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GERONTECHNOLOGIES USED BY FAMILIES/CAREGIVERS OF ELDERLY PEOPLE WITH ALZHEIMERS: CONTRIBUTION TO COMPLEX CARE[1]

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ABSTRACT

Objective: to identify gerontechnologies developed/used by family members/caregivers as strategies of complex care strategies for the elderly person/family with Alzheimer's disease.

Method: an exploratory, descriptive, qualitative study, carried out with 13 family members/caregivers of elderly people who were participants of a support group from a university institution in Rio Grande do Sul, Brazil. Data were collected from January to April in 2016, through a semi-structured interview and submitted to discursive textual analysis.

Results: were identified gerontechnologies used/suggested by family members/caregivers, regarding forgetfulness regarding finding their way back home; refusing to take baths/showers; repetition and irritability; medication; money; ignorance/stigmatization of Alzheimer's disease; the risk of falling; care control.

Conclusion: the family caregivers of elderly people with Alzheimer's disease experience difficulties in the physical, mental and social aspects, for which they develop/use gerontechnologies in the form of products and processes/knowledge/strategies, to assist them in the care/coexistence with the elderly person with Alzheimer's disease.

DESCRIPTORS: Elderly. Aging. Alzheimer disease. Family relationships. Caregivers. Technology. Nonlinear dynamics. Nursing.

GERONTOTECNOLOGIAS UTILIZADAS PELOS FAMILIARES/ CUIDADORES DE IDOSOS COM ALZHEIMER: CONTRIBUIÇÃO AO CUIDADO COMPLEXO

RESUMO

Objetivo: identificar gerontotecnologias desenvolvidas/empregadas pelos familiares/cuidadores como estratégias de cuidado complexo à pessoa idosa/família com doença de Alzheimer.

Método: estudo exploratório, descritiva, de abordagem qualitativa, realizada com 13 familiares/cuidadores de pessoas idosas, participantes de grupo de apoio de uma instituição universitária do Rio Grande do Sul, Brasil. Os dados foram coletados, de janeiro a abril de 2016, por meio de entrevista semiestruturada e submetidos à análise textual discursiva.

Resultados: identificaram-se gerontotecnologias empregadas/sugeridas pelos familiares/cuidadores, com relação ao esquecimento da própria casa/caminho de casa; à não aceitação do banho; à repetição e irritabilidade; à medicação; ao dinheiro; ao desconhecimento/ estigmatização da doença de Alzheimer; ao risco de queda; ao controle dos cuidados.

Conclusão: os familiares/cuidadores de pessoas idosas com doença de Alzheimer vivenciam dificuldades nos aspectos físico, mental e social, para as quais desenvolvem/empregam gerontotecnologias na forma de produto e de processo/conhecimento/estratégias, para auxiliá-los no cuidado/convivência com a pessoa idosa com a doença de Alzheimer.

DESCRITORES: Idoso. Envelhecimento. Doença de Alzheimer. Relações familiares. Cuidadores. Tecnologia. Dinâmica não linear. Enfermagem.

GERONTOTECNOLOGÍAS UTILIZADAS POR LOS FAMILIARES/ CUIDADORES DE IDOSOS CON ALZHEIMER: CONTRIBUCIÓN AL CUIDADO COMPLEJO

RESUMEN

Objetivo: identificar gerontotecnologías desarrolladas/empleadas por los familiares/cuidadores como estrategias de cuidado complejo a la persona anciana/familia con enfermedad de Alzheimer.

Método: estudio exploratorio, descriptivo, de abordaje cualitativo, realizado con 13 familiares/cuidadores de personas mayores, participantes de grupo de apoyo de una institución universitaria de Rio Grande do Sul, Brasil. Los datos fueron recolectados, de enero a abril de 2016, por medio de entrevista semiestructurada y sometidos al análisis textual discursivo.

Resultados: se identificaron gerontotecnologías empleadas/sugeridas por los familiares/cuidadores, con relación al olvido de la propia casa/camino de casa; a la no aceptación del baño; a la repetición e irritabilidad; a la medicación; al dinero; al desconocimiento/estigmatización de la enfermedad de Alzheimer; al riesgo de caída; al control del cuidado.

Conclusión: los familiares / cuidadores de personas mayores con enfermedad de Alzheimer experimentan dificultades en los aspectos físico, mental y social, para las cuales desarrollan/emplean gerontotecnologías en forma de producto y de proceso/conocimiento/estrategias, para auxiliarlos en el cuidado/convivencia con la persona mayor con la enfermedad de Alzheimer.

DESCRIPTORES: Ancianos. Envejecimiento. Enfermedad de Alzheimer. Relaciones familiares. Cuidadores. Tecnología. Dinámicas no lineales. Enfermería.

INTRODUCTION

Care can be understood as a complex phenomenon, made possible through multiple relationships, interactions and systemic associations, with the objective of promoting and recovering the health of the human being in an integral and articulated way with all that surrounds him.[1] In the care of the person elderly and family with Alzheimer's disease (AD), as it is a neurodegenerative, irreversible, insidious, progressive, that causes cognitive and motor decline, there are more worries than answers and constant care is required, by a relative in the home environment.[2]

Care for the elderly person with AD generates multiple demands for the family caregiver[3] and produces difficult-to-manage feelings in the family that impose changes in the social, physical, psychological and financial aspects.[4] Care demands grow as the AD evolves which results increased workload for the family caregiver. A study that aimed to describe the repercussions of AD on the life of the family caregiver demonstrated that feelings such as sadness, tiredness, impotence, stress are present in their day-to-day lives. In addition, the study showed that family caregivers become more vulnerable to psychiatric disorders, as well as hypertension, digestive symptoms, and conflicts in the family and work environment.[5]

The caring process consists in seeing the elderly person in their singularity and multidimensionality, in the biopsychosocial, political and spiritual aspects, valuing the experiences in the family/community. This way of viewing the person as a multidimensional human being and part of a larger system, which, in this case, involves the family/community, is in agreement with complex thinking, which leads to the visualization of the whole, within its parts, as well as taking the complexity of the human being in its biological and cultural aspect into consideration.[6]

The understanding of the human being, from the complex thinking, challenges professionals to look for different ways of meeting the needs that are marked by continuous and rapid changes.[7] For the complex care of the elderly person with AD, it is necessary that health professionals, especially nurses, act together with family caregivers with the objective of strengthening a reform of thinking, replacing linear and unidirectional causality with a multidimensional, multi-dimensional causality.

A thought that can be complementary and antagonistic at the same, by the knowledge of the integration of the whole to the interior of its parts.[6] That allows the perception of the order from the disorder experienced through the AD in the elderly person. Such an exercise may lead family caregivers to (re) organize their day-to-day lives and assist them in the care process and coexistence with the elderly person with AD. Understanding this reality, together with the increase in the number of elderly people with chronic noncommunicable diseases (CNCDs), in particular AD, has directed gerontechnologies focused on the experiences of the elderly people/families.

The concept of gerontechnology is derived from the terms "gerontology" and "technology". It emerged from the interface between various branches of the sciences in order to provide technological and care contribution to the elderly population and their family caregivers. It can be conceptualized as

the development of products, environments and services that improve the daily life of the elderly person by providing a better quality of life (QV).[8] They are contributory technologies for the health care of the elderly which take aging and the health/disease process into account, and promotes care, co-responsibility and co-participation.[9]

The five objective of gerontechnologies are: to prevent/delay age-related functional decline; compensate existing functional limitations related to age and the presence of disability resulting from CNCDs; to promote increased engagement and satisfaction in the participation of work, leisure and family activities, as a support in old age for new educational opportunities, artistic expression, work, providing adapted spaces and social interaction; support caregivers and dependent elderly people through appropriate technological resources and environments; and to develop research on the use of technologies in aging.[8]

Gerontechnology is not always a product, but the result of work that involves a set of actions that present health care as a purpose. Nursing, as a profession and at the same time as part of the great social system, reforms thought when it considers the elderly person as a singular being, evaluating the singularities with respect to the overall view of systematized care.[9] Simultaneously, perceiving it as multidimensional, which encompasses its entire network of relationships and interactions.

This process causes gerontechnologies to appear in the articulation of all forms of knowledge, which refers to the importance of the knowledge of family caregivers who are directly involved in the care of the elderly person with AD, justifying the need and relevance of this study. It is also justified by the understanding that issues related to AD, elderly health, family and technologies are of great importance in the context of public policies, and are highlighted by the Ministry of Health as priority lines of research in Brazil.[10]

In view of the above, we question; which gerontechnologies do the family members/ caregivers of elderly people with AD use in the daily routine of complex elderly care? The objective of this study is to identify gerontechnologies developed/used by family members/caregivers as complex care strategies for the family living with an elderly person with AD.

METHOD

An exploratory, descriptive, qualitative study guided by Edgar Morin´s Complexity Theory.[11] The study was carried out with 13 family caregivers of elderly people with AD, who participated in a support group called Integrated Multidisciplinary Care with Caregivers of People with the Alzheimer's Disease (AMICA), developed in a higher education institution located in the State of Rio Grande do Sul, Brazil. This group started activities in 2007 with an interdisciplinary team, composed of teachers and students from health/human sciences areas in the same institution.

The inclusion criteria for the study were: to be a family member/caregiver of an elderly person with AD, enrolled in AMICA and attending or have attended for a minimum period of six months, considered enough time for the participants to have interacted, acquired knowledge about AD and have understood the way AMICA works, and be able to describe their experiences. The invitation to participate in the study took place in January 2016, through telephone contact with each participant, authorized by the coordinator of the AMICA group. Home visits were scheduled (HVs), according to the availability of each participant.

The HVs were performed between January and April 2016, at which time the data collection was performed using the semi-structured interview technique based on the guiding questions: what is it like for you to care for an elderly person with AD? Do you/did you experience any difficulties living with the elderly person with AD? What were they? Do you think there any potentialities in the process of caring for and living with the person with AD? What are they? What does the AMICA group mean to you? Have you done any adaptation/strategy and/or created something to facilitate the care process for the elderly person with AD and the family?

The interviews were recorded on a MP3 player and were transcribed at a later time. After, the data processing was carried out based on the discursive textual analysis technique, and organized based on a recursive sequence which contains three components: unitarization, establishment of relations and communication.[12] Initially, the researchers examined the texts with intensity and depth and subsequently formed the central category based on the identified gerontechnologies used or suggested by family members in their reports. They were unitarized in two base units; in the first unit, all the gerontechnologies were grouped into a product form and, in the second, in the form of a process/knowledge and/or strategies.

Subsequently, the establishment of relations between the base units began. At this stage, a new

reading was performed starting with the central category and the base units, with the aim of establishing relationships between them, i.e., each report inserted in the basic units was read in detail, and separated into different units, according to the use of gerontechnology. Finally, the last stage of the analysis method was performed, where the researcher presented the understandings from the two previous focuses, using the process of communication between gerontechnologies in the form of product and the gerontechnologies in the form of process, knowledge and/or strategies, according to the need, resulting in the metatexts of the description and interpretation of the investigated phenomena.

According to Resolution 466/12, the ethical precepts involving human research in Brazil were upheld. The project was approved by the Research Ethics Committee and was registered with CAAE: 48877315.2.0000.5324. Participants were identified by the letter F (Family member) followed by a number (F1, F2 ... F13).

RESULTS

Among the 13 family caregivers, five were female and eight were male, and all were between 30 and 66 years of age. Regarding the relationship with the elderly person with AD, eight were children, two were grandchildren and two were spouses/companions. The caregivers had between two and 14 years of experience as caregivers. Among these, eight lived with the elderly person with AD and five lived in separate houses. Nine of the family caregivers alternated the care with other people and three did not alternate with anybody. The amount of time in which the relatives/carers participated in AMICA varied between six months and 10 years. All participants were primary caregivers of the elderly person with AD.

The analysed data resulted in a central category: Gerontechnologies used/suggested by family members/caregivers in the care of the elderly person with AD and eight gerontechnologies subcategories, as can be seen in figure 1.

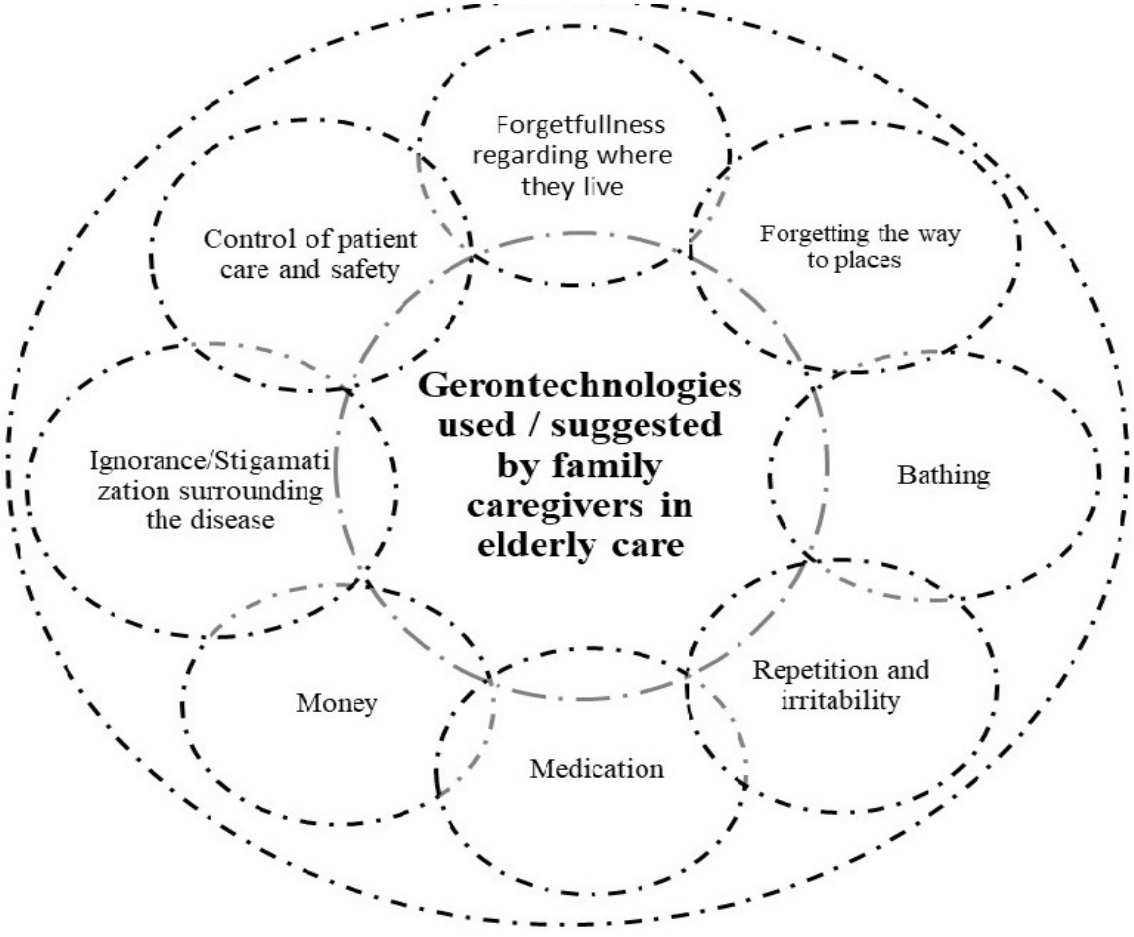

Figure 1 - Complex scheme of the (inter) linking of the central category with the subcategories Gerontechnologies related to forgetting where they live

Older people with AD, at some period of the disease, have difficulty recognizing common places, such as their own home. Thus, family caregivers developed/used diverse gerontechnologies to assist them in coping with the problems related to this context. These gerontechnologies were sometimes in the form of a product, other times, in the form of processes, knowledge and/or strategies and had positive results after practical application with the elderly person.

[...] *she told me that she wanted to go home, and she was at home, I started saying, 'No problem, I'll take you home.' Then I would take her, go around the back of the yard, go around the house, go to the front, change the subject a little and I would say: mother, look how fast we came home, we are already at your house. She would tell me: ' Really, we came so fast!'* (F1).

You have to distract them with something else. Once mother put the clothes into little bags and said that she wanted to go to her house [...] *I told her to get some sleep and as soon as my husband arrived, I would call her to take her home. When she woke up, she did not even remember that she wanted to go home, imagine if I started to argue with her, or tell her that she was messing up her clothes, she would be anxious, agitated and much worse* (F4).

One day I could not stand mother telling me that she wanted to go to her house, so I remembered that I had some thread, I gave it to her and asked her to unravel it for me, she stayed there for an hour and a half trying, you should have seen it, she was at peace. The people at AMICA say that they should always have to have something to occupy them [a person with Alzheimer's], *not television, something manual* [...] *So, I bought some modelling clay for her and she paints at my daughter's house* [...] *I'm trying to encourage these things, my daughter wants to buy a doll for her, because she has a passion for dolls, so she can entertain herself by dressing the doll, you know, these little things* (F6).

Gerontechnologies related to forgetting the way to places and destinations

A common situation in elderly people with AD is to leave home and not remember their way back. Some gerontechnologies, in the form of a product, are described: *the group has already taught us to make a badge, with the name and phone number of a relative, and put it on the clothing of the person with Alzheimer's, because if she gets lost and leaves and doesn´t remember the way home, someone can find them, see the badge and call the family* (F2); *they say that now there are some wristbands created for people with Alzheimer's to use that has the person's name and a their next of kin´s telephone number* (F8).

The family member F1 referred to gerontechnology in the form of knowledge/strategy as conversing with neighbors and commercial establishments close to their home, in order to take care of the elderly person with AD.

I warned the neighbours nearby and in the markets that my mother had Alzheimer's [...] *people have to know, because, if she got lost, someone could let me know* (F1).

Gerontechnologies related to refusing to bathe

In this subcategory we observe two gerontechnologies, which hav shown to have positive results when they are applied to the elderly person with AD, in situations where they refuse to perform personal hygiene. Firstly, one gerontechnology in the form of knowledge/strategy, used by F2, is presented by negotiating with the elderly person about something that he enjoyed to do, in this case, going to church.

[...] *we began to use church as a way to make him bathe because he always went to mass. We told him that if he wants to go to church he had to take a shower. Even when there was no mass, we used this strategy and it always worked* (F2).

In F13´s report, one can observe the use of a gerontechnology in the form of product, presented as a calendar for taking a bath or shower, which also has its logic in the negotiation of something pleasurable for the elderly person with AD.

[...] *at home I did the following: I put a paper on the wall; the days of the week are on top and the days of the month are below, like a calendar. So I made a challenge to see who wins, the days that he* [elderly person with AD] *refuses to take a shower, he has to draw blue x on that day, and when he takes a bath, he draws a red x. He supports a football team who uses a red uniform so he always wants to see the calendar full of red, he takes a shower, goes there and draws the red x* [...] *sometimes, when he does not want to take a shower, I mark a few days with a blue x and he looks and asks: 'all this in blue?', and I say, 'Yes'* [...] *you have to take a shower today, to make it red. Then he agrees to take a shower so I can give him the red pen. This was how I was able to make him take a shower* (F13).

Gerontechnologies related to repetition and irritability

Repetition and irritability are relatively common and even expected when a person lives

with an elderly person with AD. The ways in which family caregivers use strategies that can be thought of as care related gerontechnologies as they have a practical application in the care of the elderly person:

[...] *when she gets very repetitive about a particular subject, when she insists on doing something, I go along with it so that she doesn´t get upset, frustrated, because they are like that, one moment they are aware and then they are not, so I try to shift the focus, divert her attention to something else* (F3);

[...] *when I realize that she is talking a lot about a certain subject, I say something quite different to distract her and she forgets the first subject* (F6).

Another gerontechnology in product form, used by F3 in the care of the elderly with AD, is the manual activity of doing crochet, as it had a positive effect in the practical application of care. The gerontechnology kept the elderly person distracted, calm, quiet and involved which, according to the family member/caregiver, prevented her from becoming irritated by other situations.

[...] when she was younger, she crocheted, so *I tried to see if she still knew how to do and she did. So now I've been giving her things like to do, I give her tablecloths and when she's there, she's quiet and pays attention to the work, so much so that if I leave, she stays all day, and doesn´t remember to eat, to walk, nothing ... she just stays there, I have to remind her to eat and invite her to take a walk. So, this is good for her, because it distracts herself and she doesn´t get annoyed at other things, because she gets irritated sometimes. When I do not even have the money to buy the fabric* [...] *I undo the work for her to do again and she does not realize* (F3).

Gerontechnologies related to medication

In this subcategory, there is the interference of the family caregivers regarding the use of gerontechnologies in product form. These are devices such as boxes or pots used to separate medications for the different days of the week and schedule/shift.

We put the medication in a box that has the days of the week from Monday to Sunday; on one side and day and night, on the other side. We organize all the medications for the week and there is no way we can go wrong or forget (F6).

We began to divide the medication; we took a few pots and wrote the days of the week and the time, morning, afternoon and night. Then, we had the medicine from the boxes and we organized it the pots for the whole week, so he could take care of it (F2).

The family member F10 stated that he used a type of gerontechnology in the form of a product, by identifying the medication blister packs using a permanent pen. The days of the month in which they were to be administered were identified.

[...] *as they* [elderly people with AD] *take a lot of medication, I used to take the medication blister pack and I used a permanent pen to write on them; first I wrote the month, for example month ... and on top of each tablet inside the pack I put the day, for example: day 1, 2, 3... if the same medication had to be given more than once in the day, I would repeat the number, for example: 1, 1... 2, 2... and so on. Because that way, neither I nor the caregivers could get confused... It's no use writing on the box: take three times a day, because I could get confused as to whether I had given it or not. So, I write on top of the tablet, I looked at it and if today was day one, and the medication of day 1 was still there, it is because it had not yet been given to my mother* (F10).

Gerontechnologies related to money

In situations where the elderly person does not have autonomy related to day-to-day activities, for example, the capacity to recognize the value of money, the family members used gerontechnologies:

I put the money in his wallet using notes with smaller denominations, because it makes him happy. He looks at it and thinks he has a lot of money, but in fact, they are low-value notes. I control how much I put (F13).

You have to change the high notes for the same amount of notes, but with lower values. I learned this from another member from the group. That way, we do not totally deprive them of their autonomy, avoid constraints and making them angry. And if they give it to someone or hide it, at least it's not a lot of money. Another family member from the group said that he did this, because his father lost track of the value of the money, but he counted the amount of notes in his wallet to see if anyone stole it. (F2)

In F2´s report, it is possible to observe the importance of not completely withdrawing the elderly person´s autonomy regarding their money. According to the relative, this gerontechnology had positive results in practice and was used by another relative in AMICA.

Gerontechnologies related to ignorance/stigmatization surrounding Alzheimer's disease

In this subcategory, the family members used the folder and manual created by AMICA, as educational-care related gerontechnologies in the

form of a product, for the guidance regarding the care for the elderly with AD and the dissemination of the disease. The relatives reported that there was a lot of ignorance and stigmatization related to AD.

[...] *I have guided many people in my group using my experience, I show them the folder, the AMICA manual and explain about the disease and I invite them to look for the group because there is still a lot of ignorance about Alzheimer's* [...] *it is still a disease that people, families, due to lack of knowledge, still try to hide, letting only the people closest to them know* (F1).

I invite everyone that I know who takes care of an elderly person with Alzheimer's to participate in AMICA, I explain how it works and show our manual that we made in the group. There is still a lot of stigmatization surrounding the disease, until recently this disease used to be a taboo, only recently people have started talking about this disease openly and there are still people who are not yet aware of Alzheimer's disease (F2).

It is observed that family caregivers, when guiding others, use AMICA as a reference gerontechnology. They explain how it works and invite people to join the group.

Gerontechnology related to patient care and safety control

In order to feel more confident about the care offered to the elderly person with AD, the family caregiver implemented a daily report where care notes were recorded, as a type of gerontechnology product.

[...] *I implemented the daily report, everything the caregivers did they had to record, it was a register, from the time of arrival until the time they left. The vital signs, the medication that was given, if they urinated, had a bowel movement; everything was recorded in this book. I think this is very important, because sometimes we were in doubt about something, we looked in the book and there it was written everything that had been done and the date, it was a very good control of everything* (F10).

Regarding patient safety and the risk of falls in elderly people with AD, family members referred to the use of grab bars and railings in the bathrooms as gerontechnologies in product form.

At the entrance to her mother's house, we placed a railing on a stairway; in the bathroom we put some bars for her to hold on to on the front of the toilet and inside the shower (F12).

We put the iron bars on the wall for her to hold on to in the bathroom (F5).

Table 1 - Summary of gerontechnologies used/suggested by relatives/caregivers in the daily care of the elderly person with Alzheimer's disease

Gerontechnologies used/suggested by family members/caregivers in the daily care of the elderly person with Alzheimer's disease (AD)	
In product form	-Modelling clay, ball of thread and doll as entertainment related gerontechnologies for the elderly person with AD; - Identification card or bracelet for the elderly person and telephone contact of the relative as a care related gerontechnology; - Competition game in calendar format to facilitate the acceptance of body hygiene as a care related gerontechnology of the elderly person with AD; - Crochet as a gerontechnology to aid in times of repetition or irritability of the elderly person with AD; - Pots containing separate spaces with the days of the week and the schedule/shift in which the medications should be administered to the elderly person with AD; - Devices (glasses/pots) as care related gerontechnology to separate medications by days of the week and schedule/shift; - Medication blister packs with days for the administration of the tablets marked with permanent pen; -Folder and manuals created at AMICA as educational related geron technologies for guidance related to the care of the elderly person with AD; -Railings and support bars as care and prevention related gerontechnologies related to falls in the elderly person with AD; -Book called "daily report" as care and communication related gerontechnology for the elderly person with AD.

In the form of process / knowledge/ strategy	- Removal of the elderly person with AD from their home, taking them for a walk and to return to the same environment - care related gerontecnhnology when the elderly person forgets things about their own house; -Distraction of the elderly person as a care related gerontechnology in order to remove the focus causing the repetition/confusion; - Dialogue with neighbors and nearby commercial establishments about the elderly person with AD - care related gerontechnology for situations where the elderly person leaves and forgets the way to return to home; - Use of pleasurable situations for elderly person: "mass and church" – care related gerontechnology related to refusing to take a bath or shower; - Focus on a subject other than what the elderly person is insisting on as a distraction – care related gerontechnology at times of repetition and irritability in the elderly person with AD; - Replacement of high value money notes, for the same amount, but with less value, in the elderly person with AD – care related gerontecnhnology related to the self-esteem of the elderly person in situations of forgetfulness regarding the value of money.

DISCUSSION

The context of caring for the elderly person with AD appears singular, uncertain, complex and changes due to its complexity.[13] In complex situations, there is always the presence of order and disorder, which causes uncertainties and the need for strategic attitudes of the human being when faced with disharmony, perplexity and lucidity.[14] Such attitudes sometimes potentiate the production/construction and use of care related technologies. Technology in the field of health can be understood as both knowledge as well as its material and non-material unfolding in the production of health services.[15]

The present study evidenced that the family caregivers of elderly people with AD experience daily disorders, for which they develop/use some technologies that in the context of gerontology are known as gerontechnologies. They are structured in the form of product or processes/knowledge/strategies, aimed to establish a new order that makes it possible to (re) organize themselves for the process of care/coexistence with the elderly person with AD.

The gerontechnologies in the form of process/knowledge/strategies used by family caregivers refer mainly to strategies used to distract the elderly person from repeating themselves and/or becoming aggressive, negotiation for the acceptance of care activities, as well as dialogue with neighbors and businesses who live close to the elderly person's home. Such forms of gerontechnologies are important in the relational processes with the elderly person with AD, since forcing them to perform unknown activities may lead to situations of irritability.

The functionality and practicality of the presented gerontechnologies is evidenced, since they enabled the family caregivers to work with the singularity of each elderly person, which enhanced the appreciation and recognition of their habits, their culture and their life history. It is necessary to find ways to improve this process, either in the control of care or in the relationship with the elderly, in order to maintain care, both for the health of the elderly person, and of the family caregiver, the latter, is often overwhelmed with the responsibility of care, which can generate stress, physical and mental exhaustion.[16]

Gerontechnologies have enabled this appreciation within this researched reality, which can be seen when the family caregivers seek to use strategies related to distraction and negotiation with something pleasurable for the elderly person. The strategies in this study used as gerontechnologies are in agreement with the complexity, since they are open, evolutionary, face the unexpected, the new, unfold in random situations, use risk, obstacles, diversities, with the objective of demystifying the uncertainties, in this case, the uncertainties related to the elderly person with AD.

Regarding gerontechnologies as products, the family caregivers used a calendar to help the elderly person with AD to accept and perform personal hygiene, manual activity, through the technique of crochet, modelling clay, painting and a spool of thread, which maintained the elderly person distracted, calm, quiet and involved. Such gerontechnologies demonstrated functionality and practicality in the researched reality, as well as the benefit of avoiding the elderly person with AD becoming irritated. In other words, they enabled the reorganization from

the disorder experienced, which automatically led to a new order for the care process.

The process refers to the Edgar Morin´s Complexity Theory, which refers to organization as a permanent reorganization of a complex system through its interactions, which tends to disorganize when faced with the disorder caused by the disease itself. Thus, Morin conceives not only the organization, but also the continuous and permanent self-organization of the system,[14] in this case, understood as the home environment of the elderly person with AD.

With respect to the care/control of the elderly person's medication, the family caregivers used devices to separate the medications into the different days of the week and schedule/shift, as well as using permanent pen to identify the medication packs with the days of the month in which they should be administered. As they provide contributions, practicality and functionality to the care process, these initiatives, in their product form, are presented as gerontechnologies, since they are instruments used for the health care of the elderly person in their singularity which consider their aging process, health/disease process and facilitate care.[17]

These gerontechnologies are relevant as they are developed according to the unique needs of each elderly person, helping the family caregivers to administer the medications. Due to their functionality, they refer to Edgar Morin's Complexity Theory, which allows thinking about concepts without considering them as concluded, as well as understanding the circularity of order and disorder, based on the reorganizational processes.[6]

In an attempt to sensitize people and explain AD and the elderly care, the study participants used gerontechnologies, in the form of a product, i.e., the folder and manual created by AMICA. This data is in line with research carried out with members of Mutual Aid Groups (GAM), in the Municipality of Florianópolis/SC (Brazil). In the study in question, some participants reported using the knowledge acquired in the group to inform others, encourage their awareness on the subject and reduce stigmas surrounding AD.[18] Another study, developed with elderly people with stomas, presented the benefits of a guidebook as an education related gerontechnology.[9]

The family caregivers used grab bars in the bathrooms and railings on the stairs as gerontechnologies in the form of products to avoid the elderly person from falling. This form of gerontechnology is relevant, since falls, in addition to fractures and physical injuries, can generate a constant fear of falling, progressively limiting the elderly person´s participation in their daily activities.[19] The supervision and prevention of accidents in AD patients is of extreme importance because of the difficulty they have in discerning risk situations.[16]

One family member implemented gerontechnology, in the form of a product, as a daily report in which care notes were made regarding all the the care given to the elderly person on a daily basis. Such gerontechnology is relevant in view of the care demands of elderly people with AD and their families, especially in cases of advanced AD.[2] Thus, the daily report presented itself in a practical and functional way, and is characterized as a technological instrument which can be easily consulted when there was any doubt related to the care. According to the Complexity framework, a new order arose in the face of disorder, through the reorganizational process,[5] made possible by gerontechnology.

The gerontechnologies developed/used by the family caregivers of elderly people with AD were reflections of a context, initially, of disorder and the need to care for the elderly person, which, however, could be driven by a circular movement in which the disorder directed the family caregivers to reorganization, generating a new order in the care process of the elderly person. Thus, the antagonism and complementarity of order and disorder are represented, representing a recursive, singular and complex process.

The limitations of this study refer to the scarcity of bibliographies about technologies related to the theme of AD in the elderly and their families. It is worth highlighting the reference used, which made it possible to broaden the understanding of the phenomenon, and aided in the understanding of gerontechnologies, by describing their contributions to the daily life of the elderly person/family, from the perspective of the family caregivers.

CONCLUSION

The results identified gerontechnologies developed/used by family caregivers of elderly people with AD, which were divided into two groups: gerontechnologies in the form of products and process/knowledge and/or strategies. Gerontechnologies in the form of process/knowledge/strategies refer mainly to distracting the elderly person from constant repetition and/or becoming aggressive; maintaining the elderly person's self-esteem by keeping their money in their wallet; the need to negotiate regarding personal hygiene,

using situations that are pleasurable for the elderly person; making neighbors and nearby commercial establishments aware of the elderly person with AD.

Gerontechnologies in the form of a product are characterized by using modelling clay, crochet technique, spools of thread and the use of a doll to provide entertainment to the elderly person with AD; giving the elderly person an identification card or bracelet with a contact number; bath calendar related to baths or showers in order to help the elderly person with AD to accept person hygiene; box, glass/pots to separate the medications by days of the week and schedule/shift; medication charts with administration days of the tablets identified with permanent pen; folder and handbook created by AMICA for the orientation of care for the elderly person with AD; handrails and grabs bars to prevent falls in elderly people with AD; a "daily report book" to register the day-to-day care tasks.

The union of gerontechnologies made the construction of a synthetic framework possible, which can also be considered as a gerontechnology, since it can be used as a way to orientate other people who experience situations similar to those of the family caregivers participating in this study. Thus, it is believed that the gerontechnologies presented may help other family caregivers caring an elderly person with AD.

It is understood that the socialization of gerontechnologies can directly contribute to care, and improve the well-being of the elderly person so that they experience the process of AD with greater physical security and quality of life. With regard to the family caregiver, they will be able to assist the elderly person during the care process, allowing a more relaxed coexistence with the elderly person with AD. Regarding the contributions of the study to nursing as a science and profession, it is understood that gerontechnologies can be included/used in the clinical/nursing practice of nurses as well as other health professionals, individuals and families that experience AD, and in the teaching disciplines related to gerontology and geriatric care.

REFERENCES

1. Backes DS, Zamberlan C. Colomé J. Souza MT, Marchiori MT, Erdmann AL, et al. Interatividade sistêmica entre os conceitos interdependentes de cuidado de enfermagem. Aquichan [Internet]. 2016 [cited 2016 Dec 05]; 16(1):24-31. Available from: http://www.scielo.org.co/scielo.php?pid=S1657-59972016000100004&script=sci_abstract&tlng=pt
2. Araújo CMM, Vieira DCM, Teles MAB, Lima ER, Oliveira KCF. The repercussions of Alzheimer's disease on the caregiver's life. J Nurs UFPE on line [Internet]. 2017 [cited 2017 Oct 05]; 11(2):534-41. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/9610/pdf_2507
3. Marins AMF, Hansel CG, Silva J. Behavioral changes of elderly with Alzheimer's Disease and the burden of care for the caregiver. Esc Anna Nery [Internet]. 2016 [cited 2016 Dec 05]; 20(2):352-6. Available from: http://www.scielo.br/pdf/ean/v20n2/en_1414-8145-ean-20-02-0352.pdf
4. Vizzachi BA, Daspett C, Cruz MGS, Horta ALM. Family dynamics in face of Alzheimer's in one of its members. Rev Esc Enferm USP [Internet]. 2015 [cited 2016 Dec 05]; 49(6):931-6. Available from: http://www.scielo.br/pdf/reeusp/v49n6/0080-6234-reeusp-49-06-0933.pdf
5. Araújo CMM, Vieira DCM, Teles MAB, Lima ER, Oliveira KCF. The repercussions of Alzheimer's disease on the caregiver's life. J Nurs UFPE on line [Internet]. 2017 [cited 2018 Jan 20]; 11(2):534-41. Available from: https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/11971/14517
6. Morin E. A Cabeça bem-feita: repensar a reforma, reformar o pensamento. 17ª ed. Rio de Janeiro (RJ): Bertrand Brasil; 2010.
7. Backes DS, Zamberlan C, Freitas HM, Colomé J, Souza MT, Costenaro RS. Del cuidado previsible al cuidado complejo de enfermería. Enfermería Global [Internet]. 2014 [cited 2016 Dec 05]; 13(4):282-8. Available from: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1695-61412014000400015
8. Neri AL. Palavra-chave em gerontologia. 2 ed. Campinas (SP): Alínea; 2005.
9. Barros EJL, Santos SSC, Gomes GC, Erdmann AL. Gerontotecnologia educativa voltada ao idoso estomizado à luz da complexidade. Rev Gaúcha Enferm [Internet]. 2012 [cited 2016 Dec 05]; 33(2):95-101. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1983-14472012000200014
10. Ministério da Saúde (BR). Agenda nacional de prioridades de pesquisa em saúde /Ministério da Saúde, Secretaria de Ciência, Tecnologia e Insumos Estratégicos, Departamento de Ciência e Tecnologia. 2. ed. Brasília (DF): Editora do Ministério da Saúde, 2008.
11. Morin E. Introdução ao pensamento complexo. 5ª. ed. Lisboa (PT): Instituto Piaget; 2008.
12. Moraes R, Galiazzi M.C. Análise textual discursiva. 2ª ed. Ijuí (RS): Editora Unijuí; 2011.
13. Cassola TP, Backes DS, Ilha S, Souza MHT, Cáceres KF. Adaptive processo f caregivers of a person elderly with Alzheimer: contribuitions of nursing. J Nurs UFPE on line. [Internet]. 2014 [cited 2014 Oct 20]; 8(suppl 1):2243-8. Available from: http://www.

revista.ufpe.br/revistaenfermagem/index.php/revista/article/viewArticle/5319

14. Morin E. Ciência com consciência. Rio de Janeiro (RJ): Bertrand Brasil; 2010.
15. Merhy EE. Saúde: a cartografia do trabalho vivo. 2ª ed. São Paulo (SP): Hucitec; 2005.
16. Ricci M, Guidoni SV, Sepe-Monti M, Bomboi G, Antonini G, Blundo C. Clinical findings, functional abilities and caregiver distress in the early stage of dementia with Lewy bodies (DLB) and Alzheimer's disease (AD). Arch Gerontol Geriatr [Internet]. 2009 [cited 2014 Oct 20]; 49(2):101-4. Available from: http://www.sciencedirect.com/science/article/pii/S0167494308002033
17. Barros EJL, Santos SSC, Gomes GC, Erdmann AL, Pelzer MT, Gautério DP. Ações ecossistêmicas e gerontotecnológicas no cuidado de enfermagem complexo ao idoso estomizado. Rev Bras Enferm [Internet]. 2014 [cited 2014 Oct 20]; 67(1):91-6. Available from: http://www.scielo.br/pdf/reben/v67n1/0034-7167-reben-67-01-0091.pdf
18. Pires FRO, Santos SMA, Mello ALSF, Silva KM. Mutual help group for family members of older adults with dementia: unveiling perspectives. Texto Contexto Enferm [Internet]. 2017 [cited 2017 Sep 06]; 26(2):e00310016. Avaliable from: http://www.scielo.br/pdf/tce/v26n2/0104-0707-tce-26-02-e00310016
19. Ilha S, Quintana JM, Santos SSC, Vidal DAS, Gautério DP, Backes DS. Falls in elderly people: reflection for nurses and other professionals. J Nurs UFPE on line [Internet]. 2014 [cited 2015 Oct 20]; 8(6):1791-8. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/viewArticle/6158

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