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Access technology and dementia care: Influences on residents' everyday lives in a secure unit

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Abstract
There is a need to understand how technology can best be used to facilitate well-being in people with dementia. This study sought to describe how access control technology influenced the everyday lives of people with dementia living in a secure unit. The staff members and the unit's residents participated in the study. Data were collected through ethnographic observations and semi-structured interviews over 6 months, and were analyzed using the constant comparative method. The results show how access technology supported the residents' sense of security, territoriality, orientation, and adaptation to the environment. However, certain conditions were necessary for these influences to appear. Overall, the results indicate that access control technology may be used to support the well-being of people with dementia, and to increase their opportunities to feel in place in a secure unit. However, there is an urgent need in the future for further exploration of the conditions for use of technology in the field of dementia care, and the necessity of making careful evaluations of the use of technology in this field cannot be overemphasized.

Key words: *Access technology, dementia, ethnography, environment, spatial orientation*

Introduction

Dementia care and everyday occupations

Dementia is a serious concern for the aging society of today, as its consequences lead to increasing disability and dependence in everyday life, factors that challenge the sufferers, their families, and healthcare systems (1). Cognitive abilities are required for satisfactory engagement in occupations; as these abilities are diminished, people with dementia may be deprived of a sense of participation (2). In particular, enabling participation in the occupations of everyday life for people with severe dementia while simultaneously considering safety is a challenge for inpatient dementia care-givers (3). Technological solutions to safety problems in dementia care are increasingly common. However, electronic surveillance has been suggested as being in conflict with human dignity and freedom, and as encompassing a risk for misuse (4). Research is as yet sparse concerning the influences of technology on

the users' lives in dementia care units, and empirical studies are urgently needed (4–6). With this background in mind, we set out to explore how an intervention in terms of access control technology influenced the everyday lives of residents in a secure dementia unit.

As dementia diseases are progressive and as yet without cure, well-being is often the main goal in dementia care (7,8). Therefore, for caregivers of people with dementia, the focus is often on adaptation of the environment and on individualized support in everyday life, rather than on remediation of impairments (9,10). As is well known in occupational therapy, occupations are fundamental to a person's experiences of well-being and meaning (11). Research has shown that spontaneous engagement in daily occupations at home may increase the sense of rest and respite for people with dementia (12–14). Also occupations in dementia care can take on different meanings for those engaged. For example, a feeling of well-being and belonging may

emerge in people with dementia attending day-care as their sense of "normal function" increases through active participation in occupations (15).

It is well-known that the well-being of people with dementia may be promoted by environmental influences (2,11,16,17). In 1988, Zgola (18) stated: "A calm, predictable and accepting environment can provide the sense of security that enables a client to make full use of his abilities" (p. 28). The importance of considering both the properties of the physical environment and the environment as experienced has been underscored in the literature on dementia care (17,19,20). The environment as experienced by the person with dementia could be referred to as part of his or her world, incorporating unique experiences for each individual and allowing him or her to "be in place" (21,22). Experiences of being in place are important to take into account when support is being provided to people with dementia, particularly in a severe stage of the disease when performance of occupations is utterly restricted (12).

In summary, experiences of being in place and having meaning in everyday occupations are essential for the well-being and quality of life of residents in dementia care (2,8,11,23). In dementia care units occupations may, at the best, offer experiences of meaning and being in place, which may increase the well-being of the residents (11). The residents' experienced meaning in everyday life occupations serves to support their feelings of being in place and hence become more important than the end-product of the occupation per se, which is often unattainable for people with severe dementia without aid from others (11,22). Consequently, the care environment—especially when it supports experiences that promote well-being in people with dementia—is an area of vital concern. To what extent technology has a potential to meet this end has not yet been explored.

Wandering and access technology

Spatial disorientation, one common consequence of dementia, may have considerable results for people with dementia and for their care environment. Wandering has been recognized as a serious problem for caregivers and institutions, as people with dementia get lost while moving about (24,25). In particular, social and ethical concerns are raised as people with dementia may put themselves at risk when they wander off (4,26). Wandering is problematic for people with dementia, and especially for caregivers, who may anticipate the consequences of getting lost, and who might react by restricting the autonomy of the person with dementia to assure his

or her security (3,7). As wandering is a major cause of hospital admission for people with dementia (27) and is relatively common (28), engineers and medical staff have created tracking devices mostly via an electronic transmitter attached to a patient's clothes for determining his or her position (5). Wandering and agitation are often found together (29,30), which has resulted in environmental approaches such as introducing walking programs (30) or using tracking-device technology (5,6). Tracking devices are recognized as being only marginally useful in some cases, because of technical and ethical barriers, especially due to low acceptance from people with dementia (5,6). Rather than stopping the wandering, tracking devices mostly have helped reduce the time the person was lost, thus diminishing the risk of injury (5). On the one hand, surveillance technology may bring about opportunities to create a safer environment for vulnerable people; on the other, it raises serious concerns for human rights and dignity. One of the most commonly raised concerns in the literature is that technology would result in less attention being paid to the needs of residents with dementia due to "a false sense of security by the attachment of bracelets to residents which set off an alarm when they leave, or, worse still, if already low staffing levels are cut further" [4, p. 374]. However, it has also been suggested that technological solutions could decrease the risk of residents feeling trapped, by giving them a greater perceived sense of freedom but the necessity of making careful evaluations of the use of tracking devices cannot be overemphasized (4).

In Switzerland, as in other countries, one solution to wandering is the use of special secure dementia units for people with severe problems due to the disease. Such a unit was set at the hospital at our study site. A new technology, an access control system called Quo Vadis, was developed and implemented by the Swiss Foundation for Rehabilitation Technology. Quo Vadis I is similar to a tracking device and alerts caregivers when the person with dementia wanders off the authorized perimeter. Quo Vadis II, used inside the house, has the goal of increasing security and autonomy, by unlocking doors only for authorized patients and staff members (31,32). Each door in the unit was equipped with an electronic system, which controlled locking and unlocking. As someone authorized (i.e. wearing a chip card) entered the antenna's perimeter, the door unlocked and access was granted. Contrary to Quo Vadis I, which is a detect-and-alert technology, Quo Vadis II acts on the environment by locking and unlocking doors, blocking or unblocking an elevator, and recording the access of everyone equipped with

a chip card. The access technology system referred to in this study from here on is the Quo Vadis II.

As little is known about access technology and wandering in institutional secure units, and no study has explored the perspective of the actual users of access technology, there is a need to investigate how people with dementia interact with an access control technology system, and how it might influence their everyday lives. Therefore, the aim of the study was to identify and describe the influences that this access control technology had on the everyday lives of residents with severe dementia in a secure unit.

Material and methods

Design

The study was designed to have an ethnographic approach, involving both interviews and participant observations (33,34) with residents and staff at a secure dementia unit over a period of 6 months. This approach was chosen as it was considered to offer a variation in points of view and experiences and, hence, should provide richness of data.

Study setting

The secure unit where the study was conducted was situated in the middle story of a three-floor building in a hospital compound of many buildings. The unit specializes in investigation and short-term treatment for dementia care. On discharge, residents moved to long-term institutions or back home. Access to a secure garden on the north side was provided and an elevator connected the lower entrance level to the two units above. Access to the elevator and stairs was also secured by the Quo Vadis II system. The unit comprised 16 beds in 14 rooms, 2 rooms with 2 beds and 12 rooms with 1 bed. Private items could be brought into the rooms, although standard furniture was provided (i.e. a bed, a bedside commode, two cupboards, and a chair). The unit including the garden was square. The rooms, in two perpendicular hallways, faced south and east, with the garden on the other side. The hallways joined at the center of the unit—a combined living and dining room, a pharmacy, a staff office, and the most used access to the garden. Visits from family members were authorized at any time, and they had easy access in and out as long as they were wearing a chip card.

Selection of participants

The study participants were people with dementia, who were residents in the unit, and staff members, who had been working for at least 6 months before the study. This time limit was set to achieve valid information on the unit's life. All participants were included on a voluntary basis. Families and patients were informed of the study, and the families' consent was asked for regarding the participation of the person with dementia, since their own informed consent could not be requested because of their severe dementia (35). Informed consent was also required from the respondents on the staff.

Residents qualifying for participation in the study had been diagnosed with dementia, according to the criteria of DSM-IV (36). Everyone in the unit qualified at the time the study started or was included on arrival if he/she approved and consent was given. Three families agreed for their relative with dementia to participate more closely in the study (i.e. to be followed in their everyday lives during the time of their hospitalization).

Over the 6 months of data gathering, 15 residents at the unit were observed on and off. The three who were observed more closely were two females, whom we called Liliane and Rose, and a male we called Valentin. During the first week after hospitalization, the three main participants scored between 0 and 14 on the Mini-Mental Stage Examination (MMSE) (37). All three main participants had frequent visits from family members. Residents usually stayed from 3 weeks to 2 years, with a mean stay of 4–6 months.

We interviewed 13 members of staff (nurses, aides, physical therapist, activity therapist, occupational therapist, physician, and housekeeper) who participated in the study and who were referred to by the general term "staff", to protect confidentiality and identity. They all had close connections with the three main participants, through everyday care (e.g. therapy, clinical evaluations, housekeeping).

Data collection

The data collection design incorporated an ethnographic approach to gain understanding of the participants' interactions with and experiences of the influences of the access control system (34). This approach has been found particularly suitable in exploration of people with dementia (38). Hence, repeated observations were carried out in the unit at different times during the day, and two rounds of interviews were conducted with the staff in the unit. All data were collected by the first author (IMC). Initially, three pilot observations were carried out and analyzed at the beginning of the study (33). The pilots created an observation guideline composed of a drawing and description of place, people, and main interactions. The pilots also reported stories of specific observations based on interactions and activities as they unfolded. These helped calibrate

an observation guideline, to focus the observer's attention, rather than having a global view.

Altogether, 20 1-hour participant observation sessions (33) were conducted over a 6-month period. Observation sessions always started in the combined living–dining room with a written record of who was present and a quick drawing of the situation, to grasp the social group (34). Interactions became the clue for following residents through the hallways and to their rooms, observing their activities and trying to understand the meanings they assigned to physical, social, and occupational situations. Participants with dementia were not formally interviewed, as their cognitive impairments would not allow interviews (39), but their conversation and spontaneous comments during the observations were written down after each session, as part of the field notes.

Semi-structured interviews were conducted with 13 participants from the staff. The interviews lasted about an hour, and never more than an hour and a half. All interviews were taped and transcribed. They were scheduled after the first observations so that topics resulted from a preliminary analysis of these data (33). Topics related mostly to representations and explanations, such as the meaning the staff would give to the room for people with dementia. Staff would be asked to elaborate on the meanings they gave to the residents' actions as well as on the meanings that they thought the residents gave to certain situations. They were also asked to narrate their own observations and give them meanings, and to try to give meaning to the first author's observations.

Field notes included not only observation sessions and comments from the residents, but also reflective comments (33). Those would include details that came to mind after the observation sessions (e.g. noting that the technician spent 2 hours that day working on the elevator controls and imagining what people with dementia would make of that). Photographs were taken for descriptive purposes only and were not included in the data analysis.

Data analysis

The data analysis began during the data-gathering period, as the analysis in the field allowed emerging themes to be thoroughly investigated (33,34,40). First, all interviews, observations, and field notes were read to obtain familiarity of content. Data were then coded, with each sentence and paragraph yielding one or more meanings. Open codes, based on the content, were assigned to the data and classified (i.e. "activity in room", "security", "trails", "autonomy"). A pattern began to emerge from constantly comparing codes and data, and

continuously questioning the data. For example, we questioned the possible relationship between codes (e.g. "rest" showed itself to be dependent on "respect of property", as "rest" required that unauthorized patients be kept from entering all rooms). New data were obtained with each new observation and interview session and were first analyzed separately, adding codes to the text. These codes then were compared with the existing codes and emerging categories, resulting in inclusion or rearrangement into new ones. Eventually, all codes seemed to be linked to each other. Some were linked to more than one other code, which complicated the analysis process (40). Following the process of constant comparison, eventually categories were formulated from similarities and differences between codes, and the categories, in turn, formed a pattern that illustrated how the residents seemed to be influenced by the access technology. In the analysis, careful attention was paid to the fact that the data reflected several different perspectives (because, for example, the interview data were obtained from different categories of staff, while observational data were obtained from the researcher's observations of the residents' actions). As far as possible, the different perspectives were shown explicitly when we presented our findings, and our understanding of the data was presented in terms of possible understandings rather than indisputable facts. Keeping the study aim in mind helped themes emerge, and to identify in what way the system influenced the everyday lives of people with dementia (33).

Ethical considerations

The ethical aspects of implementing technological solutions in dementia care need careful consideration (4,41). People affected by dementia may not always express valid informed consent to participate in research (35,41). In the process of inviting participants into this study, it was difficult to ascertain how much the residents understood, as their communication ability was often reduced. Therefore, when the resident expressed a positive attitude towards the researcher's presence and attention, the family was informed and gave consent on behalf of the relative. Part of the process of receiving informed consent from the residents was to monitor their behaviors closely (39) and stop gathering data if signs of stress were shown. Participation in observation was adjusted to the sensibility of the participants, so that the observer would be neither intrusive nor distant (33). The research ethics committee in Switzerland rejected consideration of this study; the committee felt the study concerned quality-of-care-assurance rather than research in medical

science, because it did not involve a chemical substance. Therefore, the ethical authorization was granted by the hospital management, after revision of the protocol by the head physician of the psycho-geriatric department.

Confidentiality of all participants, both residents and staff, was ensured. All names were changed, details of location and personal characteristics were kept to a minimum, and data were not discussed with the hospital administration. All references that could be used to identify any participant directly or indirectly were either erased or modified. Precise information on the study and constant discussion of its proceedings were considered important for the family members to feel included and be reassured of their relative's well-being.

Findings

Conditions for the influence of the access technology

One of the main findings was that certain conditions had to be met for the access technology to influence the everyday life of residents with dementia in the secure unit. Three conditions were identified and appeared to have more or less serious consequences. For the first condition, operation of the system depended on its reliability, vital to the daily life of the residents. The second condition concerned the residents' pacing taking place inside the unit, which confused the technology when approached rapidly from a certain angle. The third condition, which also was the most difficult to meet, was the proper placement of the card on the person.

The reliability of the access technology system

Like all new technology, this access control system needed a phase of testing after implementation. At the time of the study, different parts of the system were added one after the other, and technical problems were solved, according to the staff. For example, for new cards, at one time all granted access became denied access, and reciprocally, which resulted in a couple of residents being able to wander outside. This problem was solved by the technician. Consequently, many aspects of the system ran smoothly, but components had yet to be added. For example, control of the elevator was added to the system at the beginning of the study. The technology then had to be programmed to recognize different types of chip cards; an overriding protocol was implemented in the computer to allow precedence of staff and family cards over patients' cards. Thus, the elevator could then allow outside access to patients accompanied by staff or family.

The part of the system controlling access to the rooms, which was central to the study, did not experience significant break-downs and did not suffer from the progressive installation of other components during the data-collection period. It was considered by the staff to be a reliable technical product, which also was pointed out as being vital for all those concerned.

Matching the pacing of the system and the pacing of the residents

The residents differed in their pace while walking and moving about in the unit. The access technology system used antennae over doors to detect chip cards in a given space. Entering the zone made the door's signal light turn orange and followed the resident's pacing appropriately. A problem arose when a person approached his or her room's door handle at a narrow angle and the system either did not react quickly enough in unlocking the door or did not detect the card where it was worn on the person. In similar situations, staff were seen staying a couple of seconds in front of the door, moving their cards to get the system to unlock. In contrast, people with dementia, not understanding how to unlock the door, would try to move the handle once and then walk away. However, this did not seem to be a major problem, as the doors to the patients' rooms were very sensitive and opened easily, while the doors to the hallways were not. This latter fact did not have much importance, as those two doors were usually kept wide open to facilitate movements and allow wandering. Still, doors failed to open occasionally, when the system did not react properly to the pacing of the residents.

Keeping each chip card on the intended person

One of the most difficult problems in using the access technology arose from keeping each chip card on the intended person. The antenna above the door would only release the lock if the appropriate chip card was detected. Residents who did not understand the chip card but were aware of it being there, either around their neck or attached to their clothes, often took it off, left it lying around the unit, or even threw it away. Staff reported spending time looking for lost chip cards, re-attaching them, and explaining what their function was, to no avail. One of them was quite upset when she talked about this situation: "Oh yes, they lose the cards. I don't know how they do it. We can't find the cards. They must throw them away. When the cards are lost, the system is of no use to these people."

When the cards where exchanged between residents and their visiting families, the staff experienced the resulting liability as increased. For example, Valentin, one resident with dementia, wore his wife's card, went into the elevator, got out of the building, started to walk away, and got lost. There was no alert by the alarm because the card he was wearing (i.e. his wife's card) was authorized. His wife left him in the elevator going up to the unit after her visit, not noticing the card exchange between them. Following this incident, visiting family members were asked to bring their relative back inside the unit before leaving them, and to be sure that they had the right card. Nevertheless, this incident reminded everyone that the system works only within its defined parameters.

In summary, these findings showed that all three conditions had to be met for the system to be beneficial. Without a proper chip card and recognition of it by a reliable system, the access control system could not influence the everyday lives of the residents with dementia in the secure unit.

Influences of the access control system on residents' everyday lives

The access technology influenced the residents with dementia in ways that were understood to create a pattern of three themes. Theme 1, promoting a sense of security, appeared to be closely connected to Theme 2, contributing to a sense of territoriality. Theme 3, coping with the environment, built upon the first two themes to show how adaptation can be supported by technology. Adaptation also seemed to be the optimal influence of the access control system. Notably, the system seemed to have more or less direct influence on the residents' lives within the themes. For example, succeeding in opening one's door could directly be dependent on the system, while the importance of accessing one's room was primarily related to the familiar objects in it. Hence, access control indirectly influenced access to personal belongings, and to their experienced meanings. Additionally, for each theme presented below, the necessary conditions presented above had to be met, in order for the system to have a direct or indirect influence on residents' lives.

Theme 1: Promoting a sense of security in residents and staff

The system's influence regarding security proved to be complex, as feeling secure had many components, both intrinsic to personal characteristics and extrinsic (i.e. related to the environment and to access control technology). Theme 1 seemed to have two main components: first, the secure environment, which included a sense of security as experienced by residents and staff. The access control system played a direct role in security by making sure nobody got lost and by controlling access to individual rooms. Second, security also appeared to result from a combination of privacy, autonomy, and feelings of capability. These aspects were intertwined and inter-balanced, present for all residents but not of the same importance for all. For example, sometimes privacy was valued more, whereas for other residents autonomy was more important.

A secure environment. This component was explicitly elaborated on by staff, as residents did not generally express security of the environment as an issue. Most of the staff were adamant that they needed to know their clients could not wander away and get hurt. In the interviews, the staff made it clear that protecting the residents was their first duty. Stories were told of people getting lost and dying; the possibility of this happening frightened the nurses and had to be avoided above all. One of the nurses told such a story: "In the canton of Jura, an old man got out at night; they didn't find him in time and he died from the cold. So not to lose the people in my care is an important issue."

All staff seemed to understand the concept of security as meaning physical security (i.e. to keep their patients from getting hurt). One nurse said: "Before Quo Vadis II, everything was locked up; now there's security with freedom added." Physical security was closely associated with the access control system; the staff relied on the system to guarantee security by not unlocking doors for unauthorized persons. This seemed to create in their minds a feeling of security; in turn, the staff projected this feeling of security to the people with dementia, who appeared very able to pick up moods. A staff person reported: "It's incredible how sometimes, when we are under-staffed, the patients all go wild on us, acting crazy; that's when we get into trouble. I guess they just pick up on our moods; If I'm feeling stressed, that's the morning Mr Joe will choose to be aggressive. So I think we just try, when we know we're going to have a busy day, to relax and project a feeling of security. And it works, most of the time."

The physical environment provided by the system was understood to be secure and to allow residents with dementia the freedom to move about safely. Nurses did not have to worry about "losing" the people in their care, which put their minds at rest and allowed them to relax when interacting with residents. Hence, the system appeared to help staff provide and transfer a sense of calmness and security

to residents with dementia, knowing that the patients they were responsible for actually were secure.

Security from privacy, autonomy, and a sense of capability. The access technology was found to have a direct influence on the fulfillment of the residents' need for privacy and autonomy of movement; thereby, to some extent, the technology also supported the residents' sense of capability. The expressions of privacy, autonomy, and capability often were intertwined and more or less explicit in people with dementia, depending on individual personalities.

The system seemed to promote privacy for the residents by controlling the access to the rooms, and by offering a secure, private place. One of the staff said: "She [Rose] found it [privacy] in her room, because she knows no other patient may come in and disturb her. I think Quo Vadis respects property and privacy, and is an advantage for residents. It allows them to isolate themselves, creating a place where they can find their rest and resources." Knowing, through experience, that they would not be disturbed by others coming into their room seemed to help create a feeling of security among residents.

However, mostly the access technology system helped residents respect the property of others. One of the staff said: "There is less trouble with those patients who go into all the rooms they find, and get clothes out of the cupboard, touching everything, eating everything they find, sometimes even urinating in the room. We've had trouble with this man who urinated in front of the walls in his room. If Quo Vadis hadn't been there, he would have urinated in other patients' rooms, can you imagine!" The respect for property and privacy made possible by the system reinforced feelings of security as residents gained access to a place of rest without having to worry about protecting themselves and their belongings. The staff reported that before the system such worries were normal.

Autonomy, as expressed by the participants in observations and interviews, was understood as freedom of movement and choice in walking. Staff explained: "The greatest advantage of the technology is for the patient to be free to walk and wander, to have more freedom, and, if authorized, to get access to the outside whenever that is desired." By unlocking doors, the system allowed access to movement throughout the unit, depending on choices made by residents and within the boundaries of the authorization. The access technology was also found to facilitate autonomy through automated responses to wandering, by unlocking appropriate accesses. In such situations residents did not face the need to call for a nurse, which was in any case impossible for most residents due to their severe cognitive impairment. For example, one resident, who spent his day walking, was obviously assisted by the system to gain access to the hallways and to his room. After some walking, the access control system seemed to influence his wandering by granting him access to his room at the end of the corridor where he could lie down and rest for a couple of minutes before starting his unending walking again. In this manner the technology appeared to give him the choice of resting by allowing him immediate access to the privacy of his room, and thus permitting him to practice autonomy in deciding to stop wandering.

By helping residents gain autonomy, the system seemed also to reinforce their sense of capability, which benefited from opportunities to make choices and succeed in activities. Feeling capable was closely linked to autonomy, as expressed by both staff and residents. For example, one resident seemed very proud to be able to find her room, despite memory problems; in succeeding she felt confirmed as capable. She reported: "This [the chip card] helps me find my room, I know I can try out all the doors, so I can forget my room and still find it; I don't have to worry and I don't have to interrupt and ask the people in white to show me my room." The access control system could hence be understood as providing a sense of capability by granting access to the right room, as the resident was confident and felt secure about her ability to find her room again.

In the staff's understanding, both autonomy and capability seemed to be involved in creating a sense of security. One member of staff expressed the influence of the access technology system thus: "It is a lot of frustration for them, they try, they shake the handle and it won't open, so sometimes they get angry. And then they come to their own door and they manage to open it; they don't understand, but I can see on their face that they are proud of their success. It's as if they were saying: Look, I did it all by myself! They manage to succeed in something; the system allows them to succeed all by themselves with something important. Yes, I think it helps reduce anxiety and stress, and reinforces their identity by being able to succeed." Thus, the system allowed the residents to gain access to their rooms without help from the staff. According to staff, this seemed to decrease anxiety levels throughout the unit, as random and repeated unsuccessful efforts to open locked doors were diminished, which in turn helped provide a feeling of security.

In summary, Theme 1 describes how the access control technology was found to influence movement and wandering of residents by guaranteeing a secure environment, protecting their privacy and property from unauthorized tampering, supporting

their autonomy, and reinforcing a sense of capability. All these components seemed to reduce anxiety in both staff and residents, and promote an overall sense of security on both sides.

Theme 2: Contributing to creating a sense of territoriality in the residents

Through its indirect but necessary influence, the access control system seemed to contribute to setting aside a unique space for people with dementia to use (i.e. their room). The meaning of this for the residents seemed more related to activities taking place in the room and to familiarity than to the direct influence of the system. This pattern helped the emergence of a sense of belonging and territoriality, which were sometimes also expressed as well-being by all participants.

The room as the resident's territory. Controlled access to the room was shown to provide residents with security and respect of property, as described in the first theme. In doing so the technology helped create a unique place for residents to fill with personal belongings and activities of their liking. The access control system actually was seen to protect both belongings and activities from tampering and disturbance by other residents. This guaranteed protection—a direct influence of the system—seemed to support the creation of a sense of territoriality for the residents.

For example, one of the unit's residents, Liliane, was often observed initiating activities involving objects in her room, as shown by an excerpt from the observation notes. "She then opens the door and enters the room. There she wants to show me her family pictures, so we sit on the bed. She takes the pictures from a drawer in the bedside commode and goes through them carefully. For each picture she tells me who is on them. I don't understand everything she says because her language is affected, but she is smiling fondly at the pictures. She seems content for me to smile back at her. After she has gone through all the pictures, she reassembles them and puts them in a neat pile back in the drawer." Liliane loved to invite people in her room to show them her photographs. Sometimes she selected 2–3 of the photographs and carried them in her purse, but she never showed them outside her room. She was able to have this personal activity because access to her room was kept private and was guaranteed freely to her alone. In other words, the room became a place that belonged to her. Staff expressed this in the following words, when commenting on this habit of Liliane: "[…] may go in her room whenever

she wants, it's *her* room, *her* place, *her* domain [staff's emphasis], and she has her own chip card, so she knows no other patient may enter". By guaranteeing privacy to the room, the system seemed to offer the residents moments when they could anchor themselves, with a familiar activity of their own choice in private territory, as in Liliane's example.

The familiar territory as a reflection of the resident's habituation. The rooms of residents in many cases provided them with some familiarity, through personal belongings they kept there. No other place in the unit was seen to offer the same familiarity, as every other place had to be shared. Familiarity, brought about by belongings, reflected the person's habits and allowed residents to feel comfortable, thus helping create a territory in the room.

One of the staff explained, when talking about Liliane's and Rose's use of their rooms: "They go into their room to see whether it corresponds to their image. And all [residents] who regularly go into their room have personal items in it. Sometimes it's a teddy bear or a picture, or a familiar object on the bedside commode. I think it represents an attachment to the past, a familiar point of reference in a strange environment." The past, which often was familiar, offered many points of reference in the rooms, as the only space where personal belongings could be kept in the unit. In turn, the access control system aided them in accessing and protecting these familiar belongings, and hence it could support the access to their past as it was represented in their present territory.

In summary, the protected room and the private territory facilitated access to memories of the past and increased contentment through the performance of private activities of personal meaning in the room. By guarding the room's privacy, the system aided the residents in creating familiar territory through indirect influence.

Theme 3: Supporting residents to cope with the environment

The staff reported that the unit's new residents needed less time to calm down and to cope with their new environment during the time of the study, in comparison with before the access control system was completed. Three factors linked to the technology came forward as contributing to this: use of the territory to meet the trauma of being hospitalized; use of points of reference; and use of the system to facilitate learning trails in the new environment.

The private territory's role in overcoming the trauma of being hospitalized. The staff reported that, when first hospitalized in the unit, all residents with dementia showed experiences of trauma and loss. This often made them aggressive, as they did not understand what was happening; their behavior showed in both observations and interviews. From their expressions of fear and anguish, and sometimes aggressiveness, the residents with dementia seemed to feel the loss of freedom on top of all the other losses they experienced. A member of the staff explained the losses as follows: "There's already the loss of their home, the social loss is tremendous, too. I would say work, too, at least for the younger people here who have pre-senile dementia.... But the social loss, friends, relations, all the contacts with outside, they lose it all...and there's also the losses linked to memory, they have lost whole parts of their history. In fact it's a loss of their integrity and identity, it's very profound and traumatic. They feel it acutely when they get hospitalized. And then we take away their freedom."

The staff understood some of the residents' behaviors as a more or less successful defense against that trauma. Common defenses, they said, were disbelief, aggressiveness, and use of their room as a place to find themselves again, to find their resources. One of the staff explained one way of coping with the trauma as follows: "They use their room as the place they can isolate themselves for a while, to rest, or to refresh themselves[1], find new resources, new strength to cope with the situation."

Obviously, as the room was each resident's only private domain, the access control system could to some extent help him or her to face and cope with the trauma of being hospitalized through providing access to and protection of that territory. In other words, the access control system helped them to access the private domain when they wanted, whilst protecting their privacy and shielding them from unwanted disturbances. In combination, this could be a step towards helping residents to cope with the sudden change of living conditions when being hospitalized.

Points of reference supporting orientation and adaptation. Despite their cognitive impairments, residents appeared to use various points of reference for their orientation. However, two particular references in time and space were most consistently observed in the unit. These points of reference were seen to emerge progressively after a couple of days of hospitalization. First, having meals at regular intervals and always in the same place seemed to help the residents structure their day and offered points of reference in time. Second, their room being the only one they always had access to seemed to offer a point of reference in space. The room, by providing important meaning as private territory, was consistently used as a central and secure point of reference from which to organize space.

With their room as a central point of reference, the residents seemed to be able to find their way to and from the living-room, the garden, the kitchen, the restrooms, and the hallways, where most wandering took place in the winter. The system also proved helpful when residents were returning to their rooms. For example, Liliane always had the same starting point in the trails she had learned. In the mornings she came out of her room alone after having been helped to dress, and unerringly turned right to get to the dining-room for breakfast. Even later during the day, each time she came out of her room, she turned right. When she first came to the unit, she would try all the doors in the hallway until she found her own, which then opened for her. The picture of her husband and herself was put on the door and she soon integrated it as a point of reference. After a week she recognized that room to be hers and she tried the other doors less often. The photographs and the success in opening her door obviously encouraged her to recognize it as her own. Liliane seemed to benefit from the system by learning how to get to the living-room from her room and back, which was understood as one step towards coping with the new environment.

In summary, coping with the environment seemed to involve learning trails and creating points of reference in order to know the environment better and be able to move around purposefully in it. The access control system was found to have a direct influence on learning trails, by not letting people get sidetracked into other rooms and by offering as direct a path a possible to the main living–dining room. The influence of the system appeared to be indirect in providing a secure room as a strong point of reference and a place to find resources to cope with the trauma of hospitalization.

Discussion

The optimal influence of the access control system seemed to be that it helped people with dementia adapt to a new environment such as a secure unit, given that all components presented in the results were present. Security was needed as a basic factor to create a feeling of territoriality in the residents, and, at its best, the residents were supported by orienting themselves within the unit and finding a place of privacy that helped them adjust to the new environment. Hence, the results showed that as long

as the conditions for electronic access control were fulfilled, this technology might be useful for elderly residents of inpatient dementia care. These findings add to former studies suggesting that surveillance technology first and foremost may influence security by keeping residents from wandering off (4–6). Importantly, however, the mere implementation of an access control system does not guarantee that residents with dementia are supported in terms of experienced security and territoriality and increased adaptation. Rather, it is the use that is made of the technology within the care context that determines whether the outcome is good or bad, as underscored by Welsh et al. (4).

In the first theme, autonomy increased the sense of security for residents through their independent performance when walking about and opening doors. Security and autonomy have been put forward as key outcomes that should be fulfilled to meet the needs of residents in dementia care (17). Even though the residents in our study were dependent on support from staff members for all everyday activities, they were allowed to wander and try to open doors with the system working. In the literature on dementia, autonomy has been opposed to security (42), as caregivers usually restrict autonomy to preserve security—this was the perceived duty of staff members in our study as well. However, our results suggest that security and autonomy were intertwined rather than being in opposition. Privacy represented control of the environment and of interactions, as when residents were in control of their own territory, and this seemed to enhance their perception of autonomy, decrease vulnerability, and promote a sense of security. The residents' expressions of autonomy when, for example, succeeding in unlocking a door also seemed to encourage their sense of self-esteem and capability, which is in line with other studies (3).

Territoriality came forward in terms of residents having a private sphere—their room—and in having the familiar items within their territory protected. The concept of territoriality has been identified as a universal human component; striving to build territoriality is a universal human behavior (43). Our results confirm this; the residents with dementia appeared to both strive for and benefit from experiences of territoriality or, in other words, to be in place in the unit, despite severe cognitive deficits. Similarly, Lawton (17) pointed out that privacy is essential for quality of life in dementia care. He defined the ultimate outcome of environmental design with regard to privacy as follows: "Residents experience a sense of bodily privacy, have the ability to keep personal information confidential, and have sufficient opportunities to be alone and to communicate

and interact with others" (p. S59). Interestingly, the access control system seemed to contribute to this sense of privacy by offering refuge and security in a private sphere where personal belongings could be protected and where withdrawal from life in the unit was possible. In turn, these possibilities were understood to expand experiences of familiarity and belonging as the room, in some cases, could be compared to home, while becoming a familiar place.

Elderly people are known to experience being in place through many components, one of which includes the importance given to certain spaces (11,22). In this study, the individual rooms appeared to be a central space from which the residents could confront the outside world. In a study of people with dementia who still lived in their homes, Öhman and Nygård found that they used self-chosen activities for many reasons, one reason being to find or create a sphere of their own (14). In that study, the personal sphere—being a particular room or an intrinsic, experienced space—seemed to provide a sense of freedom, inner peace, enjoyment, and a possibility to feel alive and competent, in contrast to the impact of the progressive disease. Considering the shared, institutionalized environment of a secured unit, and the limited possibility to have a vivid inner world when severe dementia is present, the importance of the private territory of the room, assured by the access control system, seems outstanding.

Spatial disorientation was central to the difficulties experienced by the residents in the secure dementia unit, as expected. Deficits in spatial and procedural memory and in the ability to acquire points of reference often play a role in people with dementia wandering and getting lost (44). According to Woods (7), specific training may have an impact on improving orientation, and people with dementia may learn trails or create points of reference. Research has, for example, shown that way-finding interventions may be effective for residents with dementia in a short time perspective, but no effects were sustained after 3 months (28). Interestingly, in our study, the access control system seemed to help residents find their way in the unit by creating points of reference as they learned to find their own room. In contrast to the time-limited way-finding intervention in the study by McGilton et al. (28), the access control system provided a re-occurring and repetitious learning situation that, in time, became familiar and seemed successful as a way-finding strategy.

Overall, the results appeared to offer several interacting potentials to the use of an access control system in dementia care, as long as the prerequisite conditions were fulfilled. Eventually, adaptation to the new environment, supported by the access control system, emerged as the ultimate result of

the technology as it helped residents cope with their situation. The results also exhibited that people with dementia still have resources and competences in some areas, as all of the participating residents had MMSE scores between 0 and 17 out of the maximum 30, which indicate a severe degree of dementia (8). Nevertheless, they showed some ability in adapting to a new environment. Many staff participants, who had been working in the unit before implementation of the access control system, reported a perceived difference in terms of improved overall mood and decreased ambient anxiety in the unit as well as increased well-being among residents. Even if this experienced change could not be directly attributed to the system, the suggested interpretation from the staff was interesting to note, as it underscored the importance of further inquiry into the potential of environmental adaptations in dementia care.

Methodological considerations

The overall positive attitude to the technology by the staff may have influenced our results; in data the staff showed an overall positive view of the access control technology. However, it is important to note that not all of the staff were positive to technology per se, and not all had willingly accepted the technology when it was first implemented. Based on this fact, and on the rich amount of observation data, we consider the accounts of the staff to reflect what they experienced rather than what they presupposed or expected to happen with a technology such as Quo Vadis II. The possible reasons for residents not to benefit from the system were not particularly investigated in this study, but were expressed in data as related to conditions for system reliability. Further research into explanations as to why people with dementia might not benefit from such a system is needed, to find ways to adjust the essential conditions of the system to the potential of the users. Also studies of how access control systems may influence caregivers and the philosophy of care are important in the future.

As the research area of our study was complex, we chose an approach that would allow complexity, which also brings about hazards. Multiple avenues of data-collection methods allowed data to exhibit different points of view and opened up a wider understanding of the situation. This variety in the data provided a richness reflecting the life in the unit as closely as possible, but also a complexity that needed to be carefully apprehended through analysis (45). For example, the choice to include different perspectives in terms of using observations and interviews, and including both residents and staff, brought with it a risk of conflicts in how to interpret data, as different perspectives may have yielded contradicting information. However, observation alone would probably not have allowed as much reflection, comments, interpretations, illustrative examples, and comparisons with the time before the technology to appear in data. Interviews with residents as the only source of data would have raised questions of trustworthiness; people with severe dementia may not be able to communicate their experiences by using language (35,38). Interviews with staff only would probably have focused more on understanding the setting from the staff's point of view, which could lead to a bias in this study (39). Family members were not included, which may be considered as a gap in the data.

In conclusion, dementia and technology are sometimes considered as opposites because of the need for cognitive skills to operate technology, and because of a risk of misuse. Our results exhibit how technology might assist people with dementia if the right conditions are maintained; when consciously put to use, an access control system may support experiences of security and territoriality in residents in dementia care, and ultimately may support adaptation during hospitalization. However, there is an urgent need in the future for further exploration of the conditions for use of technology in the field of dementia care, and development of guidelines for good practice, as suggested by Welsh et al. (4).

Note

1. "Se ressourcer" in French.

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