What Was (Also) at Stake When a Robot Bathtub Was Implemented in a Danish Elder Center: A Constructivist Secondary Qualitative Analysis

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Abstract

Assistive technologies are often considered to be passive tools implemented in targeted processes. Our previous study of the implementation of the robot bathtub in a Danish elder center suggested that purposeful rationality was not the only issue at stake. To further explore this, we conducted a constructivist secondary qualitative analysis. Data included interviews, participant observations, working documents, and media coverage. The analysis was carried out in two phases and revealed that the bathing of the older people was constructed as a problem that could be offensive to the users' integrity, damaging to their well-being, and physically strenuous for the staff. The older users and the nursing staff were constructed as problem carriers. We conclude that technological solutions are not merely neutral and beneficial solutions to existing problems, but are rather part of strategic games contributing to the construction of the very problems they seek to solve.

Keywords

assisted personal body care; assistive technology; constructivism; Denmark; elder care; Foucault; health technology assessment; implementation; nursing; robot bathtub; secondary qualitative analysis

Introduction

In Western countries, assistive technology is implemented on a large scale in elderly care settings. Reviewing the literature in this field shows that the technologies are typically viewed as a means of saving resources and improving traditional health care delivery (Agree & Freedman, 2011; Eyers, Carey-Smith, Evans, & Orpwood, 2013; Goodacre, McCreadie, Flanagan, & Lansley, 2008; Lexis, 2013; Ramacciati, 2013) and enhancing user-directed self-management and quality of life (Brandt et al., 2012; Mitchell & Begoray, 2010; Persson & Husberg, 2012; Rosser & Eccleston, 2009). The most prevalent paradigm seems to expect that the technology will operate as a passive tool that facilitates desired human actions and interactions. Hence, studies on technology assessment largely seek to identify causalities, compare results across studies, and translate promising research procedures into everyday clinical practice (e.g., Brandt et al., 2012). An alternative understanding of technology is posed in the field of studies in Science, Technology, and Society (STS). By emphasizing the active role of technology rather than its utility as a passive tool, and by focusing on a relational approach to understanding humans and their interactions with inanimate objects, STS studies challenge this paradigm (Bruun Jensen, Lauritsen, & Olesen, 2007; Cresswell, Worth, & Sheikh, 2010; Galis, 2011). In this article, we report on a study of the implementation of a robot bathtub in a Danish elder center. As with most STS studies, our study is informed by the notion that technology plays an active role.

Background

This article presents the findings of a secondary analysis (Heaton, 2008). The original hermeneutic study examined the attitudes among managers, nursing staff, and older users toward a newly implemented robot bathtub (Beedholm, Frederiksen, Frederiksen, & Lomborg, 2015). See Box 1 for description of the robot bathtub and bathing procedure.

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Box 1. Description of the Robot Bathtub and Bathing Procedure.

The robot bathtub is constructed to wash the user in the horizontal position. The 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. The 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 put an arm into the cylinder and help the person whenever needed. After each bath, the empty couch is automatically cleaned and disinfected, operated by 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 may wash the person's hair, prepare for the bathing person to subsequently get dressed, and assist afterwards with toweling and getting dressed.

Photo of the robot bathtub.

Photo: Jacob Hille/Teknologisk Institut, Center for Robot Technology, Denmark. Reprinted with permission.

The initial study was based on eight interviews with managers, nursing staff, and older users and revealed that different attitudes and reasoning were at play concerning implementation of the robot bathtub. The study, however, left us with several unanswered questions regarding the different rationale among informants for which the hermeneutic approach could not provide answers, suggesting that individual, purposeful rationality is not the only issue at stake when technology is implemented. We therefore shifted our focus to a social constructivist approach

expecting it to allow an illumination of the collective processes which were the starting point of the informants' rationale.

The Study

The overall social constructivist approach to the study was inspired by Foucault's notion of forms of problematization, governmentality, and social technologies (Foucault, 1976/1994, 1984, 1991a, 1991b, 2001). Here, we drew on Foucault's notion of forms of problematization (Frederiksen, Lomborg, & Beedholm, 2015), focusing on collection of thoughts, stemming from behavior or area of action that loses its familiarity and thereby provokes a number of difficulties around it (Foucault, 1984) and considering problematization as an "answer" to a concrete real situation (Foucault, 2001, p. 172). Also the position of Spector and Kitsuse (2001) that solutions participate in producing problems by contributing to the framework within which the problem is expressed served as an overall inspiration for our analytical approach.

In accordance with this overall social constructivist approach, we drew theoretically and methodologically on the presentation of solution models as an analytical approach in Jöhncke, Svendsen, and Whyte (2004). This allowed us to illuminate the processes during which the robot bathtub was created as a solution as well as the rationalities connected to this process.

Solutions, Social Technologies, and Rationalities

According to Jöhncke et al. (2004), working with solution models is based on the assumption that specific solutions create the frameworks by which problems are mentally and linguistically formed and perceived. Solutions provide space for thinking and acting, which again shapes the ways in which problems are handled, and they are closely linked to the construction of problems. From this perspective, problems or troublesome conditions do not exist per se. On the contrary, promises of solutions, such as improvements or healing of a condition, contribute to perceiving certain conditions as problems. Thus, solution models can contribute to the perception that conditions, previously perceived as part of the human condition, now being thought of as problems, are possible to remedy.

Solutions are closely linked to social technologies, which Jöhncke et al. (2004) present as methods, techniques, apparatuses, and forms of organization and procedures: concrete tools and more abstract techniques, processes, and modes of organization. Social technologies are realized in social relations and reflect an

Table 1. Overview of the Data Material.

	Type of Data	Volume/Scale	Data Source
From the original study	Interviews	Eight interviews • Two managers • Four nursing staff • Two elderly users	Semi-structured interview conducted by first author
Additional data	Observations	Opening ceremony inclusive invitation and song	Participant observation by first author
	Media coverage	49 newspaper articles or paragraphs in local and national newspapers from January 2009 until December 2012	The database Infomedia
	Working documents	• Master plan/plan of action • Stakeholder survey • Memo to decision making • Status report to The Fund for Better Working Environment and Labour Retention	The area manager

intention to shape "the social," for example, to regulate the behaviors and states of specific target groups. The intention to regulate is often connected to institutions and is frequently expressed in policy papers describing planned approaches.

Jöhncke et al. presented social technologies as an analytical term useful in perceiving connections between technological rationales and their practical consequences in social contexts. This is linked to a third central term: rationalities. The term rationalities is used to express implicit and explicit perceptions, which appear during the process of specific solutions being constructed or implemented. Social technologies are based on assumptions about what is natural, necessary, useful, and neutral; rationalities are expressed in terms of common sense perceptions of what is responsible and standard behavior. Even though the social technologies do not always have an effect in reality, they are characterized by having an intention to improve "the good society" (Jöhncke et al., 2004, p. 385). This means that social technologies are morally verified: They are not only considered useful, but also proper and good.

Jöhncke et al. (2004) indicate that solutions do not only solve problems, they also create problems as well as "problem carriers." Hence, the solutions create specific target groups that have a problem, which the solution can then tackle. The most common, efficient, and smooth way of establishing target groups is when the relevant people take it upon themselves to identify themselves as carriers of a certain problem through the solution model of the social technology.

Aim

Inspired by the previously mentioned analytical approach, we considered the robot bathtub to be a solution. Similarly, we considered the process of implementation to be a specific kind of social technology, namely a technology of management, wherein societal and professional rationalities were expressed. The aim of the study was to explore the questions of how the robot bathtub was introduced and implemented; which professional and social rationalities in this process appeared to be logical, responsible, or useful; and which problems and problem carriers were constructed in relation to the personal hygiene of older users and the implementation of the robot bathtub.

Design

Following Heaton's (2008) typology of secondary analysis, our approach represents a supra analysis, wherein the aims and focus of the secondary analysis transcend those of the original research (2008). In contrast to secondary analysis based on data sets collected by others, our secondary analysis has re-used self-collected data (Heaton, 2008).

Method and Material

Studies of solution models support the use of multiple data sources. In this secondary analysis, all data material from the initial study (eight interviews) were included. In addition, data in the form of working documents, media coverage, and participant observations from the inauguration ceremony of the robot bathtub were included (see Table 1).

Data Collection Procedures

Data collection for the initial study was carried out from 2011 to 2012. Eight interviews with managers, nursing staff, and older users of the robot bathtub were conducted,

focusing on the daily life in the elder center, and the informants' general attitudes toward the increased focus on assistive technology and their attitudes toward the specific, newly acquired robot bathtub. The interviews lasted approximately 1 hour, were performed by the first author, and were based on a semi-structured guide. Furthermore, working documents were collected from the two managers and newspaper articles were collected through a search in Infomedia on November 29, 2013. An advanced search was made using the words "robot bathtub" [bad-erobot] OR "bath cabin" [badekabine] AND "[city name]." The search was conducted over all media within the past 5 years; the result was 49 media spots.

Ethical Considerations

The initial study was approved by the Danish Data Protection Agency (ID no. 2011-41-7043). According to Danish law, no particular ethical permission was needed to conduct either the initial study or the secondary analysis. Informed oral and written consent was obtained from all participants. The participants were free to withdraw consent at any stage of the interview without any consequences. All interviews were confidential and only the relevant researchers had access to the data.

Data Analysis

In accordance with the works of Foucault, we considered this secondary analysis to be diagnostic (Beedholm, 2003), and attempted to establish an "outsider perspective." The analytical questions developed from our theoretical framework made this "outsider perspective" possible. All data were analyzed according to our theoretical framework in two phases. First, each data type was analyzed separately to generate specific analytical questions (see Table 2). The analysis of the field observations focused on the questions of how the robot bathtub and the problem carriers were constructed and which rationalities supported them. The media spots were systematically analyzed to identify which problems were constructed and supported and by which rationalities. The working documents were reviewed to gain an overview of the process and to identity the management technology to shed light on how target groups were constructed and which managerial rationalities were central to this. The analysis of the interview focused on how the actors took part in the construction of problems, problem carriers, the solution, and the supporting rationalities. Second, the data and preliminary results from Phase 1 were analyzed according to the following questions:

- How was the robot bathtub introduced and implemented?

Table 2. First Analysis Phase—Data Type and Analytical Focus.

Data Type	Analytical Focus
Field observations	How the robot bathtub and the problem carriers were constructed, and which rationalities supported them
Media spots	The construction of problems and supportive rationalities
Working documents	Overview of the process
	Identification of the management technology and central managerial rationalities
	The construction of target groups
Interview	How the informants took part in the construction of problems, problem carriers, and solution, and which rationalities supported this

- Which management technologies were applied, and which professional and societal rationalities were expressed and presented as common sense?
- Which problems and problem carriers were constructed in response to the robot bathtub, and which rationalities supported this?

Throughout the process, the analysis was discussed among all authors to ensure communicative validity (Kvale & Brinkmann, 2009).

Findings

The presentation of the results of the analyses is structured according to the three primary analytical questions.

Introduction of the Robot Bathtub

From the interview with the area manager of the nursing center, we know that she made the decision to acquire the robot bathtub. She participated in a network for the development, use, and dissemination of robot and welfare technology in the context of nursing. She stated,

> Well, I went to those meetings, and there I met [anonymized] from The Technological Institute, and we were talking about what we should do. Then he showed me that robot bathtub, and then I said: "This one we must have!"—So [laughter]—and so it was!

The decision lead to two comprehensive and time-consuming processes: First, a process to obtain necessary financial, political, and managerial support for the project; second, a process to render attitudes toward the

robotic bathtub among the nursing staff and the users of the nursing center more positive. The network consisted of different private and public actors and institutions, and it aimed to create synergy among different actors and to strengthen the focus on the technological possibilities within the area of welfare technology.[1] The vision of the network was among others "to create a sound foundation for addressing future demands for improved quality, despite the growing challenges created by the lack of resources" (http://www.carenet.nu/). The manager's decision to acquire the robot bathtub was not largely motivated by a problem or need concerning the personal hygiene of the users of the care center. Rather, she expressed a willingness to try out new technological devices introduced in this network of stakeholders in welfare technology.

Management Technologies and Accompanying Rationalities

The area manager and the center manager made a systematic effort to brief, include, and motivate stakeholders such as politicians, management, unions, interest groups and the public, as well as the nursing staff and users. In this process, social media communication was employed, as evidenced in the relatively comprehensive attention from the press. Out of the 49 press features, 25 cited the area manager and/or the committee chairman as direct sources. Apart from this strategic external communication, the inclusion of target groups in the identification of the problems that the robot bathtub was intended to solve was the central management technology. This was demonstrated in the interview by the managers' descriptions of the robot bathtub and its success; the managers rarely commented on the practical function and utility of the robot bathtub, but rather they predominantly focused on the organizational and managerial process to make the nursing staff welcome the robot bathtub well. For example, the initial question asked was if this labor-intensive process had been worthwhile, and the manager replied with great enthusiasm: "[. . .] what has been most rewarding, and what makes me most happy is to see how we've made the employees think this was a good idea."

The rationale of the managers was that as long as the caregivers welcomed the robot bathtub, they would contribute to creating a positive attitude toward it among the users as well as the public.

Inclusion of target groups. Two groups of problem carriers were constructed: the nursing staff and the older users. The staff was included through the establishment of a project group and a reference group consisting of, among others, representatives of the staff and the older users, and by continuously placing the question on the daily agenda.

Both managers expressed that it had been a very time-consuming process both for them and the staff. There had been many discussions and disagreements among the nursing staff, who were worried that a robot bathtub would weaken the relationship between user and caregiver.

The analysis revealed that through inclusion, the caregivers target group had been led to identify "independently" both the problem and the pre-set solution. In the interview with the center manager it was expressed as, "We have had some really good discussions in the staff group, which maybe started in sort of general terms, but then we sort of came closer and closer to the topic of a bath cabin." In this process, it had gradually been decided that it was a heavy task to assist some of the users of the center with their personal hygiene, and that they "might perhaps be helped by some technology or some other aids than the ones currently available, and then step by step like that, the process happened." The choice of words "might perhaps" indicates a certain hesitation with regard to the need for a robot bathtub. The word "process" refers to the nursing staff's emerging realization that they were facing the prospect of receiving a robot bathtub. Thus, they started "step by step" discussing "who they could see that they could use the robot bathtub for, and what it would mean for their daily practice." The quote reflects a process that has been organized in such a way that, through inclusion, the nursing staff was led to identify the problem "independently" based on the premise that they needed a robot bathtub.

Social technologies, according to Jöhncke et al. (2004), become attached to moral, not just as "useful" but as "right" and "good" ways of handling a problem. In the current study, this morality was expressed by a nurse who was motivated by the discussions to consider the current practice:

> [. . .] But then I thought a bit about how: Okay, if I was old or handicapped, then how would I prefer things? And then I started thinking about how were they [the users] bathed now. And I would be loath to experience that. Then I would rather use a bath cabin after all.

Her reflection on her own resistance to the robot bathtub raised moral considerations about what is considered to be good. In this way, the practice that she had not previously experienced as problematic appeared so in the light of the prospective solution.

The inclusion was apparently an effective management technology, as it not only succeeded in encouraging the staff to accept the robot, but also to change their opinions and consider the robot a protection of—not a threat to—their professional and interpersonal values. According to the nursing staff, the language use changed

during the process from referring to a robot bathtub instead to a bath cabin, as the latter caused less alienating associations.

The target group's identification with the solution. When the area manager referred to the implementation as a great success despite the robot bathtub not working optimally, her implicit criterion of success was not the function of the robot bathtub, but rather a change in the mind-set of the nursing staff. Similarly, the center manager evaluated the process as valuable because the discussions had empowered the staff to face future challenges and it had prepared them to respond to the same critical questions from external observers that they themselves had initially posed. The process not only encouraged the nursing staff to accept the robot bathtub, it also led them to identify themselves with the solution and be able to defend it in front of others. This happened when a critical letter by a colleague from another area of municipal elderly care was published in the local newspaper. This critique was a turning point: The caregivers gave up their resistance and, in a response letter, defended the robot bathtub's professional and ethical soundness. The caregivers took the initiative to respond themselves, and in doing so they came to identify with the solution as they defended it. The episode was reported by the area manager as an example of the success of the robot bathtub:

> Then the staff at the care center became really angry and appalled because that was not how they saw it and they chose to make an answer to this letter. Yes, well that was nice, wasn't it? The best thing is when staff gives a proper and decent answer. They came and asked: "Will you read this through to make sure we send something proper?" Fantastic! This was the best outcome!

Thus, the success was not ascribed to the traditional criteria of saving resources, improving traditional health care delivery, and/or enhancing user-directed self-management and quality of life, nor to the technical function of the bath cabin in relation to personal hygiene or ergonomics, but to this sign that the caregivers, apparently by volition, undertook the defense of the robot bathtub.

The inclusion of the other target group, the users, was less comprehensive and appeared to be more of a symbolic gesture. Apart from being represented in a project and reference group, the older users were represented as stakeholders at the inauguration ceremony of the robot bathtub. The inauguration was marked as a celebration with a reception for the users and staff as well as invited guests such as politicians, the Council of Elders, and the press. The inclusion of users was symbolically stressed by the fact that the ribbon to the bathroom with the robot bathtub was not cut by a politician or manager, but by one

Table 3. Overview of Rationalities and Construction of Problems and Problem Carriers in the Media Coverage.

Problem Carriers	Problem	Frequency/ Occurrence	Rationalities
Elderly users	Well-being, dignity, and integrity of users	26	Quality
	Self-activity and independency for the users	12	Optimization/ cutbacks
Non-specified	Efficiency	19	
Nursing staff	Physical strain for the nursing staff	5	Ergonomics

of the users, who, in her wheelchair, cut the cord and was portrayed in the local newspaper.

Construction of Problems and Problem Carriers—And Accompanying Rationalities

In the extensive media coverage of the robot bathtub, we identified the same qualities as generally attributed to health technology in Denmark and internationally (cf. "Introduction"). The analysis of 49 media spots revealed only four articles critical to the robot bathtub. The other reports were either very positive (10) or neutrally informative (35). The frequency of recurring arguments for the acquisition of the robot bathtub was improved quality in the form of increased well-being, dignity, and integrity of users (26), increased self-activity (12), less strain on the caregivers (5), and optimization in the form of decreased use of staff resources (19).[2] Decreased use of staff resources appeared as a kind of added benefit to its other attributes and was expressed indirectly as the bathtub would allow nursing staff to concentrate on other, more important tasks (Table 3).

For the first part of the period, the optimization/cutback rationale prevailed, although according to interviews with both staff and managers, it was clear from the beginning that the robot bathtub would not be labor-saving. One explanation for this could be that the optimization/cutback rationale was employed in the first fund application to Labor-Saving Technology Fund (ABT Fonden), which supports projects with a clear potential for labor-saving initiatives. The optimization/cutback rationale seemingly appeared so evident or natural that the argument about the labor-saving potential of the robot bathtub appeared in 18 of the 19 articles that were published before July 2011. After the refusal from the Labor-Saving Technology Fund, an application was sent to The Fund for Better Working Environment and Labour Retention (Fonden for Forebyggelse og fastholdelse), and the argumentation was

restated to fit the focus of the fund on avoiding attrition among workers and keeping workers in the labor market. Although the robot bathtub was purchased with economic support from The Fund for Better Working Environment and Labour Retention, the ergonomics rationale is not nearly as prominent in the media coverage as the optimization rationale. Thus, the media coverage, to a large extent, mirrors the predominant societal rationalities in relation to health technology rather than the concrete properties of the robot bathtub.

During the last part of the examined period, the quality rationale was dominant. The media spots focused on the potential of the robot bathtub for improving integrity, dignity, and well-being. Thus, the argumentation directly mirrors the assumptions of society regarding health technology: optimization and cutbacks, increased independence for users and increased quality—though adjusted and formed by the distinct traits and challenges of the robot bathtub. It is notable that the argument about increased independence and allocation of staff resources to more important tasks is predominant, as this has neither been perceived nor implemented as a project with focus on cutback. This could also be an expression of the strength of the prevailing rationality and perception of health technology as a contributor to optimization within public institutions.

While the optimization/cutback rationale was not directed at specific target groups, and in several cases seemed to be a sort of added bonus to a solution that was launched with a separate aim from optimization, both the quality and ergonomics rationales were directed at solutions in regard to specific target groups, namely the older users and the nursing staff. Thus, assisted personal hygiene was constructed as a problem that could be offensive to the integrity and dignity of the users and could be connected to decreased well-being and a physical burden for the staff.

Similar images of problems and problem carriers appeared in interviews with managers and caregivers in a number of the documents we have studied. The interviews also showed that constructions of problems and problem carriers are both composite and contradictory (cf. Jöhncke et al., 2004) and take place during processes where problems are shaped and reshaped.

Shaping and reshaping problems. The interviews with staff and managers shed light on a dichotomy between the ruling societal rationalities that see technology as a tool to increase efficiency and quality on one hand, and, on the other hand, past experience saying that the robot bathtub would never meet these expectations. In the interviews, we repeatedly found the notion of the robot bathtub as a solution to increase the users' experience of well-being and integrity and to relieve the labor of nursing staff.

However, it became apparent in the interviews with the caregivers that the arguments in favor of the robot bathtub were not rooted in problems they themselves had experienced to be particularly urgent. The reasoning of the caregivers seemed to be "external" truisms that they felt morally urged to convey. For example, in this quote the informant simultaneously put forth and rejected the argument that the robot bathtub could protect the modesty of the users:

> I think it protects them [the users] some, yeah, I think it does—but I mean, it doesn't anyway, because we have to help them out of their clothes, we have to dry them and we have to help them back in their clothes. But okay, if they feel like they get a bit of protection in this way.

The caregivers constructed the problem as a response to a solution rather than as a response to an experienced problem. This was mirrored in the hesitation with which the caregivers supported their own statements about the robot bathtub's qualities, for example,

> [. . .] There is perhaps a more pleasant wellness experience for those who get the bath, but it doesn't really save us any work. Then, it can be a nice . . . a more pleasant experience as staff—at least that's how I experience it. I think it's a pleasant experience to give people a bath, when you can see the wellness they experience by it. So in that way you could say that it's good . . .

A similar dichotomy between support and apprehension toward the reigning common sense was expressed in this quote about the contribution of the robot bathtub to increase the quality of the bath experience: "If you feel like there is any joy in getting in there and lying in the cabin—and the water comes from these nozzles—then I think it's just fine. I mean, it's different from someone washing you."

Both quotes show that the problem the robot bathtub was intended to solve was not particularly urgent. The rationale appears as a negotiation between the staff's own experiences and an external common sense.

Thus, the quality rationale about increased integrity and well-being appears to be rife with contradiction: on the one hand, the nursing staff did not express that integrity and dignity had previously given rise to trouble; in fact, quite the contrary. At first, the nursing staff reacted with resistance toward the robot bathtub based on concerns about whether it would objectify the older users and weaken the interpersonal relationship between users and caregivers. On the other hand, this same solution which, as a starting point, had been conceived as a threat to the basic values of the caregivers, was verbally constructed as something that would save or protect these values. This suggests that there has been a direct appeal to the

values of the health professionals when the robot bathtub was launched as a means to increase integrity and well-being. It is noticeable that arguments such as increased hygienic or physical quality of the bath have not been put forth.

In the shaping and reshaping of the workload problem and the construction of the caregivers as problem carriers, we again identified a dichotomy between a societal rationality and the experienced practice. The center manager repeatedly mentioned during the interview that the robot bathtub did not work optimally, but that it had a great potential. In response to questions about the nature of this potential, she stated that it was founded on the ergonomics, as the robot bathtub should help make "the bath situation easier for the staff." This she justified with the fact that the money for the acquisition had been sought at The Fund for Better Working Environment and Labour Retention, for which reason the ergonomics "naturally" had been in focus. This means that the foundation application contributed to shaping the problem to a large extent. In response to the question about whether the staff found that the robot bathtub had relieved their workload, she stated, "[. . .]—when it perfectly suits the situation of a particular citizen, then there are definitely some benefits to reap, but we just don't have so many citizens that [. . . it] makes a difference." The workload argument appears more like an automatic and legitimate argument than as an experienced problem. During the interview with the area manager, it was expressed as an assessment of the value of the robot bathtub:

> [. . .] The citizens use it—they love it, it is SO nice. [. . .]—you can ask [the center manager] about that, she knows much more about it. What I've heard is that there ARE fewer transfers, there ARE fewer turns and twists and it IS easier when you have to shower.

Both groups of problem carriers are mentioned in rapid succession, and the reference to the center manager for further information indicates that the question about whether the robot bathtub had had a relieving effect was of little concern to her.

Discussion

The aim of this study was to illuminate how a robot bathtub was introduced and implemented by exploring the construction of problems and problem carriers and the accompanying rationalities. Though Jöhncke et al. (2004) are concerned with social technologies, which are less concrete and more complex as they can consist of more extensive societal programs, the analytical approach has been helpful to shed light on what is (also) at stake when novel technology is implemented in

health care. In general, technology assessment studies attempt to inform policymakers and health professionals of the implications of the technological options and consider multiple scenarios, cost/benefit analysis, forecasts, and environmental impact. Stemming mainly from the fields of medicine and engineering, these studies generally draw on a realistic epistemological approach, aiming to identify causal relationships, detecting potential confounding factors, comparing results across studies, and translating promising research procedures into everyday clinical practice (Brandt et al., 2012). Even though technology assessments make use of different conceptual models (Lenker & Paquet, 2003) or multifaceted approaches (Thokala & Duenas, 2012) and are obliged to analyze and evaluate both desirable and undesirable consequences of technologies (Wallner & Konski, 2008) or users experiences and satisfaction (Lilja, Bergh, Johansson, & Nygård, 2003; Pigini, Facal, Blasi, & Andrich, 2012), the overall assumption seems to be that the process of decision making and implementation is expected results of targeted and controlled processes. Our study offers insight into intentional as well as unintentional effects of implementation processes and contributes to the understanding of what (also) happens during processes of acquisition and implementation of technology in health care. As such the social constructivist approach, in terms of model of solutions, turned out to provide an alternative perspective on what was going on; our analysis illuminated the constructive/constitutive forces of the robot bathtub.

Limitations

Our analysis does not claim to be conclusively true or authoritative, but rather seeks to provide a descriptive contribution to the collective understanding of what is at stake when new technology is implemented. Thus, the analysis is a result of one analytical perspective out of many possibilities.

Conclusion

With the introduction of a robot bathtub, the personal hygiene of the elderly was constructed as a problem that could be offensive to the integrity and dignity of the users and could be connected to decreased well-being and physical burden for the staff. Along these lines, two groups of problem carriers were created: the older users and the nursing staff. The management strategy that had been most extensively used was to include the target groups, particularly the nursing staff. This strategy was accompanied by strategic communication using the rationalities well known from the

public policy: quality, efficiency, and ergonomics. Our study demonstrates that the understanding of technical solutions as inherently providing neutral and beneficial solutions to the existing cannot stand alone. Technical solutions become part of strategic games and contribute to the construction of the very problems they seek to solve.

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Declaration of conflicting interests

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Notes

1. Membership of the network was made possible through an earlier fund application for support for the development of new technology, resulting in 250.000 DKK, which was spent to become a member of the network.
2. Some articles contained more arguments, which is why the total number of arguments exceeds the number of articles.

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