

## Research Article

# Attitudes to a robot bathtub in Danish elder care: A hermeneutic interview study

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**Abstract**

In Western countries, assistive technology is implemented on a large scale in elder care settings. Only a few studies have attempted to explore the different attitudes to assistive technology among various groups of users. In this study, we investigated and explained the different attitudes among the involved leaders, nursing staff, and older people to a newly-implemented robot bathtub. Qualitative analyses of eight interviews with managers, nursing staff, and the older users revealed that the informants focused on different aspects (process, values, and functionality, respectively), used different implicit quality criteria, and ascribed different symbolic significance to the robot bathtub. Thus, the study demonstrated how attitudes toward the robot bathtub were connected to the informants' institutional role. The findings challenge the current paradigm, where technology is expected to operate as a passive tool, simply facilitating desired human acts and interactions. Further studies drawing on the epistemological and ontological perceptions of science technology studies are needed in order to understand human rationalities in the assistive technology context and to offer new insights into how technology “works” in organizations.

**Key words**

assisted personal body care, assistive technology, attitudes, elder care, implementation, older person, robot bathtub.

**INTRODUCTION**

In response to the demographic changes in Western countries (Pammolli *et al.*, 2012), and a resulting increase in the demand for treatment and care of the growing aging population, specialized technologies have been developed and applied in elder care (Rodeschini, 2011). Literature in the field of assistive technology reveals that the appliances are viewed as a means of saving resources and improving traditional healthcare delivery (Goodacre *et al.*, 2008; Agree & Freedman, 2011; Eysers *et al.*, 2013; Lexis *et al.*, 2013; Ramacciati, 2013), and as a means of stimulating user-directed self-management (Rosser & Eccleston, 2009; Mitchell & Begoray, 2010; Brandt *et al.*, 2012; Persson & Husberg, 2012) and quality of life (Ocepek *et al.*, 2012).

In line with these expectations, a robot bathtub was implemented in a Danish elder care center in 2011. A photo and description of procedure are depicted in Figures 1 and 2.

The robot bathtub functions as a horizontal shower. Despite the term “robot”, only the soaping and showering functions are automated. Assistive technologies, such as

electronically-driven manlifts and wheelchairs, are prevalent in elder care. However, the acquisition of the robot bathtub drew considerable attention in public media and among leaders and nursing staff. This led us to conduct an evaluation study of the impact of the robot bathtub on the practical performance of assisted personal body care (APBC) (Frederiksen *et al.*, 2013). Although the study determined that the robot bathtub has had a limited impact on APBC and the caregiving relationship, we observed that the robot bathtub drew attention and instigated discussions among the leaders and nursing staff. Different views were voiced in the discussions, and we hypothesized that differences in attitudes were related to the informants' institutional roles. Therefore, we pursued our assumptions and further investigated these different attitudes in order to understand how they might be explained.

**Literature review**

Although policy papers point to the importance of the skills and attitudes of both the health professionals and the users for successfully implementing assistive technology, an extensive part of existing research focuses on the features of the technologies (e.g. Seok & DaCosta, 2014). Only a few studies address the attitudes of older people or their experiences with technology in nursing homes (Harrefors *et al.*, 2010;

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**Figure 1.** Photo of the robot bathtub.

Robot bathtub was constructed to wash the user in the horizontal position. Person to be bathed is couched on a litter on wheels and subsequently pushed into a cylinder, which closes around the person's body from the neck to the feet. Water and soap wash-and-rinse cycles operate automatically and are controlled from a panel display on the outside of the cylinder, and consequently out of reach for the person being bathed. On the two sides of the robot bathtub, "windows" with curtains make it possible to observe the bathing person's body and reach in to help whenever needed. After each bath, the empty couch is automatically cleaned and disinfected, controlled from the panel display. Typically, one or two formal caregivers (nurses, nursing assistants, or nursing auxiliaries) assist the older person to get undressed, positioned, and placed in the cylinder. During the bathing procedure, the nursing staff might wash the person's hair, and assist afterwards with towel and getting dressed.

**Figure 2.** Description of the robot bathtub and bathing procedure.

Landau *et al.*, 2010), geriatric rehabilitation units (Skymne *et al.*, 2012), or at home (Mahmood *et al.*, 2008; Williams *et al.*, 2010; McCaig *et al.*, 2012; Gramstad *et al.*, 2013). These studies focused on the significance of functionality, confidence in personal knowledge and experience, independence, and trust and security in the care. Some studies advance that older people in general are willing to adopt new technology when they find it useful and practical (Harrefors *et al.*, 2010; Heinz *et al.*, 2013). In contrast, Cohen-Mansfield and James Biddison (2007) found that although technology that related to their jobs appeared to be universally welcomed by the staff caregivers, the older adults displayed mixed emotions.

Roelands *et al.* (2006) revealed that home nurses in Belgium had positive attitudes and a high level of intention, subjective norms, and self-efficacy toward most steps in the decision process of introducing assistive devices to older people. In contrast, Kristoffersson (2011) found that the attitudes of older residents in a retirement village toward robots were generally more positive than the attitudes of their relatives or the staff.

A study describing the perceptions of healthcare decision makers with respect to the decision-making processes for new health technology (Gallego *et al.*, 2008) demonstrated that safety and effectiveness were the most important criteria in decision-making.

Overall, no clear picture exists, and we found only a few studies that analyzed the perspectives of various groups toward the same technology. We also did not find any studies addressing the symbolic values of assistive technology. Thus, the aim of this study was to investigate and explain the different attitudes among the involved leaders, nursing staff, and older people to a newly-implemented robot bathtub.

**METHODS**

The study was designed as a qualitative, hermeneutic interview study, structured according to the seven stages of research interviewing, as described by Kvale and Brinkmann (2009): thematizing, designing, interviewing, transcribing, analyzing, verifying, and reporting.

**Sample and settings**

Our assumption that attitudes toward the robot bathtub were connected to institutional roles led us to interview representatives from different groups, including managers, nursing staff, and the older users of the robot bathtub. Eight informants were purposefully selected in order to cover these groups (Table 1).

The two managers were selected because of their central role in the processes of acquisition and implementation of the robot bathtub. The regional manager was responsible for the municipality's entire care effort for elder citizens. The center's manager was the staff manager for the center's nursing staff and was subordinate to the regional manager. The remaining six informants were selected with help from the center's manager, both in order to gain access to the older users and to include informants with both positive and critical views and informants with different educational backgrounds.

**Ethical considerations**

The study was approved by the Danish Data Protection Agency (identification no. 2011-2041-7043). According to

**Table 1.** Informant profiles

Position in the organization	Informants
Management	1 regional manager 1 center manager
Nursing staff	2 nurses 1 nursing assistant 1 nursing auxiliary
Citizens using the elderly center	1 woman 1 man

Danish law, no particular ethical permission was needed to conduct the study. Informed oral and written consent was obtained from all participants. The participants were free to withdraw at any stage of the interview. All interviews were treated confidentially, and no outside person had access to the data.

### Data collection

In order to ensure that the informants had experience in using the robot bathtub, the interviews were performed from 6 to 17 months after the introduction of the robot bathtub at the elder center. Semistructured interviews were conducted, focusing on three main topics: (i) the informants' description of daily life in the elder center; (ii) their general attitudes to the increased focus on health technology as a tool for improving older people's self-care; and (iii) informants' attitudes concerning the newly-acquired robot bathtub. The purpose of the first topic was to let the informants speak freely about general topics not related directly to the robot bathtub, and thereby prevent leading questions based on our initial assumptions. We therefore opened the interviews with questions about the informant's daily life (Kvale & Brinkmann, 2009, p. 155). The second topic focused on the increasing use of health technology in general. Finally, the informants were asked direct questions (Kvale & Brinkmann, 2009, p. 156) about their experiences with the robot bathtub. The interviews lasted approximately 1 h and were performed by the first author. The interview with the regional manager took place at the interviewer's office. The remaining interviews took place at the elder center.

### Data analysis

The recordings were transcribed verbatim in accordance with the methodological guidelines suggested by Kvale and Brinkmann (2009), and were read independently by two of the researchers. Afterwards, the interpretation was discussed among all researchers to ensure communicative validity (Kvale & Brinkmann, 2009, pp. 280–3). The analysis was carried out as a meaning interpretation, pursuing the initial observations on the connection between attitudes and institutional roles, and going beyond what was said directly in order to more clearly determine structures of meanings not immediately apparent in the interviews (Kvale & Brinkmann, 2009, p. 230). The analysis was conducted manually without the use of any software program. During the

initial reading, we made an observation that the informants were apparently referring to different issues when they discussed the robot bathtub. The systematic analysis was therefore initiated by the analytical question: What do the informants say about the robot bathtub? A schematic listing of answers to this question revealed that the informants focused on different aspects of the robot bathtub (Table 2). This directed our analytical interest toward uncovering the implicit criteria of success, which lay behind the informants' attitudes to the robot bathtub. Finally, we pursued an idea we had evolved during the process that the robot bathtub had been given a symbolic status by some of the informants. This assumption was based on observations that the robot bathtub had been the subject of extensive attention among the leaders and the nursing staff. By testing these observations systematically, we developed table overviews. A simplified version is provided in Table 2.

## RESULTS

Our analysis identified two main themes: "Decreasing enthusiasm from leaders to older users" and "Process, values, and function – aspects of the implementation".

### Decreasing enthusiasm from leaders to older users

The first theme shows how attitudes to the bathtub varied according to the informant's position in the organization.

#### *People love it and it has potential*

The acquisition of the robot bathtub was a result of the regional manager's initiative and sustained commitment. Although she recognized that the robot bathtub was not functioning properly and had no economic potential, she expressed great enthusiasm. When she was asked about the value of the robot bathtub, she replied: "The citizens love it. They are thrilled with it. It's so nice". The center's manager also expressed great involvement, although she regretted that it could not be used for the anticipated number of users. As the daily leader of the elder center, she was responsible for integrating the bathtub into the daily work routines. She emphasized that the bathtub had potential, but she did not specify further what this potential was. When she was asked to elaborate, she replied somewhat vaguely that it was the "well-being that the person feels", that there were some ergonomic potentials associated with it, and that the robot

**Table 2.** Stakeholders' different focuses, implicit criteria for success, and symbolic values according to institutional role

	Management	Nursing staff	Users
Focus	Process	Professional values	Practical function
Implicit criteria for success	To change the staff's mindset	Well-being and integrity To appear nurturing	To be washed properly
Symbolic value	Innovation and development orientation	Professional self-understanding and increased professional prestige	None

bathtub provided knowledge regarding the minimum functionality requirements needed for this kind of technology.

### *If people enjoy it, then it's fine with me*

The nursing staff that carried out the APBC had a different view. None of them expressed any enthusiasm, but rather expressed acceptance that the robot bathtub was a reality. They assessed the bathtub as a large investment in time and money. They did not recognize it as labor saving, nor as having significant ergonomic benefits, although they did recognize that it was good to have anyway. They indirectly expressed loyalty to the managerial decision for acquiring the new technology. For example, a nursing assistant stated that it did not work and could not be used for those for whom it was intended, because the bearing was too narrow or because some of the potential users refused to use it. Then she added: "As an idea, I think it's fine . . . and if you feel pleasure getting into and lying inside the bathtub . . . then I think it's good enough".

### *It's nice, but not something we're all talking about*

Neither of the two users who were interviewed showed enthusiasm for the bathtub. After a few baths, one informant refused to use it again. The second informant was one of the most frequent users of the robot bathtub. According to the staff, she was happy using it. She was generally positive about using technology. When she was asked what she thought about using the robot bathtub, she replied: "Well, I think it's lovely, but . . . you can't use your own soap". During this part of the interview she was entirely focused on the strange smell of the bath soap; the bath soap automatically sprayed out inside the bathtub. When she was asked whether she thought that other users might be interested in trying it out, she replied that she did not know because they did not talk about it.

The enthusiasm among the users that was mentioned by the regional manager is difficult to identify in this somewhat more taciturn assessment from one user. Thus, the positive appreciation of the project decreases with informants' increasing remoteness from the process of buying and implementing the robot bathtub.

## **Process, values, and function – aspects of the implementation**

The second theme shows how the informants focused on different aspects of the implementation of the bathtub and ascribed it different symbolic significance.

### *An exciting process with great external awareness – managers' views*

Both managers highlighted the preparation and implementation process as the main benefit of the bathtub. The process had taken a lot of planning and time, but had led to valuable discussions and a change in "mindset" among the nursing staff. The regional manager illustrated the success of the robot bathtub by referring to two incidents. The first incident

involved a critical reader's letter published in the local newspaper, written by an employee in another elder center, complaining that the robot bathtub was impersonal and degrading to the users. The letter initiated a mobilization of support among the staff, an activity praised by the regional manager:

That was nice, wasn't it? There's nothing better than employees who give a sober and proper response. They came and asked: "Would you take a look at this (an answering letter)? We want to make sure that we send in something that's pertinent". Fantastic. It couldn't have been a better outcome.

This anecdote was related as an expression of the success of the robot bathtub. However, it says nothing about the bathtub's practical function in relation to APBC. Reaction to the critical letter caused the staff to take up management's decision to purchase the robot bathtub as an issue for themselves and to show solidarity with their decision.

The second example of success concerned the testing of the robot bathtub by another institution in the municipality. When a decision was to be made about the bathtub's permanent location, the regional manager had left it up to the nursing staff to decide whether they wanted to have the robot bathtub returned; they did. In the interview, the regional manager concluded this anecdote with the words: "And I almost can't express it (the success) any better, right?". Immediately afterwards, the interviewer asked the manager how the bathtub was working and she replied: "Well, it isn't working, or isn't working 100%. . . . We can't use it optimally because of its design". When the manager was asked whether she would do it again, she replied: "Yes, any time. . . . That's progress – trying something new and being able to take some new steps or even make your own footsteps". Both anecdotes show that the criterion for success was not the robot bathtub's actual function, but the process of getting the staff to take ownership of the project.

The regional manager was not interested in the robot bathtub's actual functioning. She focused on creating the robot bathtub as a "good story" among staff and users, and externally in relation to the public, politicians, and senior municipal management. She had prepared a systematic stakeholder analysis and involved all those who "might come and ruin the good story". She had been active in relation to the press, and expressed pride that they had succeeded in launching a professional discussion on a national level, and that the robot bathtub had attracted visits from politicians, local top officials, and students, as well as manufacturers from Denmark and abroad.

Although the regional manager recognized the limited use and continued need to motivate the nursing staff, the robot bathtub appeared as a success in her description because she was not concerned with efficiency, quality, or the autonomy of the users. Her (implicit) success criterion was to move the employees' mindsets and create ownership for the new technology. By doing this, she drew on the arguments related to health technology when it is discussed in political strategy plans: increased efficiency, quality, and user autonomy. Thus,

the success of the robot bathtub was independent of whether it was well suited to wash the users or not, but was connected with its symbolic function: to express courage to take the lead and forge new paths. Thus, the success story could have been created with other assistive technologies as well. In the regional manager's statement, it functions as a symbol of innovation and development orientation, a signal to the surrounding world to not be "afraid" of new technology.

The center manager also focused mainly on the implementation process. She described the process as "very long" and "time consuming", but that it had generated many "good discussions" among the staff, leading to a redefinition of the robot bathtub as an aid and not, as was initially the case, a threat to their professionalism.

### *Strengthening professional self-understanding – health professionals' view*

The four informants from the nursing staff all expressed that they had been opposed to the robot bathtub at first, but had accepted it. They felt that the process had made them aware of their professional values, such as caring for the user's well-being and integrity. One nurse explained that the process had challenged her to reflect on how she would like to be cared for when she got old:

Then I started to think about how they were being bathed now, and that I would not wish it to be like that. So I would rather be washed (bathed) by a robot bathtub.

The process toward acceptance of the robot bathtub had occurred through staff discussions and reflections, working through their mental images of the robot bathtub. For this nurse, the path went through an identification process, in which she imagined her own old age and felt uncomfortable by the kind of care that is currently offered. Thus, the robot bathtub was transformed from being a threat to being an aid for strengthening the values of the nursing staff.

Several informants referred to the critical reader's letter in the local newspaper. One nurse said that when the letter was published, she mobilized her colleagues to defend the robot bathtub:

Because my values are the same as hers, and they do not change because a robot bathtub arrives on the scene.

In the cross-pressures between the value-based arguments of management and those of an external colleague, a distinction was established between "her" and "me", or "them" and "us", thus giving an opportunity to identify with the values of well-being and integrity. Through this process, to which both management and the public paid attention, helping older people with their bathing was transformed from not being a very prestigious task, which usually takes place unnoticed, to being a valuable task associated with essential values of public interest. The public, political, and managerial attention associated with new technological inventions had a spillover effect on the everyday work of performing APBC, which then appeared to be something special, not because of practical

and hygienic conditions, but because of the values attributed to the robot bathtub. The increased professional self-understanding did not concern the physical or hygienic function of the robot bathtub, but instead concerned the values of well-being and integrity. Through this valorization, the robot bathtub became a symbol for the value of assisted body care. The process of interpretation, whereby the robot bathtub was transformed from appearing as a threat to becoming a support for professional values, is reflected in the language used. The staff stated that they initially intended to use the term "robot bathtub", but later referred to it as the "bathing bed" or "horizontal shower".

### *Can it wash me properly? – users' perceptions*

The users of the robot bathtub had a more practical approach to the device. One user, as previously described, was concerned about the possibility of using her own soap for her bath. The other user was a man in his 70s. He was positive about the use of assistive devices and technologies, including his electric tricycle. However, when he was asked about his opinion on the robot bathtub, he replied: "Nothing! I've been in it twice, but it only sprays water . . . so there isn't damn much to it. It's a waste of time". He preferred a shower, which required help from only one caregiver; there should preferably be two to operate the robot bathtub. In principle, he was not opposed to it, saying: "If it worked, it would be totally in order". He felt damp after having been in it, and added: "So it was much better if they bought a dryer you could be put into". For both users, the crucial factor was whether they were washed and dried properly. No other importance was added aside from its concrete function. Thus, different (implicit) criteria for success lie behind the attitudes of the three groups (Table 2).

The managers' success criterion was to change the staff's attitude. For the staff, the success criterion was that the bathtub enhanced their professional self-understanding, while the users judged success based on whether they were being washed properly.

## **DISCUSSION**

Our study supports previous studies that suggest that older people in general are willing to adopt new technology when they find it useful and practical (Harrefors *et al.*, 2010; Heinz *et al.*, 2013). Furthermore, our study offers a perspective to describe and explain patterns in the somewhat diffuse picture of attitudes to assistive technology. In particular, the study demonstrates that the processes of decision-making and implementation of assistive technology are not solely targeted and controlled, and the appreciation of technology is not solely based on usability and effectiveness. Our analysis suggests that the robot bathtub being ascribed symbolic values fulfilled other goals than effectiveness and quality of APBC. In a context of health policy marked by the state's demands for efficiency and competition in the global market (Pedersen, 2011), the new robot bathtub served as a symbol of innovation and development orientation for the managers. For the nursing staff, the robot bathtub served as a symbol for

the value of APBC, and thereby became a symbol to elevate the status of their function as “relationship professionals” (Moos *et al.*, 2008). As such, the robot bathtub might be interchangeable with other technology. This finding challenges the prevalent paradigm that expects technology to operate as a passive tool that facilitates desired human acts and interactions (Andreassen & Dyb, 2010), and the overall assumptions that the processes of decision-making and implementation are the results of targeted and controlled processes. The field of studies in science, technology and society (STS) attempts to introduce an alternative understanding of technology in the field of medicine and technology. STS emphasizes the active role of technology, and the relational approach to understanding humans and their interactions with inanimate objects (Bruun Jensen *et al.*, 2007; Cresswell *et al.*, 2010; Galis, 2011).

Despite the fact that our study was not conducted as an explicit STS study, it suggests, similar to the STS, skepticism in considering technology as simply a neutral and passive tool.

### Limitations

As our aim was, in the occasion of a newly-implemented robot bathtub, to investigate the attitudes to this specific example of assistive technology. We selected our informants from those involved in the implementation of the robot bathtub. The elder center, the informants, and the assistive technology involved are not considered to be “representative” of a general picture of implementation of assistive technology in elder care. Rather, the small number of informants was selected with the purpose of gaining variation in the data that reflects an interest in the collection of rich, in-depth data.

Data collection was undertaken in an elder center that was located in a municipality with a significant political and managerial interest in developing technology solutions for elder care. These kinds of local conditions are part of the environment when research is undertaken in social contexts, and have to be taken into consideration when comparing with studies carried out under different conditions.

Despite the small sample size, the study uncovered some distinct patterns that would probably be both strengthened and nuanced with the inclusion of additional informants.

### Conclusion

The study demonstrated that the attitudes toward the robot bathtub were connected to the informants’ institutional role. The attitudes varied according to the perspectives of the agents, and the robot bathtub was ascribed different symbolic significance from leaders, nursing staff, and older users. This study highlights that different attitudes to assistive technology are not only a matter of functionality, but can, to a high degree, be regarded as a matter of institutional interest and strategy. This might be appropriate for paying attention to when technology is implemented in clinical settings.

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### CONTRIBUTIONS

Study Design: KB, KF, AMKF, KL.

Data Collection and Analysis: KB, KF, AMKF, KL.

Manuscript Writing: KB, KF, AMKF, KL.

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