in relevant databases: CINAHL, PubMed and Inspec. In the third step, the data were collected to identify the attributes and contextual basis of the concept, including variations in the relevant literature and search terms capturing the aim of this concept analysis. The collected studies on HC were published between January 2000 and December 2017. Both

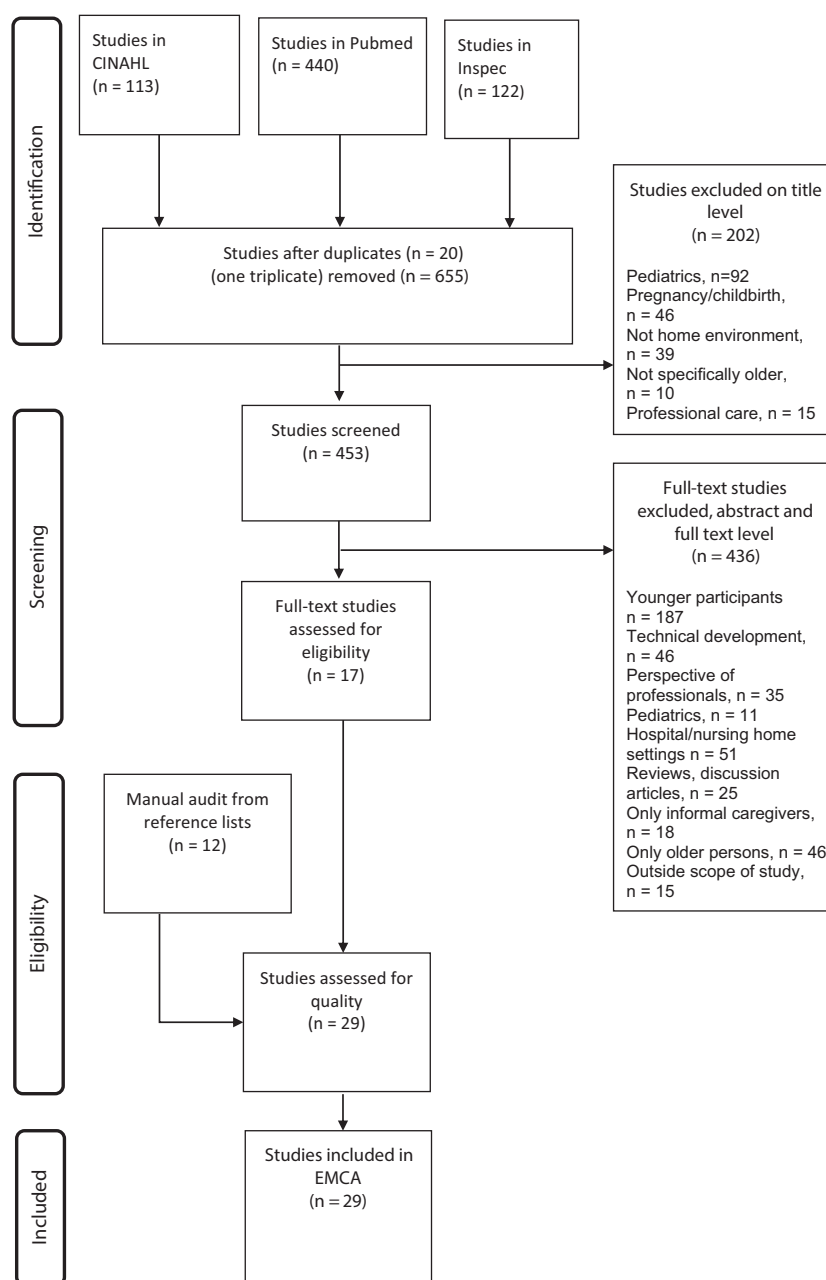
controlled vocabulary, including CINAHL headings ('major concept') and Medical Subject Headings (MeSH), and free text was used in the search. The search results were reviewed, and if new controlled vocabulary search terms were found relating to the aim of the study, they were added, thus enabling a more comprehensive search.

The data collection consisted of four different search blocks: health communication, older persons, informal caregivers and home care (see Appendix 1). Additional search terms were added by using concepts in Ratzan et al.'s (6) definition of HC: health issues, health motivation, health influencing and disease prevention. To be as specific as possible, these search terms were combined with the Boolean operator 'AND'.

The inclusion criteria for this concept analysis were as follows: (i) participants defined as older people, (ii) having a participating informal caregiver, (iii) studies conducted in the home environment, (iv) peer-reviewed empirical studies and (v) published in English. Including the perspectives of both older persons and informal caregivers are valuable because of the caring relationships between these individuals (27). Study protocols, literature reviews and studies describing technical development or focusing on a professional perspective were excluded. The database search yielded a total of 675 studies, from which 20 duplicates were removed. Another 202 studies were excluded at the title level and 436 at the abstract and full text levels for lack of alignment with the aim of this study, for example, because they focused on younger persons or the perspective of healthcare professionals. This screening process resulted in 17 studies that met the inclusion criteria. To ensure that no relevant studies were missed, reference lists from the included studies were read through in three steps (up to the tertiary reference). This process of manually auditing reference lists uncovered an additional 12 studies that were eligible for inclusion (28). The 29 studies (Appendix 2) were monitored for quality according to the Critical Appraisal Skills Programme (CASP), for qualitative study and trial checklists (29), and were used for the EMCA (Fig. 1).

### Data analysis

In the fourth step of the EMCA, the data were analysed according to the characteristics of the concept; each step of the analysis is described as follows (26). The data analysis was conducted by gathering sentences, words or passages from the included studies, which were then grouped as either surrogate terms and related concepts, attributes, references, antecedents or consequences (26). Surrogate terms describe the concept with other phrases or words that are interchangeable with the concept and, therefore, influence both the collection and identification of data (25,26). Related concepts are similar to surrogate terms but do not share an equal set of attributes.



**Figure 1** Flow chart diagram of the systematic review process.

Attributes are what the concept consists of – that is, what defines it. References are actual situations or contexts wherein the concept is used. Antecedents are phenomena or events that precede an instance of the analysed concept. Consequences are results or events that follow the concept, such as achieved outcomes. The included studies were re-read several times during the analysis to ensure that no parts of the text were excluded. The authors went back and forth over the steps in the EMCA to avoid drawing premature conclusions (26). In accordance with the EMCA, the attributes were used to create

a descriptive definition of the concept, as in Lindberg et al. (30).

## Results

The results are presented according to the EMCA of HC from the perspectives of older persons and their informal caregivers in the home environment with the following headings: surrogate terms and related concepts, attributes, references, antecedents, consequences, exemplars of the concept and descriptive definition. The results are presented in Table 1.

**Table 1** Overview of the results

	Example(s)	References
<b>Surrogate terms and related concepts</b>		
Awareness, knowledge	'Family caregivers need not only to receive education regarding the disease...'	Gratao et al. (2010)
Health education, health information		Sørensen et al. (2008) Biggs and Freed (2000), Marriott et al. (2000)
<b>Attributes</b>		
Resources of the recipient	Taking initiative, evaluate and use information that is considered helpful Requesting knowledge Providing online information is considered as beneficial	Schumacher et al. (2000) Jitramontree et al. (2015)
Influence on decisions	Pointing out to do the right thing to avoid damaging the future health and recover more quickly Information tailored to individual needs of informal caregivers made them more sensitive to recognising symptoms of Alzheimer's.	Torkamani et al. (2014) Bedaf et al. (2016) Koivisto et al. (2016)
Advantages of tailored information		
<b>References</b>		
Need of information related to diseases or conditions and influence of the home environment	Independence, privacy  Safety, security Education, reduced caregiver burden, improving care	Bedaf et al. (2016)  Ohta et al. (2002), Wild et al. (2008) Arbuthnot et al. (2007) Marriott et al. (2000)
<b>Antecedent</b>		
The need for increased knowledge, including information and education	'...family caregivers do lack knowledge of elderly nutrition...'	Biggs and Freed (2000) Marriott et al. (2000), Phung et al. (2013)
<b>Consequences</b>		
Improved care	Developing/changing strategies  Learning	Kramer et al. (2005), Mahoney et al. (2006), Torkamani et al. (2014), Williams et al. (2013) Kramer et al. (2005), Whitlatch et al. (2006) Toseland et al. (2004) Torkamani et al. (2014)
Technology contributing to knowledge	Specific information Creating awareness Guidance from HCP	Middlemass et al. (2017) Dadlani et al. (2010)
Irrelevant and excessive information	Causing stress/overwhelming  Technology as stressful Balance of provided information	Middlemass et al. (2017) Wild et al. (2008) Middlemass et al. (2017) Clare (2002)

**Surrogate terms and related concepts**

The identified concepts related to HC were awareness and knowledge (31,32). Surrogate terms, such as health

education and health information, often overlapped with the concept of HC (19,33–38). These related concepts emphasised the sender perspective of HC; for example, 'sharing information' was used instead 'communication' (34).

### *Attributes*

Significant attributes of the concept of HC were identified as the resources of the recipient, influence on decisions and advantages of tailored information. Each attribute is described below.

### *Resources of the recipient*

HC had different impacts depending on the recipient's resources, which were predominantly social resources and network for support (39). How the resources were used depended on how the information was viewed and how useful it was considered to be in different situations (32,40). Resources of older persons were individual characteristics, such as the will and ability to utilise HC and change habits (41). Informal caregivers focused on problem-solving and taking the initiative to search for health-related information to improve their understanding (42). In addition, older persons and informal caregivers could both have a passive role in the communication process – that is, by receiving information – as well as an active role in providing and searching for information. Passive recipients preferred HC to be delivered more actively (43). Both older persons and their informal caregivers expressed the desire for help, advice and support to understand the information they received, and they identified healthcare professionals (HCPs) as those who could support them by providing information (34,40,42,44–46).

### *Influence on decisions*

For both older persons and informal caregivers, using HC influenced decision-making by giving recommendations, descriptions and instructions about what was best, such as explanations about what one should or should not do (35,47). HC was supportive as well as persuasive. Further, HC was used to give advice to promote a behaviour, propose a change, motivate, remind, or encourage and to suggest the best or most appropriate action to take (32,35,41,44). HC contributed, for example, knowledge of ways to avoid possible hazards and dangers in the home, the benefits of using a cane (35), potential risks and positive outcomes of doing 'the right thing' for the receiver's own benefit (47).

### *Advantages of tailored information*

HC could be used to tailor a message as specifically as possible to a target group and to fulfil the specific needs of older persons and informal caregivers (36,48,49). By providing tailored information and support, which was better suited to the needs of the individual in each unique situation, HC improved the caregiving provided

by informal caregivers (32). HC was also used to meet the needs of receivers, for example, by offering demographic information, diagnosis and disease history (50).

### *References*

References described the older persons' and informal caregivers' needs for information related to conditions or diseases and the influence of the home environment.

Aspects of independence and privacy in the home environment played an important role for older persons as well as their informal caregivers (47,50). This related to concerns about sharing information with HCPs by monitoring as a tradeoff that would benefit health and allow for maintaining independence and safety (50). In addition to increasing safety, HC was used to reduce anxiety when living alone (50,51), to enhance knowledge of risks, to change attitudes, and to involve family members in reminding older persons to be cautious (35). For older persons living alone in rural areas, HC enhanced well-being by supporting independence through the knowledge gained (39). HC also contributed to independence in an urban context (35). HC in the forms of education and stress management for informal caregivers reduced caregiver burden and improved the mood of care receivers (38). The home environment was also shown to be an obstacle to HC, since habits could hinder change (33). Among persons with chronic diseases, such as dementia, HC was shown to be appropriate for improving care (19,31,32,36,38,43,45,48–50,52–55).

### *Antecedents*

Antecedents are what precede the concept of interest. In this study, the antecedent was the need for knowledge, including information and education. This need was mainly described in relation to informal caregiving (33,38,48). With increased knowledge, the capability of identifying strategies and managing care situations improved (32,48).

### *Consequences*

Consequences of HC were described as both beneficial and nonbeneficial, including improved care, technology contributing to knowledge, and irrelevant and excessive information. Each consequence is described below.

### *Improved care*

By offering a new understanding, HC improved care (31,37,40,43,53,55) and was also used to reduce the insecurity of older persons when staying alone at home when informal caregivers were not present (35). Furthermore, HC encouraged informal caregivers to be more

confident and competent in the caregiving situation (32,35,46,48). One of the beneficial consequences for informal caregivers was the provision of improved care due to increased knowledge (19,37). The level of knowledge affected information-seeking and provided a sense of mastery (40).

### *Technology contributing to knowledge*

Different media, both paper-based and involving various technologies, were used in different contexts and in different ways to transmit and mediate HC messages (32–35,37,38,40,43,44,53,56). The results showed technology as contributing to communication, including communication via telephone and video instructions as well as monitoring sensors or displays used to inform and communicate with older persons and their informal caregivers. Whereas some of the included studies described HC as an intervention of structured information, most of them considered interpersonal communication, personal visits and traditional media, such as booklets and handbooks, as HC interventions (35,56). Technology-based HC included interventions, such as instructional videotapes and DVDs, intended to improve care in the home environment and to communicate with informal caregivers (37). The improvements mainly focused on distance care, such as monitoring and telehealth (50,51,57). Technology was used to present information that was not available before or could not be shared otherwise (43).

Another use of technology was to provide information about a specific topic or condition by indicating a certain parameter that stood out or was unusual (43,44,50,51). In this way, technology could be used to find patterns and behaviours, to offer reminders, or to encourage behaviour change (47). One example of technology use in caregiving was employing a sensor that could send a message about a change in condition, thus bringing awareness to both the older person and their informal caregiver (34,56). Notifications came in the form of alerts, suggestions to take action, or messages highlighting important information or unusual patterns (34,51). Monitoring technology was sometimes described as affecting privacy negatively, since collecting data and sending this information to informal caregivers could intrude on the privacy of the older person (34,50,56). This created a tradeoff between privacy and safety. In parallel, sensors contributed to the care of older persons with cognitive impairment, for example, by indicating open or closed doors, or if taps were left open.

Regarding the use of technology-based HC, the importance of guidance from HCPs was highlighted (34,35,41,42,44,55,57). The role of the HCP was to assist and encourage both the older person and their informal

caregiver in using specific technologies and to interpret, explain, and provide detailed health information. Support provided by the HCP in dementia care, for example, was to show a need for continuous supervision and provide information as the disease progressed (31,45).

### *Irrelevant and excessive information*

Negative aspects of HC could also be seen in the form of too much information or information that the receiver considered irrelevant. Older persons expressed concerns about being bound to an illness because of the excessive information they received about their condition or even feeling overwhelmed (44,50). An abundance of information given to informal caregivers about the older person's condition could also create stress for them (50). Informal caregivers viewed information about health-promoting behaviour both negatively and positively (47). They also expressed annoyance with receiving highly detailed information that was considered irrelevant (34). Furthermore, older persons could experience technology-based HC as stressful and as anxiety inducing; however, informal caregivers could play a supportive role in reducing this anxiety (44). The importance of feedback and clarity regarding expectations from HCPs was emphasised, as was the need for informal caregivers to understand their own responsibilities to help with self-management (44). It was, therefore, a challenge to balance between obtaining useful information and providing upsetting details about the disease (52).

### *Exemplars of the concept*

The fifth step of the EMCA is to provide an exemplar of HC in the home environment that contains all critical attributes: resources of the recipient, their influence on decisions and the advantages of tailored information.

*Exemplar of the older person.* 'For patients, the process of meeting peers in the support groups appeared to be of great importance providing an emotional experience of not being alone with the consequences of the disease' (32).

*Exemplar of the informal caregiver.* '...received important information and counselling that supported their ability to cope with the consequences of their spouse's disease, and to maintain their well-being' (32).

These two exemplars reflect that the interaction, the shared meaning of a chronic disease, and consideration of the information as important are equally significant outcomes of HC for older persons and their informal caregivers. Additionally, the exemplars reflect outcomes when HC is tailored to the needs and preferences of the recipient and is considered relevant. In these two

exemplars, the attribute advantages of tailored information are in the forms of printed information and support groups to share relevant concerns about dementia care. To increase knowledge, support groups devoted to chronic disease care in the home environment were perceived positively by both older persons and informal caregivers. The intervention from which this exemplar was derived also included tailored counselling to both older persons needing care and their informal caregivers. These two exemplars highlight both perspectives.

### *Descriptive definition*

In the analysed studies, the identification and construction of the meaning of HC in the home environment showed that older persons and their informal caregivers need knowledge to be able to handle health issues in the home environment. Three attributes were identified: the resources of the recipient, influence on decisions and the advantages of tailored information. These attributes produced the following descriptive definition of HC: *Tailored information, based on the needs and resources of the recipient, influences care decisions*. The descriptive definition emphasises targeting information to a specific receiver, the resources available to use, and making sense of the information, which then affect how HC influences the recipient. The consequences of HC are also based on its relation to the claims of irrelevant and excessive information and the use of technology. Furthermore, it was shown that the home environment itself could impact interpretations of HC.

### **Discussion**

Older persons and informal caregivers were described as being both active and passive when receiving or searching for HC. Further, the degree of their activity depended on how useful they perceived the information to be and whether an HCP could contribute with coaching or help in understanding the content of HC. Resources of the recipient included their ability to understand and apply information about health issues – in other words, their health literacy (HL) (58).

HC was considered useful and was viewed positively when it responded to a care need. Regarding the first attribute, 'resources of the recipient,' HC provided knowledge that helped the older persons and informal caregivers in caring situations in the home environment, depending on their ability to make use of this information and how relevant they perceived it to be. One example is difficulty in understanding health-related information (low HL), where research has shown that personal networks are deemed to be of greater importance than HCPs for understanding such information (59). According to Walker et al. (60), older persons

turned to their personal networks when seeking information and support, and they preferred 'word of mouth' communication. The results of the present study stress the importance of interpersonal interaction between the older person and their informal caregiver to enhance the understanding of HC. Communication between formal and informal caregivers and the provision of information as well as training and coaching were beneficial and were suggested to positively contribute to care (61). This indicates that support from HCPs facilitated information-seeking and clarifications, promoted understanding, and aided informal caregivers in implementing the information they received.

The attribute 'influence on decisions' highlighted how convincing, persuasive, supportive or encouraging HC was perceived to be. These results are in line with previous definitions of HC (2,4,5) that describe the purpose of HC as influencing decisions, increasing knowledge and motivating behaviour change. Another aspect of this attribute involved which sources were considered suitable, useful and relevant. Conversely, Biggs and Freed (33) discussed the potential consequences of providing incorrect information, perceived as suitable, to older persons in popular media.

The attribute 'advantages of tailored information' showed that when information was tailored to the needs of the recipient, it was more useful. This is in line with research (62) describing tailored messages as aimed at reaching a specific person depending on their unique characteristics. Therefore, HC can be perceived as relevant when messages are adjusted to individual needs (63). The understanding of individual needs must be presented in a way that is relevant and useful, such as a dialog characterising person-centred care (64). In the present study, taking individual needs into account was also viewed positively when utilising HC in care in the home environment. When older persons struggle to express their needs and preferences, interpersonal relationships with informal caregivers become important in their care. The benefits of tailored information are also in line with providing information according to the needs of the individual within person-centred care. According to van Dulmen (65), there is evidence supporting the use of tailored communication for person-centred outcomes. Further, interpersonal communication including customised communication, in contrast to tailoring (66), emphasises the importance of the relationship between the older person and the informal caregiver in sharing the meaning and understanding of HC, which is in line with person-centred care.

The consequence 'improved care' reflected the benefits of HC in terms of reduced insecurity of older persons and better care provided by informal caregivers. This supports previous research showing that HC contributes to care (67). Regarding the consequence 'technology

contributing to knowledge', the traditional mediation of HC, such as paper-based information, was used in some of the analysed studies as well as technology-based HC. Therefore, traditional communication channels should be maintained to prevent excluding important target groups that do not use technology, as shown by Tian and Robinson (68) and discussed by Suggs (10). The use of technology can enhance older persons' understanding of their condition, but it can also be a source of confusion and anxiety. To further improve technology-based HC, the co-creation of technologies by developers and users for this purpose as well as understanding of specific care needs are essential, according to Hardisy et al. (69). Anderberg et al. (70) studied the correlation between the level of satisfaction with the technology itself and the perception of health intervention outcomes. Their results indicated that anxiety caused by using technology is greater when the technology infringes on privacy. The consequence 'irrelevant and excessive information' showed that older persons and their informal caregivers considered large amounts of the same content to be excessive; for example, the older person being reminded too frequently about a disease could make them feel that they were bound to the condition. Therefore, it is important to consider the information needs and communication skills of the recipients of HC to provide sufficient, but not excessive, information (71). Giving feedback and providing clear information are other important considerations to avoid provoking anxiety. In this regard, showing respect and consideration of the needs of recipients is also important for how older persons and informal caregivers perceive communication when using technology-based HC in the home environment. Further, Fritz et al. (72) showed that technology-based HC, such as home monitoring, could create concern and stress for informal caregivers due to information overload.

Moreover, the reference 'the home environment' was sometimes seen as an obstacle to HC due to habits, even though the recipients had knowledge of what was needed. According to Verplanken (73), lack of awareness and difficulty in changing habits, together with limited mental efficiency and self-control, affected HC negatively. Social aspects can also impact healthcare in the home environment, according to WHO (23). Further, the home environment was considered a place of privacy and independence that contributed to safety. Tailored HC based on the needs of the older person and the informal caregiver had the potential to influence care decisions, as enhanced knowledge increased independence and autonomy as possible outcomes. These factors created an understanding that for older persons utilising HC, familiarity and a sense of identity are important when ageing at home (74). For informal caregivers, the home environment was also shown in the present study to be both

supportive and challenging when providing care. The reference 'need for information' is similar to the antecedent 'need for knowledge, including information and education', with the difference that need for knowledge involves searching for specific information. This is significant knowledge when older persons are receiving care at home.

### *Study limitations and strengths*

The results of this study were derived from a systematic literature search of three scientific databases and including key terms within the caring domain. Using a definition of HC as a starting point for finding relevant literature and search terms contributed to the results, although the additional studies found by using these search terms lacked in-depth descriptions of how the home environment affected HC. Further, there were differences in the controlled vocabularies used in these databases; therefore, the search terms were kept as similar as possible.

While the included studies differed in information richness, they offered varying descriptions that were beneficial to the understanding of HC. Concerning the dependability of the findings, a concept changes over time, according to Rodgers (25). Therefore, this concept analysis was based on data from 2000–2017 to capture recent descriptions of HC. The evolution of HC, including a variety of related concepts, may have affected the interpretations. One example of this diversity was the difficulty in differentiating between surrogate terms and related concepts in the EMCA and, therefore, combining the two (26).

Regarding the trustworthiness of results, the first author (EP) performed the literature search and analysis in dialog with the co-authors and with the help of a librarian to specify search terms and databases to enhance credibility (75,76). Using CASP for assessing the quality of included articles improved the credibility of this study. Lastly, most of the included studies focused on dementia care, although the results may be transferable to other chronic conditions.

### **Conclusion**

In conclusion, the possibilities of HC suggest that tailored information and mediated messages are significant for older persons to improve their health as well as for informal caregivers to provide care in the home environment. The perceived usefulness depended on the recipient's knowledge and understanding of the medium. Technology-based HC could both facilitate the understanding of information and be a barrier when information was considered excessive or irrelevant. The home environment influenced HC in terms of social



aspects, such as the interactions and habits of the older person and the informal caregiver. Thus, in this context, tailored HC contributed to knowledge, which could ultimately improve care. Further research is suggested on the needs of older persons and informal caregivers in relation to tailored technology-based HC for care in the home environment.

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## APPENDIX 1

### Overview of search blocks

Search blocks	Databases		
	Pubmed	CINAHL	Inspec
<b>Block #1: Health Communication</b>	'Health Communication' OR 'Health Communication'[Mesh] OR 'Health information' OR 'Health Literacy' OR 'Health Literacy'[Mesh] OR 'Health Education'[Mesh] OR 'Health Education' OR 'Health Promotion' OR 'Health Promotion'[Mesh] OR 'Information Literacy' OR 'Information Literacy'[Mesh] OR 'Health Knowledge' OR 'Health Knowledge, Attitudes, Practice'[MeSH] OR 'Healthcare Communication'	'Health Communication' OR 'Health information' OR 'Health Literacy' OR (MM 'Health Literacy') OR 'Health Education' OR (MM 'Health Education') OR 'Health Promotion' OR (MM 'Health Promotion') OR 'Information Literacy' OR (MM 'Information Literacy') OR 'Health Knowledge' OR 'Healthcare Communication'	'Health Communication' OR 'Health information' OR 'Health Literacy' OR 'Health Education' OR 'Health Promotion' OR 'Information Literacy' OR 'Health Knowledge' OR 'Healthcare Communication'
<b>Block #2: Home Care</b>	'Home Nursing'[Mesh] OR 'Home Care' OR 'Home-based Care' OR 'Community Health Services'[MeSH] OR 'Long-Term Care'[Mesh] OR 'community care' OR 'Community Living' OR 'Home Environment'	'home care' OR (MM 'Home Nursing') OR 'Home-based Care' OR (MM 'Long Term Care') OR 'long-term care' OR 'Community Living' OR (MM 'Community Living') OR 'community care' OR (MM 'Home Environment') OR 'Home Environment'	'home care' OR 'Home-based Care' OR 'long-term care' OR 'Community Living' OR 'Home Environment'
<b>Block #3: Older Persons</b>	'Aged'[Mesh] OR 'older adults' OR 'older persons' OR 'older people' OR elderly OR seniors OR ageing OR 'age related'	(MM 'Aged') OR 'older adults' OR 'older persons' OR 'older people' OR elderly OR seniors OR ageing OR 'age related'	'older adults' OR 'older persons' OR 'older people' OR elderly OR seniors OR ageing OR 'age related'
<b>Block #4: Informal Caregiver</b>	Caregivers [Mesh] OR 'informal caregiver' OR 'next of kin' OR 'family member' OR Relative OR 'Family'[Mesh] OR Family	(MM 'Caregivers') OR 'informal caregiver' OR 'next of kin' OR 'family member' OR Relative OR (MM 'Family') OR Family	caregivers OR 'informal caregiver' OR 'next of kin' OR 'family member' OR Relative OR Family
<b>n (with filter)</b>	<b>#1 AND #2 AND #3 AND #4 n=430</b>	<b>#1 AND #2 AND #3 AND #4 n=56</b>	<b>#1 AND #2 AND #3 AND #4 n=122</b>

## Appendix 1 (Continued)

Search blocks	Databases		
	Pubmed	CINAHL	Inspec
<b>Additional searches, using concepts in the definition of Raztan et al. (1994)</b>	'Health communication' AND 'Health information'  'Health communication' AND 'Health Motivation' 'Health communication' AND 'Health Influencing'  'Health communication' AND 'Health Issues' 'Health communication' AND 'Disease Prevention' 'Health communication'[Mesh] AND 'Health information' 'Health communication'[Mesh] AND 'Health Motivation' 'Health communication'[Mesh] AND 'Health Influencing' 'Health communication'[Mesh] AND 'Health Issues' 'Health communication'[Mesh] AND 'Disease prevention'	'Health communication' AND 'Health information'  'Health communication' AND 'Health Motivation' 'Health communication' AND 'Health Influencing'  'Health communication' AND 'Health Issues' 'Health communication' AND 'Disease prevention'	'Health communication' AND 'Health information'  'Health communication' AND 'Health Motivation' 'Health communication' AND 'Health Influencing' 'Health communication' AND 'Health Issues' 'Health communication' AND 'Disease prevention'
<b>n (with filter). Additional studies (searches not in table, n=0)</b>	<b>#1 AND #2 AND #3 AND #4 AND 'health issues'</b> <b>n=56</b>  <b>#1 AND #2 AND #3 AND #4 AND 'disease prevention'</b> <b>n=1</b>	<b>#1 AND #2 AND #3 AND #4 AND 'health issues'</b> <b>n=3</b>  <b>#1 AND #2 AND #3 AND #4 AND 'disease prevention'</b> <b>n=7</b>	<b>#1 AND #2 AND #3 AND #4</b> <b>n=0</b>

## APPENDIX 2

### Overview of included studies (title, author, year, age older/caregiver, country etc.)

#	Title	Method(s)	Participants	Age, participants	Conducted in...	Type of HC/intervention type
1	Arbuthnot E, Dawson J, & Hansen-Ketchum P. (2007). Senior women and rural living. <i>Online Journal of Rural Nursing &amp; Health Care</i> , 7(1), 35–46. <a href="https://doi.org/10.14574/ojrnhc.v7i1.142">https://doi.org/10.14574/ojrnhc.v7i1.142</a>	Qualitative method Interviews	22 older women 10 providers (5 formal, 5 informal)	Older persons (age): 65–80+ years Caregivers (age): Not specified	Canada	No intervention. Interviews of perceptions
2	Bedaf, S., Draper, H., Gelderblom, G.-J., Sorell, T., & Witte, L. (2016). Can a Service Robot Which Supports Independent Living of Older People Disobey a Command? The Views of Older People, Informal Carers and Professional Caregivers on the Acceptability of Robots. <i>International Journal of Social Robotics</i> , 8(3), 409–20. <a href="https://doi.org/10.1007/s12369-016-0336-0">https://doi.org/10.1007/s12369-016-0336-0</a>	Qualitative method Focus groups Interviews	21 focus groups	Older persons (age): Three groups 62+, 42–95, 65+ years (3 sites) Caregivers (age): Not specified	The Netherlands, United Kingdom and France	Discussing a scenario of using a robot
3	Biggs AJ, & Freed PE. (2000). Nutrition and older adults: what do family caregivers know and do? <i>Journal of Gerontological Nursing</i> , 26(8), 6–14.	Quantitative method	30 dyads	Older persons (age): 55–91 years Caregivers (age): 18–76 years	USA	No intervention. Interviews
4	Dadlani, P., Sinitsyn, A., Fontijn, W., & Markopoulos, P. (2010). Aurama: Caregiver awareness for living independently with an augmented picture frame display. <i>AI &amp; Society</i> , 25(2), 233–45. <a href="https://doi.org/10.1007/s00146-009-0253-y">https://doi.org/10.1007/s00146-009-0253-y</a>	Qualitative method	2 field trials (1+1 dyad)	Older persons (age): 85 years, 81 years Caregivers (age): Not specified	The Netherlands	Evaluation of a technological intervention (picture frame display)
5	de Lima Lopes, M. C., & Silva Marcon, S. (2013). THE LIFE EXPERIENCE OF SENIORS AND THEIR FAMILIES DEALING WITH ARTERIAL HYPERTENSION. <i>Ciência, Cuidado e Saude</i> , 12(2), 241–248. <a href="https://doi.org/10.4025/cienccuidsaude.v12i2.21745">https://doi.org/10.4025/cienccuidsaude.v12i2.21745</a>	Qualitative, Grounded theory Interviews and observations	14 families	Older persons: Not specified caregivers (age): Not specified	Brazil	No intervention. Interviews

Appendix 2 (Continued)

#	Title	Method(s)	Participants	Age, participants	Conducted in...	Type of HC/intervention type
6	Gratao, A. C. M., do Vale, F. de A. C., Roriz-Cruz, M., Haas, V. J., Lange, C., Talmelli, L. F. da S., & Rodrigues, R. A. P. (2010). The demands of family caregivers of elderly individuals with dementia. <i>Revista Da Escola de Enfermagem Da USP</i> , 44(4), 873–880. <a href="https://doi.org/10.1590/S0080-62342010000400003">https://doi.org/10.1590/S0080-62342010000400003</a>	Quantitative. Cross-sectional epidemiological design	104 older adults and 90 caregivers in Ribeirão Preto, São Paulo	Older persons (age): 60–85+ years Caregivers (age): Not specified	Brazil	No intervention. Observational study
7	Kramer, S. E., Alessie, G. H. M., Dondorp, A. W., Zekveld, A. A., & Kapteyn, T. S. (2005). A home education program for older adults with hearing impairment and their significant others: a randomized trial evaluating short- and long-term effects. <i>International Journal of Audiology</i> , 44(5), 255–264. 10.1080/14992020500060453	Quantitative. RCT	24 + 24 dyads	Older persons (age): Intervention, control mean, (standard deviation): 69 years (7.7)/71 years (8.5) Caregivers (mean age, intervention/control (SD)): 61 years (10.6)/63 years (11.9)	The Netherlands	Home education (videotapes, DVD) + instruction booklet, questions and themes for discussion
8	Middlemass, J. B., Vos, J., & Siriwardena, A. N. (2017). Perceptions on use of home telemonitoring in patients with long term conditions - concordance with the Health Information Technology Acceptance Model: a qualitative collective case study. <i>BMC Medical Informatics and Decision Making</i> , 17(1), 89 (13 pp.). <a href="https://doi.org/10.1186/s12911-017-0486-5">https://doi.org/10.1186/s12911-017-0486-5</a>	Qualitative interviews framework analysis	21 dyads	Older persons (age): 60–99 years Caregivers (age): Not specified	United Kingdom	Telemonitoring
9	Jitramontree, N., Chatchaisucha, S., Thaweeboon, T., Kutintara, B., & Intanasak, S. (2015). Action Research Development of a Fall Prevention Program for Thai Community-dwelling Older Persons. <i>Pacific Rim International Journal of Nursing Research</i> , 19 (1), 69–78.	Qualitative, Action research	80 participants comprising of 50 older persons, 20 family members, six public health nurses, a community leader, and three public health volunteers	Older persons (age): 60 and above Caregivers (age): Not specified	USA	Education program (personal meetings, nurses), handbooks
10	Riikonen, M., Makela, K., & Perala, S. (2010). Safety and monitoring technologies for the homes of people with dementia. <i>Gerontechnology</i> , 9(1), 32–45. <a href="https://doi.org/10.4017/gt.2010.09.01.003.00">https://doi.org/10.4017/gt.2010.09.01.003.00</a>	Qualitative (ethnography)	25 dyads	Older persons (age): 54–90 years Caregivers (age): below 65 years (n=20), over 65 years (n=5)	Finland	Testing of 29 different technologies

Appendix 2 (Continued)

#	Title	Method(s)	Participants	Age, participants	Conducted in...	Type of HC/intervention type
11	Seelye, A. M., Wild, K. V., Lorimer, N., Maxwell, S., Kearns, P., & Kaye, J. A. (2012). Reactions to a remote-controlled video-communication robot in seniors' homes: a pilot study of feasibility and acceptance. <i>Telemedicine and E-Health</i> , 18(10), 755–9. <a href="https://doi.org/10.1089/tmj.2012.0026">https://doi.org/10.1089/tmj.2012.0026</a>	Qualitative interviews Questionnaires	8 older persons and their families	Older persons (age): 64–92 years Caregivers (age): Not specified	USA	Testing of a video-communication robot Interviews
12	Torkamani, M., McDonald, L., Saez Aguayo, I., Kanios, C., Katsanou, M.-N., Madeley, L., ... Jahanshahi, M. (2014). A randomized controlled pilot study to evaluate a technology platform for the assisted living of people with dementia and their carers. <i>Journal of Alzheimer's Disease</i> , 41(2), 515–523. <a href="https://doi.org/10.3233/JAD-132156">https://doi.org/10.3233/JAD-132156</a>	Quantitative, Multi-centered Randomized control trial (RCT)	30 dyads	Older persons (mean age, standard deviation): 78.03 years (6.91) Caregivers (mean age, standard deviation): 60.69 years (13.90)	United Kingdom, Spain, Greece	Tablets supporting dementia
13	Toseland, R. W., McCallion, P., Smith, T., & Banks, S. (2004). Supporting caregivers of frail older adults in an HMO setting. <i>The American Journal of Orthopsychiatry</i> , 74(3), 349–364. <a href="https://doi.org/10.1037/0002-9432.74.3.349">https://doi.org/10.1037/0002-9432.74.3.349</a>	Quantitative, Multi-centered RCT	105 caregiver-care recipient dyads	Older persons [Mean age] (intervention/control): 72.8/72.5 years Caregivers [mean age] (intervention/control): 68.7/69.9 years	USA	Health Education programs (HEP) -coping strategies, education without technology
14	Toseland, R. W., McCallion, P., Smith, T., Huck, S., Bourgeois, P., & Garstka, T. A. (2001). Health education groups for caregivers in an HMO. <i>Journal of Clinical Psychology</i> , 57(4), 551–570. <a href="https://doi.org/10.1002/jclp.1028">https://doi.org/10.1002/jclp.1028</a>	Quantitative, Multi-centered RCT	58 + 47 dyads	Older persons [Mean age] (intervention/control): 72.8/72.5 years Caregivers [mean age] (intervention/control): 68.7, 69.9 years	USA	Health Education programs (HEP) -coping strategies, education without technology
15	Kinney, J. M., Kart, C. S., Murdoch, L. D., & Conley, C. J. (2004). Striving to Provide Safety Assistance for Families of Elders: The SAFE House Project. <i>Dementia</i> , 3(3), 351–370. <a href="https://doi.org/10.1177/1471301204045165">https://doi.org/10.1177/1471301204045165</a>	Qualitative phone calls, exit interview	19 families	Older persons [Mean age] : 75.7 years (SD 6.97) Caregivers [mean age]: 54.86 years (SD 12.63)	USA	Internet-based camera intervention. Web-based, sent messages/texts remotely to phones Combined with printed instructions and face-to-face instructions 24 weeks assessment



## Appendix 2 (Continued)

#	Title	Method(s)	Participants	Age, participants	Conducted in...	Type of HC/intervention type
16	Williams, K., Arthur, A., Niedens, M., Moushey, L., & Hutfles, L. (2013). In-Home Monitoring Support for Dementia Caregivers: A Feasibility Study. <i>Clinical Nursing Research</i> , 22(2), 139–150. <a href="https://doi.org/10.1177/1054773812460545">https://doi.org/10.1177/1054773812460545</a>	Qualitative (video recordings) + quantitative (survey)	1 dyad (70+? years)	Older persons (mean age): 70 years Caregivers (mean age): Not specified	USA	In-home monitoring Behaviour imaging technology
17	Sørensen, L. V., Waldorff, F. B., & Waldemar, G. (2008). Early counselling and support for patients with mild Alzheimer's disease and their caregivers: A qualitative study on outcome. <i>Aging &amp; Mental Health</i> , 12(4), 444–450. <a href="https://doi.org/10.1080/13607860802224342">https://doi.org/10.1080/13607860802224342</a>	Qualitative (semi-structured interviews)	11 pairs (patient+caregiver)	Older persons (age): 65–81 years Caregivers (age): 65–85 years	Denmark	structured social intervention programme (education with patient/caregiver and family network). Oral + written information about coping everyday life Support groups (discussions) Telephone counselling/intervention
18	Koivisto, A. M., Hallikainen, I., Valimäki, T., Hongisto, K., Hiltunen, A., Karppi, P., ... Martikainen, J. (2016). Early psychosocial intervention does not delay institutionalization in persons with mild Alzheimer disease and has impact on neither disease progression nor caregivers' well-being: ALSOVA 3-year follow-up. <i>International Journal of Geriatric Psychiatry</i> , 31(3), 273–283. <a href="https://doi.org/10.1002/gps.4321">https://doi.org/10.1002/gps.4321</a>	Kvantitativ, RCT (prospective)	236 dyads, completed 54+76 dyads = 130 dyads	Older persons [Mean age]: 75.6 years; Caregivers (mean age): 65.6 years	Finland	Rehabilitation courses (no technology) "Intervention methods included individual assess- ments, individual counseling, education, and both individual support and support groups"
19	Phung, K. T. T., Waldorff, F. B., Buss, D. V., Eckermann, A., Keiding, N., Rishøj, S., ... Waldemar, G. (2013). A three-year follow-up on the efficacy of psychosocial interventions for patients with mild dementia and their caregivers: the multicentre, rater-blinded, randomised Danish Alzheimer Intervention Study (DAISY). <i>BMJ Open</i> , 3(11), e003584. <a href="https://doi.org/10.1136/bmjopen-2013-003584">https://doi.org/10.1136/bmjopen-2013-003584</a>	Quantitative, RCT	330 dyads	Older persons [Mean age] (intervention/control): 76.5 (7.7)/75.9 years (6.6) Caregivers [mean age (SD)] (intervention/control): 65.5 (12.7)/66.5 (12.7) years	Denmark	Psychosocial intervention No technology

Appendix 2 (Continued)

#	Title	Method(s)	Participants	Age, participants	Conducted in...	Type of HC/intervention type
20	Schumacher, K. L., Stewart, B. J., Archbold, P. G., Dodd, M. J., & Dibble, S. L. (2000). Family caregiving skill: development of the concept. <i>Research in Nursing &amp; Health</i> , 23(3), 191–203. <a href="https://doi.org/10.1002/1098-240X(200006)23:3&lt;191::AD-NUR3&gt;3.0.CO;2-B">https://doi.org/10.1002/1098-240X(200006)23:3&lt;191::AD-NUR3&gt;3.0.CO;2-B</a>	Qualitative (interviews)	30 patients + 29 caregivers	Older persons (mean age): 60 years (SD=12) Caregiver (mean age): 53 years (SD=15)	USA	No intervention. Interviews about chemotherapy
21	Robinson, L., Clare L., & Evans, K. (2005). Making sense of dementia and adjusting to loss: Psychological reactions to a diagnosis of dementia in couples. <i>Aging &amp; Mental Health</i> , 9(4), 337–347. <a href="https://doi.org/10.1080/13607860500114555">https://doi.org/10.1080/13607860500114555</a>	qualitative interviews	9 couples/dyads	Older persons (age): 73–75 years (mean 77 år) Caregivers (age): 68–81 years (mean 74)	United Kingdom	Interviews. No intervention
22	Clare, L. (2002). We'll fight it as long as we can: Coping with the onset of Alzheimer's disease. <i>Aging &amp; Mental Health</i> , 6(2), 139–148. <a href="https://doi.org/10.1080/13607860220126826">https://doi.org/10.1080/13607860220126826</a>	Qualitative Interpreting phenomenological analysis (IPA)	12 dyads	Participants: 57–83 years (mean 71 years) Caregivers (age): Not specified	United Kingdom	Interviews. No intervention
23	Waldorff, F. B., Buss, D. V., Eckermann, A., Rasmussen, M. L. H., Keiding, N., Rishøj, S., ... Waldemar, G. (2012). Efficacy of psychosocial intervention in patients with mild Alzheimer's disease: the multicentre, rater blinded, randomised Danish Alzheimer Intervention Study (DAISY). <i>BMJ (Clinical Research Ed.)</i> , 345, e4693. <a href="https://doi.org/10.1136/bmj.e4693">https://doi.org/10.1136/bmj.e4693</a>	Quantitative, RCT	330 dyads	Older persons [Mean age]: 67.3 years Caregivers (age): Not specified	Denmark	counselling sessions, courses Phone calls
24	Mahoney, E. K., Trudeau, S. A., Penjack, S. E., & MacLeod, C. E. (2006). Challenges to intervention implementation: Lessons Learned in the Bathing Persons with Alzheimer's Disease at Home Study. <i>Nursing Research</i> , 55 (2 Suppl), S10–16. <a href="https://doi.org/10.1097/00006199-200603001-00003">https://doi.org/10.1097/00006199-200603001-00003</a>	Qualitative, descriptive (content analysis)	42 dyads	Older persons [Mean age]: 77.6 years Caregivers (mean age): 69.0 years	USA	Observation, home-visits by a nurse

## Appendix 2 (Continued)

#	Title	Method(s)	Participants	Age, participants	Conducted in...	Type of HC/intervention type
25	Wherton, J., Sugarhood, P., Procter, R., Hinder, S., & Greenhalgh, T. (2015). Co-production in practice: how people with assisted living needs can help design and evolve technologies and services. <i>Implementation Science</i> , 10, 75. <a href="https://doi.org/10.1186/s13012-015-0271-8">https://doi.org/10.1186/s13012-015-0271-8</a>	Qualitative Workshops, thematic analysis	10 workshops (four with end-users)	Older persons: 60-98 years (Participants from ATHENE study) Caregivers (age): Not specified	United Kingdom	Workshops of using telehealth and telecare
26	Whitlatch, C. J., Judge, K., Zarit, S. H., & Femia, E. (2006). Dyadic Intervention for Family Caregivers and Care Receivers in Early-Stage Dementia. <i>The Gerontologist</i> , 46(5), 688-694. <a href="https://doi.org/10.1093/geront/46.5.688">https://doi.org/10.1093/geront/46.5.688</a>	Quantitative	31 dyads (of 20 who completed the study)	Older persons/care receiver (mean age) : 78.9 years (SD 9.2) Caregivers (mean age): 61.7 years (SD 13.5)	USA	"structured, time-limited protocol of one-on-one and dyadic counseling for family caregivers and care receivers who are in the early stages of dementia" In-home monitoring
27	Wild, K., Boise, L., Lundell, J., & Foucek, A. (2008). Unobtrusive In-Home Monitoring of Cognitive and Physical Health: Reactions and Perceptions of Older Adults. <i>Journal of Applied Gerontology</i> , 27(2), 181-200. <a href="https://doi.org/10.1177/0733464807311435">https://doi.org/10.1177/0733464807311435</a>	Qualitative, focus groups, content analysis	Older over 55 + family member	Older persons (mean age): 80.6 years (range 66-91 years) Caregivers (age): Not specified	USA	
28	Marriott, A., Donaldson, C., Tarrier, N., & Burns, A. (2000). Effectiveness of cognitive-behavioural family intervention in reducing the burden of care in carers of patients with Alzheimer's disease. <i>The British Journal of Psychiatry</i> , 176, 557-562. <a href="https://doi.org/10.1192/bjp.176.6.557">https://doi.org/10.1192/bjp.176.6.557</a>	RCT, prospective	42 patient-carer dyads	Older persons/patients (mean age): About 75 years Caregivers (age): Not specified	United Kingdom	family intervention (carer education, stress management, coping) 14 sessions. Personal meetings, booklets
29	Ohta, S., Nakamoto, H., Shinagawa, Y., & Tanikawa, T. (2002). A Health Monitoring System for Elderly People Living Alone. <i>Journal of Telemedicine and Telecare</i> , 8(3), 151-156. <a href="https://doi.org/10.1177/1357633X0200800305">https://doi.org/10.1177/1357633X0200800305</a>	Quantitative	8 older persons. Family members included as well	Older persons (mean age): 81 years Caregivers (age): Not specified	Japan	Monitoring, infrared sensors