A Caregiver Perspective on Incorporating IT Support into Dementia Care

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Abstract

Aim: The overall aim of the present thesis was to describe and evaluate IT support in dementia care from the perspectives of staff and relatives. More specifically, it was to examine staff members’ satisfaction with work, life satisfaction and sense of coherence before and after increased IT support, to describe staff members’ opinions and perceptions of IT support during the process of implementation, to describe relatives’ opinions of IT support and to compare relatives’ perceptions of their irritations with care and life satisfaction before and after increased IT support. In addition, three questionnaires were further developed and tested among staff working in elderly care, and then used in the staff evaluation. Methods: A quasi-experimental design with baseline assessments and follow-ups and experimental and control groups was used in two studies to investigate the outcomes of IT support. A descriptive design was used to study staff views on IT support, and a correlative design was used in the methodological study. Participants were 33 staff members and 22 relatives in the evaluation, 14 staff members in the descriptive study and 299 staff members in the methodological study. Data collection methods were questionnaires and group interviews. The IT support consisted of passive passage alarms, fall detectors, sensor-activated night-time illumination of the lavatory, movement detectors, email communication, an Internet website and additional computers. Findings and conclusions: Staff job satisfaction and perceived quality of care increased in the experimental group. The relatives were generally positive about the IT support, and the experimental group showed a decrease in practical/logistical irritations. Staff described ‘moving from fear of losing control to perceived increase in control and security’ and ‘constant struggling with insufficient/deficient systems’. Conclusions are that IT support can be a resource in dementia care as perceived by caregivers if IT support is incorporated into the care system.

Keywords: dementia care, information technology, job satisfaction, quality of care, diffusion of innovations, staff, relatives

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III Engström M, Lindqvist R, Ljunggren B, Carlsson M. Staff members’ opinions and perceptions of new IT support in dementia care during the process of implementation. (Manuscript)


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<td>IT</td>
<td>Information technology</td>
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<tr>
<td>DOI</td>
<td>Diffusion of innovations</td>
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<td>LSQ</td>
<td>Life Satisfaction Questionnaire</td>
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<td>PS</td>
<td>Physical symptoms</td>
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<td>SI</td>
<td>Sickness impact</td>
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<td>QDA</td>
<td>Quality of everyday activities</td>
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<td>SES</td>
<td>Socio-economic situation</td>
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<td>QFA</td>
<td>Quality of family relation</td>
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<td>QFR</td>
<td>Quality of close friend relationship</td>
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<td>SOC</td>
<td>Sense of Coherence scale</td>
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<td>NHHS</td>
<td>Nursing Home Hassles Scale</td>
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<td>PTST</td>
<td>Patient – staff hassles</td>
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<td>CGST</td>
<td>Caregiver – staff hassles</td>
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<td>PRAC</td>
<td>Practical-logistical hassles</td>
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<td>GBS scale</td>
<td>Gottfries-Bråne-Steen scale</td>
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<tr>
<td>MDDAS</td>
<td>Multi-Dimensional Dementia Assessment Scale</td>
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<td>EPR</td>
<td>Electronic Patient Record</td>
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Introduction

During recent decades, there has been an increase in telemedicine/telecare projects and publications (1). However, there has been a predominance of demonstrations (design) and feasibility studies (2), and in Sweden, IT applications have been used to a limited extent in elderly care (3). Therefore, the overall aim of the present thesis was to describe and evaluate IT support in dementia care primarily from the perspective of staff and secondly from the perspective of relatives. Study I was conducted to further develop and test three questionnaires to be used in Study II. Study II was conducted to study the outcomes of the IT support among staff members and Study III to describe staff members’ perceptions of the IT support. Study IV was conducted to study the outcomes of the IT support among relatives and to describe their opinions of the IT support.

The context of study II, III and IV was a residential home for people with dementia. The IT support was initiated by the organization and their objectives were to facilitate for staff and residents in their daily activities through different kinds of IT support and to increase relatives’ perceived closeness to the residential home via new channels of information and communication.

IT support in elderly care

Telemedicine, telecare, telenursing, telehealth and e-health are examples of terms used for the use of IT in health care at a distance. In the present thesis, the term IT support is used, as the IT included was regarded as complementary support for the users, both at a local site and at a distance. In a review (2) of telehealth interventions to improve clinical nursing care for elderly people, researchers concluded that IT has the potential to improve nursing care for elderly people and that telehealth interventions should ideally complement nursing work. The result indicated that IT provided an alternative approach to assessing key indicators of the elderly person’s state and that it was acceptable to staff, elderly people and informal caregivers. However, according to the review, little research has addressed the effects of IT, with the exception of work on use of telephone consultations. Conclusions from a review in Cochrane (4) also stress that established telemedicine is feasible, though there is little evidence of its clinical benefits, and that policy makers
must be cautious about recommending increased use and investing in un-evaluated technologies.

**IT support in the care of people with dementia**

According to the literature, most of studies on IT support in the care of people with dementia focus on telecommunication between relatives and staff, e.g. (5-9). However, communication via video-phone/videoconference between relatives and people with dementia staying at a nursing home (10, 11) and between staff and people with dementia (6, 11-15) has also been studied. Others have focused on support/education for staff members (6, 14, 16-18). Telemedicine has also been compared to face-to-face dementia examinations (19), and a computer game has been tested for its capacity to detect cognitive decline (20). A few studies have focused on IT support for the person with dementia. For example, one study (21) described a security alarm system in the home, e.g. smoke detectors, front door detectors, movement detectors and refrigerator door detectors. Other studies have evaluated a simple-to-use telephone for people with dementia (22), a multimedia conversation support system based on reminiscence therapy (23) and robot-assisted activity with the use of interactive toys (24-26). Still others have tested the feasibility of activity monitoring (27-30) and electronic tracking or tagging devices (31-34) or have merely described the design of electronic tracking or tagging devices (35, 36). A tracking system is able to locate the user and a tagging system detects when a person, wearing a tagging device, leaves a predefined area (34). In a study by McShane et al. (32), 54% of informal carers thought a tracking system would lessen their anxiety about their relative, and in a study by Lin et al. (33), 10 of 11 users wanted to carry the locating device themselves or recommend it to a family member. In a study by Miskelly (31), staff and relatives felt reassured about being alerted via the tagging system. In a recent study conducted in Switzerland by Margot-Cattin and Nygård (37), use of access technology at a care unit for persons with dementia was studied from the residents’ perspective. The system unlocked or locked doors, unblocked or blocked elevators and recorded access for persons wearing the device. The results showed that the access technology supported the users’ sense of security, territoriality, orientation and adaptation to the environment.

Other studies (38-40) have described guidance systems that provide prompts to assist persons with dementia through their activities of daily living, e.g., hand washing. A European project entitled ‘Enabling technologies for people with dementia’ (ENABLE) (41, 42) has focused on assistive technology for persons with dementia, e.g., cooker monitors, lost item locators, automatic day and night calendars, and automatic night-lights with sensors under the bed to detect when a person leaves the bed and turns on a bedside light. Marshall (43) described technology in dementia care as serving three main functions: ‘(1) improving safety of the individual and others, (2) moni-
monitoring and maintaining health, and (3) enhancing quality of life’ (p. 85). Some of the studies mentioned above have been conducted in the context of clinical practice; others have been design or feasibility studies in which just a few persons test the IT/technology. None of the studies addressed staff members’ job satisfaction specifically. However, in a study by Sävenstedt (44), the nurse-doctor interaction in teleconsultation and the problems or tasks dealt with were described. The results indicated that IT support could be a useful tool for the staff. The power-control and practice spheres were altered, nurses were given a greater role in presenting medical problems, and teleconsultation improved the structure of work.

**Technology in elderly care and other settings**

Studies of staff opinions and/or experiences of technology, i.e. not only information technology, in caring, elderly care and other specialities and settings have revealed both optimistic and pessimistic opinions/experiences. In a study by Sävenstedt (45) of staff members’ reflections on using IT in elderly care, results showed sub-categories such as genuineness and superficiality, freedom and captivity, and dignity and unworthiness. Many staff members had a defensive attitude, and IT was discussed as something that both promoted humane care and inhumane care. Fear about using IT was also shown in a study by Magnusson (46), for example that technology might replace human contact. In a study by Barnard and Gerber (47), technology was described using eight qualitatively different conceptions: technology as machinery and equipment, as changes to skills, as increasing knowledge, as respect and autonomy, as gaining control of clinical practice, as clinical resources must meet the needs of technology, as the need to include the patients’ experience and clinical presentation, and as alteration to the free will of nurses. The authors argued that there is limited research on technology in nursing and that the complex variation in experiences requires further research. In two quantitative studies (48, 49) looking at nurses from eleven countries, results showed rather positive opinions of technology in caring. However, nurses from five countries believed strongly that the increase in technology did not entail more spare time in nursing (49). When the sample was divided into low, medium and high groups in terms of technological influence, results showed that the highly influenced group scored higher on caring attributes, with the exception of the subscale caring advocacy (48). An Australian study (50) of nurses’ attitudes towards computers also showed generally positive attitudes. However, some results diverged from the others, as over 30% thought computers detract from patient care and result in duplication of work. A study (51) of rural mental health practitioners showed a statistically significant relationship between the combination of technology use and expertise and job satisfaction.

Assistive technology in elderly care – such as audio-video communication, remote health monitors, electronic sensors and equipment such as fall
detectors, door monitors, bed alerts, pressure mats, and movement detectors – has been conceived of as an aid in the care of elderly people (52). However, when considering these technologies, each resident’s situation should be carefully assessed and issues of loss of privacy must be addressed (52). Technology and information technology have been discussed as factors that promote autonomy and independence as well as factors that are in conflict with human dignity, especially where electronic tagging and tracking are concerned (53, 54). The necessity of facing this complex dilemma (55) and of evaluating new technology when it is introduced into the care of persons with dementia have been emphasized (37). For a more extensive treatment of technology and ethics, see for example (53, 54, 56).

Studies (57-59) of elderly people’s opinions and/or experiences of IT support show that they are generally positive, although concerns about costs (57), reduced human contact (57, 58) and user-friendliness (58) are expressed. A survey (59) of elderly people’s interest in telecare showed that the majority were prepared to accept new technologies such as fall detectors, lifestyle monitoring and telemedicine. A study (57) of an intelligent home monitoring system used by 22 elderly people showed that many of the users reported enhanced feelings of safety (72%) and security (58%), although 24% reported that their homes were less private. A study (30) testing the acceptability of a monitoring system, infrared sensors, used in a hospital showed that relatives accepted the system to a high degree, while patients accepted it to a moderate degree. A cost analysis (60) of a technology-based service for elderly people and their carers showed costs reduction when the technology-based service used was compared to a hypothetical assessment of usual service costs.

To summarize, research on IT has grown during recent decades. However, research on IT support in dementia care is sparse and has mostly focused on telecommunication. Moreover, evaluations of IT support in dementia care are few. In the present thesis, an evaluation of IT support from the perspective of staff has been made, and in one study, the perspective of relatives was included. The decision was made to study the outcomes as well as opinions and perceptions of IT support during the implementation process to obtain a more comprehensive description/understanding. The IT support was initiated by the organization and adapted to the organization with the aid of a technician. Implemented IT systems were passive passage alarms in a 200-metre-long indoor walkway and in the gardens, fall detectors, sensor-activated night-time illumination of the lavatory connected to the bed alarm, movement detectors that could be used instead of the ordinary bed alarms, email communication, an Internet website for the residential home and additional computers placed in the kitchen/living room to help staff members read/write in the electronic patient record more easily. The IT support is presented in more detail in the method section.
The diffusion of innovations (DOI) theory

The theory of diffusion of innovations (61) may be used as a framework when introducing IT support in different care settings (62-64). The theory (61) includes descriptions of stages in the diffusion process and identifies important aspects to take into account when introducing innovations. In the theory, innovations are described as ideas, practices or objects that individuals perceive as new. Diffusion is described as the process by which an innovation is communicated through certain channels over time among users in a social system. According to Rogers (61), how users perceive the characteristics of the innovation – i.e. its relative advantage, compatibility, complexity, trialability, and observability – will determine the diffusion/rate of adoption. According to the theory, users may be classified, on the basis of their adoption, as innovators, early adopters, early majority, late majority and laggards. When innovations are implemented in an organization, this can be accomplished in different ways, such as authority innovation decisions, optional innovation decisions, i.e. an individual decision, collective innovation decisions, i.e. based on consensus among members, and contingent innovation decisions, i.e. those that are first made by the organization and thereafter by individuals. The first step in the innovation process in an organization is initiation, i.e. identifying and prioritizing needs/problems that could be solved with innovations and thereafter matching the problem with an innovation. The second step, implementation, starts when the innovation is modified and re-invented to fit the organization and when the organizational structure is changed to fit the innovation; this step is completed with routinization (61).

In the present thesis, IT support is viewed as an innovation and DOI theory is used to discuss how staff members perceived the innovations’ characteristics (Study III). The theory has also inspired the statements formulated in the study-specific questionnaire on staff perceptions of the innovations’ characteristics (Study II). The theory was chosen because it emphasizes user involvement in the development and implementation of innovations (61) and because it has been suggested to be useful when discussing perceptions of technology in different care settings and contexts (65).

Elderly people in municipal care

Conventionally, the definition of ‘elderly’ has been a chronological age of 65 years or older (66). When discussing studies of dementia care, the included samples may also include younger people.

The elderly population is increasing in Sweden (67) and many other countries (68), and the current trend in Sweden is to help elderly people remain in their own home. The number of rooms in residential living facilities for elderly people has also decreased during recent years. Thus, individuals moving
into/admitted to residential living facilities for elderly people now need to display extensive needs for care that cannot be satisfied in their ordinary dwellings (67). Studies have also revealed an increased care load (69-71).

One Swedish study (70) of demanding behaviour among elderly care recipients, living at home or in care settings, showed that demanding behaviour had generally increased in frequency and that staff workloads tended to be greater in 2002 than in 1993. Another Swedish study (71) of people with dementia, admitted to group-dwellings over a ten-year period, showed an increase in the need for assistance in managing everyday life and in active supervision day- and/or night-time, but the prevalence of psychiatric symptoms was unchanged. However, according to a recent Swedish study (72), staff workload assessed in 2005 showed a decrease when compared with assessments from the 1990s. The highest workload was reported for nursing homes and group living/dementia care settings, and a higher workload was reported for people with dementia than for other patients. The most important reason for moving into a residential living facility has been shown to be a diagnosis of dementia (73), and the majority of persons in residential living facilities for the elderly are people with dementia. This number is estimated to increase in the future (67). All of this places great demands on municipalities to create good living situations and care as well as working conditions adjusted to care of people with dementia (67).

Dementia

Dementia is a common disease among the elderly (74), and the cost of dementia care represents a large part of the total costs of elderly care (75). In Sweden, economic costs for dementia disorders are about 40 billion Swedish kronor annually, and over 80% of the costs derive from municipal care and social services (76). Dementia affects about 6% of the population aged 65 or older and increases in prevalence with age. Its worldwide prevalence is estimated to increase as the population ages (77). Research (78) has shown that people with dementia are largely cared for by informal carers. However, when the disease becomes more severe, many people with dementia move into a residential living facility (74). For example, one Canadian study (79) showed that high scores on behavioural symptoms were related to relocation to an institution. In a study by McShane et al. (80), results showed that people with dementia who tended to get lost were admitted into institutions more often than were those who did not have such a tendency. In addition, behavioural and psychological symptoms of dementia can increase the number of emergency room visits (81).

Alzheimer’s disease is the most common form of dementia disorder, and about 60% of all people with dementia have been diagnosed with the disease. Vascular dementia represents about 10% and frontotemporal dementia about 5% (76) of the population of dementia patients. People with dementia
experience a decline in functional abilities that results in a need for assistance with many aspects of everyday life. Symptoms and the nature of functional decline differ depending on the diagnosis. However, common to all diagnoses are a decline in cognitive abilities and memory problems, and as the disease deteriorates, patients encounter more and more problems in activities of daily life (76). Because orientation in time and place is one problem for persons with dementia, it is common for them to wander away and get lost (80). This, in turn, may become a worry for relatives and formal caregivers, and a great deal of time is spent on surveillance. Wandering is a common behaviour among people with dementia, and as Cohen-Mansfield stated (82), ‘Allowing these residents to pace in an area both agreeable to and safe for them may create less of a burden for the nursing staff and provide more comfort and satisfaction for these and other residents’ (p. 199). Wandering has been linked to agitated behaviour (83), and one Australian study (84) showed a decrease in aggressive behaviour when residents were released from mandatory confinement indoors. According to one American study (85), patterns of wandering away included: a lack of effective precautions for residents who had earlier attempted to leave the residential home area/wandered away or had a history of getting lost; a lack of awareness of residents’ location; and ineffective or incorrect use of alarm devices. IT support/alarms, if used correctly, may be of help in dementia care. Different devices have been developed, such as door alarms and bed alarms, to indicate when a person leaves a certain place (52), and an ‘emergency transmitter alarm’ that is activated by the police can be used to find people who are already lost (86). However, issues concerning who should pay sometimes make wider use problematic (87). Finding one’s way to the lavatory is also a problem, especially at night when it is dark and when patients do not know where the light switch or lavatory is located. A lamp may be left on in the lavatory at night, but some people do not want a light on when they are sleeping. Risk of falling is a common problem among elderly people (88, 89), and one study (89) showed that 33% of falls and 37% of injurious falls occurred at night. Among people with dementia, wanderers fall more often than do non-wanderers (83). In Sweden, safety alarms/community alarms are common among elderly people. However, when using ordinary safety alarms/community alarms, the person needs to press the alarm button in an emergency situation, consequently these alarm systems are useless if the person is unable to operate the equipment (21, 57). Thus, for people with dementia, other devices are needed. Fall sensors (90) or bracelets with sensors that monitor, for example, heart rate and positioning can be used to indicate a fall, abnormal conditions or that someone is leaving a defined area (52). Such devices, however, are not commonly used at residential living homes in Sweden (personal communication (91)), and they have rarely been studied from a caring perspective.
Results from one Norwegian study (92) showed that electronic surveillance was used among 7.2% of patients in special care units for persons with dementia; included were, e.g., devices on patients that automatically lock the door (0.2%), devices on patients that alert the staff (1.8%), devices to track patients (0%), devices that sound when a patient leaves the bed (2%) and other types of electronic surveillance (3.2%). In the above study, 45% of residents at special care units for people with dementia were subjected to some kind of constraint. In another Norwegian study (93), a locked entrance door was reported by 58% of the units for persons with dementia, and the most common electronic surveillance was the use of an alarm when a resident left his/her bed. In one Swedish report (94), based on results from two studies, a locked entrance door was reported among 81% of the care settings for people with dementia. According to the Swedish Board of Health and Welfare’s Provisions and General Advice (95) it is not right to lock in people and if an entrance door is locked at a care setting the residents should be able to unlock the door. In a study (96) of nurses’ perceived use of restraints in realistic and idealistic situations in dementia care, the data showed a discrepancy. The authors suggested that the nurses’ desire to preserve residents’ autonomy was in conflict with their perceived duty to ensure safety.

Behavioural and psychological symptoms in dementia (BPSD) are common (97) and constitute the basis for distress among patients, their relatives and caregivers (98). Rates of BPSD differ across studies. For example, one study of community residents (99) showed that 61% of participants had exhibited one or more behavioural and/or psychological symptom during the past month. In another study (100) of BPSD among nursing home residents, results showed that over 90% had exhibited at least one symptom during a 2-week period. BPSD are most frequent during the middle stage of the dementia disease process and less common during the early and late stages (97). In a consensus statement (98), the term BPSD was recommended and defined as ‘Signs and symptoms of disturbed perception, thought content, mood, or behaviour that frequently occur in patients with dementia’ (p. 498). Included in the term are, for example, anxiety, depressive mood, hallucinations, delusions, aggression, screaming, restlessness, agitation, wandering, culturally inappropriate behaviours and sexual disinhibition (98). In one Norwegian study (101), degree of dementia, aggressive behaviour and loss of function in ADL were the strongest correlates to use of constraints, with the exception of electronic surveillance.

Non-pharmacological interventions for these symptoms include activity programs, music, behaviour therapy, light therapy and changes in the physical environment (102). A systematic review (103) of psychosocial methods showed some evidence that multi-sensory stimulation reduced apathy, that behaviour therapy focused on pleasant events and behaviour therapy focused on problem solving reduced depression and that psychomotor therapy groups reduced aggression. Education for staff members (104) and clinical supervi-
sion (105) also have the potential to reduce BPSD. Studies have shown the importance of positive interactions (70, 105, 106), a balance between demands and competence, and a supportive organization (70). In a thesis by Graneheim (106), BPSD are viewed as meaningful acts through which people with dementia communicate their experiences of interacting with other people. However, different factors contribute to BPSD (107).

Relatives and significant others in dementia care

Studies (79, 108-110) have shown that relatives of people with dementia often continue to take an active part in care even when the person with dementia has moved into a care setting. In one study (79), 42% of family caregivers actively helped their relative with activities of daily life. Tornatore and Grant (108) showed that the majority of relatives visited the care setting at least weekly, and Andrén and Elmståhl (109) reported that 38-72% visited the care setting at least weekly.

Results from a qualitative study (111) of family carers’ experience of nursing home placement revealed five shared meanings: experiencing a loss of control; being disempowered; feeling guilt, sadness and relief simultaneously; possessing a sense of failure; and having to make a forced and negative choice. One study (112) of the existential concerns of families of late-stage dementia patients revealed categories such as obligation – guilt, being faithful, paying back what you have received, the patient can no longer communicate (described as ‘visiting a living dead person’), being a parent to your parent, denial/disavowal of death, and anticipatory grief.

Perceptions of burden are reported for relatives of people with dementia at care settings as well as for relatives caring for people with dementia at home e.g. (108, 113) and several reviews have also addressed feelings of burden among relatives of people with dementia e.g. (114-116). Higher caregiver burden has been reported among caregivers to people with dementia who are mobile as compared to those who are non-mobile (117). Caregiver burden, in turn, influences time to patient institutionalization (115). However, some caregivers may perceive both great satisfaction and moderate burden (118). Feelings of burden have been reported among family caregivers long after relocation of their relative to a care setting (119). Low subjective well-being, poor health, depression, stress and low self-efficacy have also showed to be common in caregivers to people with dementia (120).

Parts of the IT support studied here were aimed at relatives, and therefore it seemed important to also include their views on the IT support. Other parts of the IT support were directed towards the residents and the staff. However, by supporting residents and staff, it was thought that the overall atmosphere might be changed and that this, in turn, would increase the quality of care and decrease irritations that relatives may experience in their contact with the care setting.
The caring environment

There are several persons acting and interacting in the caring environment, i.e. staff, residents and their relatives or significant others. Thus, the physical environment must be tailored to these actors so that they can function optimally. According to the World Health Organization’s (WHO’s) International Classification System of Functioning, Disability and Health (121), a person’s functioning is a dynamic interaction between his/her health condition, personal factors and environmental factors. Therefore, a person’s performance can either be improved or hindered by environmental factors (121).

In a thesis by Edvardsson (122), the physical environment was described as one of two dimensions constituting the atmosphere in a care setting. The atmosphere was described as being “…constituted by two interacting and interwoven dimensions: the physical environment and people’s doing and being in the environment” (p. 5). The physical environment was described using five aspects; “…the physical environment as a symbol; and as containing symbols; the physical environment as influencing interaction; as facilitating a shift of focus, and as containing scents and sounds” (p. 43). The dimension of people’s doing and being in the environment was described as “…the experience (or absence of experience) of a welcoming; of seeing and being seen; of a willingness to serve; of a calm pace; and of safety” (p. 46).

According to Day et al. (123), therapeutic environmental design for people with dementia includes, for example, facility planning, environmental attributes (e.g., design modifications for safety), building organization, specific rooms and activity spaces. Several studies (82, 124-127) have shown positive results owing to environmental changes in care facilities for people with dementia or associations between perceptions of the environment and patient outcomes and/or user benefits. Zeisel et al. (126) describe eight important environmental concepts: exit control, walking paths, individual space, common space, outdoor freedom, residential character, autonomy support and sensory comprehension.

One study (128) exploring nurse’s aides’ reasons for continuing their work in dementia care revealed five major themes, of which one was the working environment. A clean home-like environment and adequate equipment were emphasized as important, and recommendations for managers included providing adequate equipment and supplies, such as alarm systems and daily living requirements.

In the present thesis, aspects of the IT support studied can be seen as environmental attributes that assist both the residents and the staff. Some of the IT support elements were aimed at opening up the residential living home/increasing residents’ freedom of movement/gaining access to places inside the residential living home and in the gardens and increasing residents’ autonomy. Other elements of the IT support were aimed at supporting the residents. However, IT support was primarily intended to support staff in
their daily work, and we assumed that if the staff perceived the care environment as more supporting and a higher quality of care, then their satisfaction with work would increase. Thus, because most of the IT support was directed at staff, the main focus of the thesis is on staff outcomes such as staff satisfaction with work, perceived stress symptoms and their perceptions of the IT support.

Staff satisfaction with work and perceived stress

In Sweden, absence due to illness is high in elderly care, and it is difficult to recruit new staff with formal competence. This may result in negative consequences for care of the elderly (67). A problem in the health services during the coming decades is recruiting and keeping staff in primary municipal health and social services (129), and thereby reducing turnover rates that have shown to be high among staff working in elderly care (130).

Several studies have addressed job satisfaction in elderly care. However, the results concerning how staff members perceive their job satisfaction differ in the literature, and most studies are cross-sectional in design. Some studies have reported high job satisfaction e.g. (131-136), and others have indicated low job satisfaction and/or considerable stress in elderly care e.g. (137-140). Differences have been reported between occupational groups, such that registered nurses tend to report higher job satisfaction (135, 141) and less strain (142) than do licensed practical nurses and nurse’s aides. Job satisfaction has also been reported to differ across workplaces (143-147), e.g. community-based facilities versus hospitals. Work in the elderly care sector has been reported to be more physically demanding and more stressful as compared to other sectors (148). Job satisfaction has been related to age (134), continuing education (141), perceived competence (149) and staff perceptions of the quality of care (136). It has also been reported to decline over the first six months, for newly hired staff, after which it remains more stable (150). However, other studies found no association between age (141, 151), length of employment, gender (151), hours worked per week (134) and job satisfaction. Working with patients with aggressive behaviour has been linked to burnout (152), stress (153) and job dissatisfaction (151), and three specific behaviours: being uncooperative, restless, and constant crying related to physical stress (154). In one meta-analysis (155) among different professions, self-efficacy, internal locus of control, self-esteem, and emotional stability have been found to correlate with job satisfaction. For a review of job satisfaction among nurses in different specialities, see for example Irvine and Evans or Lu et al. (156, 157).

To summarize, organizational/job factors as well as some individual characteristics seem to be linked to job satisfaction in elderly care. Job satisfaction, in turn, is suggested to be linked to mental and physical well-being
According to a meta-analysis of job satisfaction and health (158). Thus, managers have an important role to play in creating good workplaces, increasing job satisfaction among staff members and reducing stress symptoms, thereby creating a basis for high quality care. Research, although not in elderly care, has indicated some support for a relationship between job satisfaction and patient satisfaction (159, 160), staff perception of role conflict and patient satisfaction (161), and violence experienced by staff and patient-rated quality of care (162).

According to Kalliath and Morris (163), several studies have examined burnout as a predictor of nurses’ job satisfaction, while few studies have studied nurses’ job satisfaction as a predictor of burnout. The result of their study showed that staff members’ overall job satisfaction had both direct and indirect effects on burnout. On the other hand, staff members’ satisfaction levels may differ across different factors of job satisfaction and these factors, in turn, may differ with staff members’ overall job satisfaction (158). Thus, it would be interesting to examine which factors of staff members’ job satisfaction are related to their perceived stress symptoms.

Theories have been developed that focus on job satisfaction, work environment, etc. We have, for instance, Herzberg’s motivation-hygiene theory (164), one of the earliest and well-known, that describes motivation in work using five variables: achievement, recognition, the work itself, responsibility and advancement. Hygiene factors (i.e., environmental factors preventing dissatisfaction) are described using eleven variables, such as possibility for growth and interpersonal relations. In a study by Rantz et al. (165), Herzberg’s motivational research was compared with a new study on staff primarily working in healthcare settings. The results showed that interpersonal relations now ranked first as a motivating factor, compared to Herzberg’s work in which it was a hygiene factor. Recognition, the work itself and responsibility were, just as in Herzberg’s work, motivating factors. Strategies of developing positive interpersonal relations among subordinates, supervisors and peers, seeking additional responsibility, and developing the work itself to make it more meaningful were discussed as important strategies for motivation and job satisfaction.

Karasek’s (166, 167) demand-control model distinguishes between demanding aspects of work (psychological demands) and control (decision latitude). According to the model, having an active job situation (high demands and high decision latitude) for a significant period of time is related to feelings of mastery, which in turn inhibit feelings of strain. When the occupational distribution of psychological demands and control was studied, nurses were classified as having an active job situation (high demands and high decision latitude) and nurse’s aides as having a high strain situation (high demands and low decision latitude). The four categories in the model are active jobs, high strain jobs, passive jobs (low demands and low decision latitude) and low strain jobs (low demands and high decision latitude). In a
study (142) of staff members in dementia care, nurse’s aides were classified as having a high strain situation and registered nurses as having a low strain situation. In another study (168) testing Karasek’s demand-control model in health care, nurses with a high level of strain were less empowered, less committed to the organization and less satisfied with their work as compared to nurses with a low level of strain. When the high strain group was compared to the active job group, the same results were obtained.

Research on magnet hospitals, hospitals that attract and retain nurses, has shown that nurses are attracted to work environments that promote professional autonomy in practice, nursing control over the practice environment, and effective communication between nurses, physicians and administrators (169). Research by Laschinger et al. (170) supported a hypothesized relationship between magnet hospital characteristics and workplace empowerment and job satisfaction. Workplace empowerment was described in Kanter’s theoretical work, i.e. ‘Power is “on” when employees have access to lines of information, support, resources, and opportunities to learn and grow’ (p. 411).

When job satisfaction is measured, the included work factors differ across the instruments used. In a systematic review (171) of instruments that assess job satisfaction, the following domains were judged to be the basis of the job satisfaction concept: work content, autonomy, growth/development, financial rewards, promotion, supervision, communication, co-workers, meaningfulness, workload and work demands. Conclusions from the review were that many questionnaires exist, but only a few have shown both high reliability and high validity and none of the included questionnaires were found to measure responsiveness to change.

In the present thesis, satisfaction with work has been defined as staff members’ perception of their psychosocial job satisfaction, perception of quality of care, absence of sleep disturbance, and absence of stress symptoms that staff members relate to work. Because work is part of a person’s life situation, it was decided to also include broader measures of the life situation, such as life satisfaction and sense of coherence.

Life satisfaction

Quality of life includes both a person’s objective resources and his/her subjective satisfaction with those conditions. Satisfaction measures the extent to which a person feels that needs or aspirations related to activities, relationships, moods or other states of being are being satisfied (172). Work accounts for a large part of a person’s life and, thus, can be assumed to have impact on people’s life satisfaction. Research by Demerouti et al. (173) showed that 29% of the variance in life satisfaction was explained by working conditions, and exhaustion and disengagement had a mediating role between working conditions and life satisfaction. One Swedish study (174) on
staff working in dementia care showed that staff members’ life situation was affected by nursing care experiences, and that a hard day at work could imply later loss of temper at home.

Some quality of life instruments are developed for special disease groups and others are more general. The Life Satisfaction Questionnaire (LSQ), used in the present thesis, was first developed for women with breast cancer and for a study comparing women in conventional and complementary/anthroposophic care. Based on a literature review, five dimensions were interpreted as important when the questionnaire was under construction: perceived physical health; satisfaction with the social situation with respect to work, living conditions and economy; perceived quality of time regarding activities of daily life, satisfaction with relationships with a partner, family and close friends and significant others; and a global assessment of quality of life (175). According to Patrick and Erickson (172), there is a need for instruments that incorporate the positive benefits that may result from health-promoting changes in the environment (e.g., emotional well-being, positive affect, vitality and health perceptions) for use with relatively well individuals. The LSQ incorporates many positive aspects such as ‘quality of everyday activities’ (the fun and meaningfulness of everyday activities), ‘quality of family relation’ and ‘quality of close friend relationship’. The LSQ has also been used in other populations and tested in a random sample of Swedish women and men. The results showed that the factor structures were the same in the random sample of Swedish women and men as in the sample of breast cancer patients (175).

Sense of Coherence (SOC)

In Antonovsky’s salutogenic model (176), sense of coherence (SOC) is the core concept, which is formed by three components: comprehensibility, manageability and meaningfulness. SOC is ‘…a global orientation to one’s inner and outer environments which is hypothesized to be a significant determinant of location and movement on the health ease/dis-ease continuum’ (p. 731). High SOC is thought to be the foundation for successful coping. The model claims that a person’s SOC is stable by the end of young adulthood, after which only minor changes will occur. However, according to Antonovsky, this theoretical assumption has to be tested. Researchers (177-179) have also questioned this stabilization. Krantz and Östergren (178) found that job strain, low social support and low social anchorage were associated with low SOC. Nilsson et al. (177) found that SOC was stable for individuals with an initially high level of SOC, while for others SOC was influenced by individual conditions and societal changes during a five-year period. In a study by Smith et al. (179), results showed that 58% of participants had a change in SOC score greater than 10% during a four-year period.
Quality of care

Quality of care is a multidimensional concept (180) that can be measured in several ways. Outcomes of care as well as the structure and process of care can be studied (181) from different perspectives. A theoretical model of quality of care from the patient perspective developed by Wilde et al. (182) showed that quality of care could be understood in light of two conditions: the resource structure of the organization and the patient's preferences, which had both a rational and a human aspect. In the resource structure, person-related qualities as well as qualities related to the physical and administrative care environment were incorporated; these included infrastructural components of the care environment, organizational rules and technical equipment. The four dimensions of the model are the medical-technical competence of the caregivers; the physical-technical conditions of the care organization; the identity-oriented approach and the socio-cultural atmosphere of the care organization. A study by Wilde et al. (180) of elderly persons' perspectives on quality of care showed that the scales ‘care equipment’ and ‘care room characteristics’ received the highest scores when subjective importance was compared across scales. The results highlight the importance of a high quality care environment. One report (183) on Swedish studies of relatives’ evaluations of quality in dementia care showed two areas that fell below reference values for positive opinions; the areas were residents’ opportunities to be outdoors and the range of activities at the residential home. A qualitative study (184) of psychiatric staff and care associates’ descriptions of the concept quality of care showed four categories: the patient’s dignity is respected, the patient’s participation in care, the patient’s recovery and the patient’s care environment. The last category included conceptions such as personal space, aesthetics and calm atmosphere.

Different perspectives on quality of care include those of care recipients, relatives and staff members. Assessing quality of care from care recipients’ perspective, i.e. via self-reports, may be a problem during the later stages of dementia.

In the present thesis, changes were made in the structure of care, via implementation of the IT support package, and aspects of quality of care were assessed via self-reports from staff members and relatives concerning both process and outcome.

Summary

As the population demographics shift towards a larger number of elderly and a larger prevalence of dementia, the care of people with dementia and their relatives will be of great importance. IT support may be a resource in care, but there is a need to describe staff job satisfaction, quality of care, perceived stress symptoms and life situation when these new technologies are implemented in care. Describing how the users perceive the IT support and what
they think about information technology in nursing, security questions, and whether IT support could strengthen the staff were also in focus in the present thesis. The problems and possibilities associated with IT support in dementia care need to be assessed from different perspectives, for example technical, economical, human computer interaction and caring science perspectives. However, the focus of the present thesis is on caring science.

Aim

The overall aim was to describe and evaluate IT support in dementia care primarily from the perspective of staff and, secondly, from the perspective of relatives.

Specific aims

- The aim was to examine staff members’ satisfaction with their work before and after increased IT support in the care of people with dementia, over time and compared to a control group. Comparisons were also performed of perceived life satisfaction and sense of coherence (Study II). To accomplish this, the validity and reliability of three questionnaires measuring ‘work satisfaction’, ‘patient care’ and ‘staff health’ were evaluated using factor analysis, known-group validity and internal consistency, and the relationship between staff members’ satisfaction with work and perceived stress symptoms were studied via multiple regression analysis (Study I).
- The aim was to understand and describe staff members’ opinions and perceptions of an IT support package during the process of implementation (Study II and III).
- The aim was to describe relatives’ opinions of the IT support and to compare relatives’ perceptions of their irritations with care and of life satisfaction before and after increased IT support. This was accomplished using an experimental and a control group (Study IV).
Method

Design

In Study I, a correlative design was used, and in Study II, a quasi-experimental non-equivalent groups design with baseline assessments and follow-ups was used. In Study III, the design was descriptive, and in Study IV the design was quasi-experimental. See Table 1 for an overview of the studies.

Table 1. Overview of study design, sample and data collection methods used in the studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample</th>
<th>Data collection methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study I</td>
<td>Correlative design</td>
<td>299 staff members working in elderly care</td>
<td>Questionnaires</td>
</tr>
<tr>
<td>Study II</td>
<td>Quasi-experimental design with baseline assessments and follow-ups, experimental and control groups</td>
<td>33 staff members working in a residential home for people with dementia</td>
<td>Questionnaires (3 data collection points)</td>
</tr>
<tr>
<td>Study III</td>
<td>Descriptive design</td>
<td>14 staff members working in a residential home for people with dementia</td>
<td>Group interviews (4 data collection points)</td>
</tr>
<tr>
<td>Study IV</td>
<td>Quasi-experimental design with baseline assessments and follow-ups, experimental and control groups</td>
<td>22 relatives to people with dementia residing in a residential home</td>
<td>Questionnaires (4 data collection points)</td>
</tr>
</tbody>
</table>

Setting

Study II, III and IV were performed in a residential home for people with dementia. All together there were 6 units with 9–12 residents in each unit. One unit was for inquiry, short-time and respite care and was not included. The other five units were permanent dwellings for people with dementia. Most residents in these five units had undergone a dementia examination and had a diagnosis of dementia. Though there were also some residents who had not undergone a dementia examination. Some of the residents came from other residential living facilities where staff members had found it difficult to interact with the residents. However, the residential living facility also
received residents who were moving from their own homes. All units had been newly restored and adapted to people with dementia. One of the units had not yet been opened, received residents, when Study II started and was therefore not included in that study. Characteristics of residents living at the residential home, at baseline Study II, are shown in Table 2. The units were located in three buildings connected by a 200-m-long indoor walk, and each building had its own garden. The indoor walk contained three pavilions with large windows where residents, relatives and/or staff could sit down and relax. Before the IT support project, doors to the indoor walk, to the gardens and to the entrance door were locked, and residents could only be there when accompanied by staff or relatives. All residents had a private area with their own furniture, and there were also some common home-like areas for social contacts, interaction and activities. In the cellar there were two rooms for multi-sensory stimulation/Snoezelen that all units could use. The units had the same manager, and the staff-to-resident ratio was approximately 0.9:1. Available IT support, in all units, before the new project started included alarm sensors on doors to the residents’ private areas, alarm sensors on beds (pressure mats), assault alarms and electronic patient records that had been used for four to five years.

Table 2. Characteristics of the residents housing in the residential living home at staff baseline (Study II): division into experimental and control groups

<table>
<thead>
<tr>
<th>Residents</th>
<th>Experimental (n=17)</th>
<th>Control (n=23)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) mean (sd)</td>
<td>84.4 (6.4)</td>
<td>78.5 (8.8)</td>
<td>0.025</td>
</tr>
<tr>
<td>MDDAS mean score (sd)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioural symptoms (0–72)</td>
<td>9.0 (5.4)</td>
<td>8.4 (7.1)</td>
<td>0.762</td>
</tr>
<tr>
<td>Psychiatric symptoms (0–36)</td>
<td>6.8 (4.1)</td>
<td>7.8 (7.3)</td>
<td>0.584</td>
</tr>
<tr>
<td>Orientation ability (0–27)</td>
<td>7.8 (6.4)</td>
<td>6.9 (7.1)</td>
<td>0.666</td>
</tr>
<tr>
<td>Physical workload (1–5)</td>
<td>3.3 (1.7)</td>
<td>3.5 (1.3)</td>
<td>0.696</td>
</tr>
<tr>
<td>Psychological workload (1–5)</td>
<td>2.8 (1.5)</td>
<td>2.8 (1.2)</td>
<td>0.887</td>
</tr>
<tr>
<td>GBS mean score (sd)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GBS-I (0–72)</td>
<td>47.8 (17.5)</td>
<td>54.5 (16.2)</td>
<td>0.219</td>
</tr>
<tr>
<td>GBS-E (0–18)</td>
<td>8.6 (4.7)</td>
<td>13.7 (3.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>GBS-ADL (0–36)</td>
<td>22.5 (9.0)</td>
<td>25.3 (10.1)</td>
<td>0.359</td>
</tr>
<tr>
<td>GBS-S (0–36)</td>
<td>11.5 (6.6)</td>
<td>14.7 (6.5)</td>
<td>0.126</td>
</tr>
</tbody>
</table>

For a description of the instruments Multi-Dimensional Dementia Assessment Scale (MDDAS) and Gottfries-Bråne-Steen scale (GBS), see the section on data collection. a Eligible residents n = 18 (1 no answer from the relative).
Sample

Study I
A convenience sample of 444 staff members working in different forms of elderly care in one county council district (e.g., special care units for people with dementia, ordinary units for elderly people in need of care and social services, respite care, and home care), urban as well as rural settings, were asked to participate in the study. The response rate was 67.3% (n=299). The participating staff members were 286 women and 13 men, mean age 41.2 (SD 11.1), range 19–63. Of the staff, 23 were registered nurses (RN)/physiotherapists/occupational therapists, 177 were licensed practical nurses (LPN) and 99 were nurse’s aides.

Study II
At baseline, the total eligible staff comprised 27 persons in the experimental group and 32 in the control group. See Figure 1 for dropouts. The final sample consisted of 33 staff members, 31 women and 2 men, from four units. Staff members’ mean age was 40.6 (SD 9.6), range 22–62. Of the staff, 2 were RNs, 22 were LPNs, and 9 were nurse’s aides (for a detailed description, see article Study II). There were no statistically significant differences between the experimental and control groups with regard to age, sex, hours of work, working time in dementia care or working time in nursing care.
Study III

There were a total of 14 staff members that participated in the study, all working in units with the IT support. The informants were interviewed in four groups with two to five persons in each group. The informants were all women, and their age varied from 25 to 56 years, mean age 38 (SD 9), median 37. Twelve of the staff members worked daytime and 2 worked at night, 4 worked full-time and 10 part-time. Professions were 1 RN, 10 LPNs and 3 nurse’s aides. Median working time in dementia care was 3 years (range 0-12).

Study IV

Eligible participants at baseline were 50 relatives: dropouts are displayed in Figure 2. The final sample consisted of 22 relatives/significant others (experimental group n = 14, control group n = 8) from five units, three with IT support and two control units. Both relatives and significant others, e.g. friends and legal representatives, were included, and here the term ‘relatives’ is used for all of them. Relationships were 9 children; 8 spouses; 2 sisters/brothers; 1 nephew and 2 significant others (12 women, 10 men) (for a
detailed description refer to the article, Study IV). No statistically significant differences were found at baseline between the experimental group and the control group with regard to age or scores on the study instruments. There were no statistically significant differences at baseline between relatives who participated and later dropped out and those who remained with regard to age or baseline scores on study instruments.

<table>
<thead>
<tr>
<th></th>
<th>Experimental group baseline</th>
<th>Control group baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible relatives</td>
<td>n = 27</td>
<td>n = 23</td>
</tr>
<tr>
<td>Included</td>
<td>n = 22</td>
<td>n = 21</td>
</tr>
<tr>
<td>(5 refusal/no answer)</td>
<td></td>
<td>(2 refusal/no answer)</td>
</tr>
</tbody>
</table>

6 residents had died

3-month follow-up

<table>
<thead>
<tr>
<th></th>
<th>Experimental group baseline</th>
<th>Control group baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible relatives</td>
<td>n = 16</td>
<td>n = 15</td>
</tr>
<tr>
<td>Included</td>
<td>n = 16</td>
<td>n = 14</td>
</tr>
<tr>
<td>(1 refusal/no answer)</td>
<td></td>
<td>(1 refusal/no answer)</td>
</tr>
</tbody>
</table>

1 resident had died

7-month follow-up

<table>
<thead>
<tr>
<th></th>
<th>Experimental group baseline</th>
<th>Control group baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible relatives</td>
<td>n = 15</td>
<td>n = 11</td>
</tr>
<tr>
<td>Included</td>
<td>n = 14</td>
<td>n = 10</td>
</tr>
<tr>
<td>(1 refusal/no answer)</td>
<td></td>
<td>(1 refusal/no answer)</td>
</tr>
</tbody>
</table>

2 residents had died

12-month follow-up

<table>
<thead>
<tr>
<th></th>
<th>Experimental group baseline</th>
<th>Control group baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible relatives</td>
<td>n = 14</td>
<td>n = 8</td>
</tr>
<tr>
<td>Included</td>
<td>n = 14</td>
<td>n = 8</td>
</tr>
</tbody>
</table>

6 residents had died

3-month follow-up

<table>
<thead>
<tr>
<th></th>
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<th>Control group baseline</th>
</tr>
</thead>
<tbody>
<tr>
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<td>n = 16</td>
<td>n = 15</td>
</tr>
<tr>
<td>Included</td>
<td>n = 16</td>
<td>n = 14</td>
</tr>
<tr>
<td>(1 refusal/no answer)</td>
<td></td>
<td>(1 refusal/no answer)</td>
</tr>
</tbody>
</table>

1 resident had died

3 residents had died

7-month follow-up

<table>
<thead>
<tr>
<th></th>
<th>Experimental group baseline</th>
<th>Control group baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible relatives</td>
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<td>n = 11</td>
</tr>
<tr>
<td>Included</td>
<td>n = 14</td>
<td>n = 10</td>
</tr>
<tr>
<td>(1 refusal/no answer)</td>
<td></td>
<td>(1 refusal/no answer)</td>
</tr>
</tbody>
</table>

2 residents had died

12-month follow-up

<table>
<thead>
<tr>
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</tr>
<tr>
<td>Included</td>
<td>n = 14</td>
<td>n = 8</td>
</tr>
</tbody>
</table>

Figure 2. Eligible relatives at baseline and dropouts during the study period
Intervention

The IT support was mostly contextually developed, initiated by the staff, and developed together with a technician. The researchers were not involved in development. The project was led by a project nurse and implemented with opinion leaders, as supposed by the theory ‘Diffusions of innovation’ (61). The IT support can be described as having three parts: IT support directed at residents, relatives and the staff.

IT support for the residents included passive passage alarms, movement detectors, fall detectors and a light guidance system. Passage alarms were installed on the fence in the gardens and in the indoor walkway that connected the buildings. The doors were then unlocked, and staff received information when residents reached different parts of the indoor walkway (passive passage alarm activated through sensors that residents wore around their necks or in a pocket) or when someone touched the fence in the garden. The aim of these functions was to allow the residents to walk more freely in the residential living areas as well as to improve security for both staff and residents. The light guidance system consisted of sensor-activated illumination of the lavatory if a resident left his/her bed during the night. The units already had bed alarms (pressure mats) that were activated when residents got out of bed. For residents who staff felt needed the IT support, the bed alarm was linked to the light in the lavatory, which turned on when activated and switched off when the resident was back in bed. The aim of the function was to help residents find their way to the lavatory and to prevent falls in the dark. In the experimental units, different bed alarms could be used for the residents (pressure mats or movement detectors near the bed). Alarm time, for the pressure mats, was individually set on the basis of what staff thought each resident needed. When individual alarms were used, procedures followed the Swedish Board of Health and Welfare’s Provisions and General Advice (95, 185).

For the relatives, IT support included email communication with the staff and an Internet website with information about the residential living facility, planned activities, email addresses to the staff, and external links to web pages about dementia.

For the staff, email was new and some of them also became responsible for the website on Internet. During the time of the project, more and more information to the staff, from the manager and the unit’s registered nurse, was sent by email. Before the project, written information was mostly placed on bulletin boards in the units or somewhere in the staff office. Additional computers for the staff members were also installed in the units. One computer was placed in the kitchen/living room to facilitate computer use for staff, e.g., allowing them to read/write in the electronic patient record and still be together with the residents. Before the IT support project, the only place to write or read in the electronic patient record was in a separate and
sound-insulated room in the unit. Another computer was placed in the cellar, as a place for training and information search on the Internet. In the present thesis the term IT support is used for the above presented intervention.

The organization’s objectives in implementing the IT support were to enable staff members to spend more time with residents, enhance residents’ freedom of movement, create a safer and more secure living environment, and increase relatives’ perceived closeness to the residential home via new channels of communication. Achieving these objectives should, in turn, increase the quality of care, improve residents’ well-being and minimize intrusions on personal integrity. In addition, the IT support should stimulate competence development and specialization among staff (186). Figure 3 shows the implementation of the IT support.

Figure 3. Implementation of the IT support. Intervention/independent variable (X1 - Internet website, email, additional computers on the units ‘May 2002’; X2 – night-time illumination of the lavatory, passage alarm indoor-walk, fall sensors ‘February 2003’ = all planned IT installed; X3 – additional IT installed, pressure sensors on the fence in the garden ‘May/June 2003’).
Data collection

Study I, II, IV

In Table 3, an overview of the data collection methods used is presented, and in Table 4, Cronbach’s alpha values for study instruments are presented.

Table 3. Methods of data collection/instruments used in the studies

<table>
<thead>
<tr>
<th>Data collection</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial aspects of job satisfaction</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of care aspects</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychosomatic health aspects</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life Satisfaction Questionnaire</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sense of Coherence Scale</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing Home Hassles Scale</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Study-specific questionnaires for relatives and staff regarding the IT support</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Interview guide</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic data</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Demographic data were collected at baseline on staff members’ age, sex, and occupational group (Study I, II, III) as well as work related questions such as intention to stay at their present job (Study I), hours of work, working time in dementia care and total working time in nursing care (Study II), and on working time in dementia care, work status, computer use and general opinion of IT support (Study III). The relatives’ demographic data included age, sex, relationship, visit frequency, computer use, residents’ age and length of stay (Study IV).

The scales ‘Psychosocial aspects of job satisfaction’, ‘Quality of care aspects’ and ‘Psychosomatic health aspects’ were used to measure staff satisfaction with work. The above mentioned scales have been further developed from questionnaires used by Ljunggren (187) in a Swedish thesis to study ‘work satisfaction’, ‘patient care’ and ‘staff health and influences by work on their private life’ among staff working in surgical care. Ljunggren, in turn, used items in her questionnaires that had been developed by Bryntesson and Hedlund (188), and used by them and others (e.g. Beck-Friis et al. (189, 190)) to study aspects such as job satisfaction and work stress in cancer projects. In the present thesis the questionnaires used by Ljunggren were further developed and adjusted to elderly care. For example, the word ‘patient’ was replaced with ‘resident’. Furthermore, response formats with four or six levels were changed to five levels, and the response order was changed for some items so that the response order proceeded from the least desirable state to the most desirable state. When used in surgical care, there were also some items involving categorical judgements. These items were not used in...
the present study. Excluded were also items that may be difficult to answer for staff working with elderly patients in municipal care.

Permission to further develop and adjust the questionnaires to elderly care was obtained from the research leader (Sjödén P-O) in the research project where the questionnaires were first used. As no tests of psychometric properties had been performed they were tested for psychometric properties (Study I). A principal component analysis, with varimax rotation (191), was performed on each questionnaire for a sample of 299 staff (Study I). Psychometric properties are presented in Table 4 and in the article of Study I. The scale of ‘Psychosocial aspects of job satisfaction’ contains 49 items divided into 8 factors measuring personal development (9 items), workload (11 items), criticism (5 items), expectations and demands (6 items), cooperation (5 items), internal motivation (5 items), external motivation (4 items) and position in the group (4 items). The items are rated on a 5-point scale ranging from 0 to 4. The scale of ‘Quality of care aspects’ contains 24 items divided into 4 factors measuring nursing and medical care (8 items), communication obstacle (7 items), documentation (5 items) and communication ability (4 items). The items are rated on a 5-point scale ranging from 0 to 4. The scale of ‘Psychosomatic health aspects’ contains 19 items divided into 2 factors measuring sleep disturbance (9 items) and perceived stress (10 items). The items are rated on a 5-point scale ranging from 0 to 4. All factor scores, in the three scales, are transformed to a 0-100 value, with higher scores representing a more desirable state. The scales were chosen because they measure staff perceptions of their work, both positive aspects such as job satisfaction, personal development, motivation, etc., and negative aspects such as stress symptoms and sleeping problems that staff members perceive are associated with their work. The scales also illustrate staff members’ perceptions of care, with one factor focusing especially on documentation, something that parts of the intervention were supposed to facilitate. Because the scales had not been tested psychometrically, such testing was done in the present thesis.

The ‘Life Satisfaction Questionnaire’ (LSQ), developed by Carlsson and Hamrin (192), is a 34-item quality of life questionnaire with 6 factors measuring physical symptoms (PS) (7 items), sickness impact (SI) (6 items), quality of everyday activities (QDA) (7 items), socio-economic situation (SES) (4 items), quality of family relation (QFA) (5 items), and quality of close friend relationship (QFR) (5 items). The items are to be answered on a 7-point scale, and alternative 7 represents the highest quality for all items. The questionnaire has been evaluated psychometrically, and data have been published for a random sample of Swedish women and men (175, 193). Factor scores are transformed to a 0–100 value range, where 100 represents the maximum quality of life on each subscale. The LSQ was chosen because it measures several positive aspects of a person’s life, because reference data,
i.e. Swedish norm data, are available, and because the instrument has been tested psychometrically and showed good psychometric properties.

The ‘Sense of Coherence Scale’ (SOC-13) (194), developed by Antonovsky, consists of 13 items (short version) divided into three subscales: Comprehensibility (5 items, range 5–35), Manageability (4 items, range 4–28), and Meaningfulness (4 items, range 4–28). Response alternatives for the items are 7-grade, and some items are reversed before calculating the total scores. High scores on the subscales represent a strong sense of coherence (194). The SOC was chosen because it has been used in several international and national studies, and the scale has been tested psychometrically. According to one Swedish study (178), job strain, low social support and low social anchorage were associated with low sense of coherence. This makes it interesting to use the SOC in the present study, where the intervention was intended to support staff and thereby increase satisfaction with work.

The ‘Nursing Home Hassles Scale’ (NHHS) has been developed by Stephens et al. (195) and later used in Sweden by Almberg et al. (196). The scale contains 29 items derived from literature on family involvement with nursing home patients and from discussions with family caregivers whose relatives resided in a nursing home. The scale was designed to assess relatives’ perceptions of daily ‘hassles’ or minor irritations related to nursing home care. The NHHS consists of three subscales: patient-staff (PTST) (12 items on interactions between staff and the patient, such as the patient not being treated with respect); caregiver-staff (CGST) (8 items on interactions between staff and the informal caregiver, such as having to remind the staff about the patient’s needs); and a practical/logistical scale (PRAC) (9 items about providing care for the patient who resides some distance away, such as talking with the physician about the patient’s care). Response alternatives for the items are 5-grade. The respondents were asked whether an event had occurred during the past week and if so, they were asked to rate how great an irritation it was (195, 197). The scale was chosen because it measures relatives’ perceptions of care at care settings; items have been derived from the literature and from discussions with relatives. The scale was constructed in the English language, but has been translated to Swedish, tested and used in the Kungsholmen project, e.g., (196) for relatives of persons with dementia. The scale is one of several instruments recommended in a summary of instruments to be used in municipal care and social services for the elderly (197). The scale was therefore considered suitable for the present research project for use with relatives of persons with dementia residing at a residential home.

Relatives’ and staff members’ opinions of the IT support were measured using study-specific questionnaires, developed by the researchers Study II and IV, containing statements such as ‘The new IT support gives staff more time for residents’ and ‘Night-time illumination of the lavatory helps the resident find his/her way to the lavatory’. In the relatives’ questionnaire, a
total of 10 statements concerning the IT support were answered on a 5-point scale ranging from totally disagree (0) to totally agree (4) (included items are shown in table 9). The staff questionnaire consisted of 43 statements and response alternatives were the same as those used in the relatives’ questionnaire (Table 7). Seventeen of the statements formulated in the staff questionnaire were inspired by the theory DOI (see the introduction and Table 8).

The Gottfries-Bråne-Steen scale (GBS) and the Multi-Dimensional Dementia Assessment Scale (MDDAS) have been used to describe dementia symptoms and functioning/functional ability of the residents living at the residential home at baseline for Study II. The GBS scale (198) was constructed in 1978 by Gotzfries, Bråne and Steen. The scale is a comprehensive global assessment tool consisting of subscales measuring: intellectual ability (GBS-I) 12 items; emotional symptoms (GBS-E) 3 items; activities of daily living (GBS-ADL) 6-items; and behavioural and psychological symptoms of dementia (GBS-S) 6 items. Each item is scored on a 7-point scale where 0 represents the absence of any impairment in symptoms and 6 represents maximal impairment or symptoms. The scale has been tested for psychometric properties, has been used in several studies and is sensitive to changes (198). The MDDAS (199), developed by Sandman and Adolfsson, measures orientation ability, motor functions, vision, hearing, speech, ADL functions, behavioural and psychiatric symptoms, and a global rating of psychiatric and physical workload imposed on staff. Three subsets of scores can be calculated: a person-time-place orientation score with 27 items (where less than 24 points is considered to indicate cognitive impairment), a behavioural score with 24 items and a psychiatric score with 12 items. A high score for the last two indicates a higher prevalence of psychiatric and behavioural symptoms and a low score for person-time-place indicates higher prevalence of disorientation. The GBS and the MDDAS were chosen because both instruments have been tested for psychometric properties and have been used in several studies (198-200) on elderly and/or dementia care. Assessments were performed by staff members (the residents’ key carer or another carer who know the resident very well together with the units’ registered nurse).
Table 4. Cronbach’s alpha values for study instruments at baseline (Study I, II and IV) and reference values

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Items</th>
<th>Study I</th>
<th>Study II</th>
<th>Study IV</th>
<th>Reference values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychosocial aspects of job satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Personal development</td>
<td>9</td>
<td>0.84</td>
<td>0.82</td>
<td>0.84</td>
<td></td>
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<tr>
<td>-Workload</td>
<td>11</td>
<td>0.86</td>
<td>0.85</td>
<td>0.86</td>
<td></td>
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<tr>
<td>-Criticism</td>
<td>5</td>
<td>0.74</td>
<td>0.77</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>-Expectations and demands</td>
<td>6</td>
<td>0.71</td>
<td>0.63</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>-Cooperation</td>
<td>5</td>
<td>0.80</td>
<td>0.68</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>-Internal motivation</td>
<td>5</td>
<td>0.69</td>
<td>0.61</td>
<td>0.69</td>
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<tr>
<td>-External motivation</td>
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<td>0.59</td>
<td>0.31</td>
<td>0.59</td>
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</tr>
<tr>
<td>-Position in the group</td>
<td>4</td>
<td>0.52</td>
<td>0.60</td>
<td>0.52</td>
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<tr>
<td><strong>Quality of care aspects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Nursing and medical care</td>
<td>8</td>
<td>0.85</td>
<td>0.81</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>-Communication obstacle</td>
<td>7</td>
<td>0.81</td>
<td>0.71</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>-Documentation</td>
<td>5</td>
<td>0.86</td>
<td>0.84</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>-Communication ability</td>
<td>4</td>
<td>0.80</td>
<td>0.90</td>
<td>0.80</td>
<td></td>
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<tr>
<td><strong>Psychosomatic health aspects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Sleep disturbance</td>
<td>9</td>
<td>0.93</td>
<td>0.90</td>
<td>0.93</td>
<td></td>
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<tr>
<td>-Perceived stress</td>
<td>10</td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
<td></td>
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<tr>
<td><strong>LSQ</strong></td>
<td>34</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-PS</td>
<td>7</td>
<td>0.77</td>
<td>0.81</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>-SI</td>
<td>6</td>
<td>0.76</td>
<td>0.85</td>
<td>0.82</td>
<td></td>
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<tr>
<td>-QDA</td>
<td>7</td>
<td>0.86</td>
<td>0.81</td>
<td>0.89</td>
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<tr>
<td>-SES</td>
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<td>0.66</td>
<td>0.67</td>
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<tr>
<td>-QFA</td>
<td>5</td>
<td>0.87</td>
<td>0.87</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>-QFR</td>
<td>5</td>
<td>0.91</td>
<td>0.87</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td><strong>SOC-13</strong></td>
<td>13</td>
<td>0.89</td>
<td></td>
<td>0.74-0.91</td>
<td></td>
</tr>
<tr>
<td>-Comprehensibility</td>
<td>5</td>
<td>0.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Manageability</td>
<td>4</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Meaningfulness</td>
<td>4</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NHHS</strong></td>
<td>29</td>
<td>0.83</td>
<td></td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>-PTST</td>
<td>12</td>
<td>0.66</td>
<td></td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>-CGST</td>
<td>8</td>
<td>0.71</td>
<td></td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>-PRAC</td>
<td>9</td>
<td>0.53</td>
<td></td>
<td>0.61</td>
<td></td>
</tr>
</tbody>
</table>

Reference values of ‘Psychosocial aspects of job satisfaction’, ‘Quality of care aspects’ and ‘Psychosomatic health aspects’ are from Engström et al. (i.e. Study I), LSQ from Carlsson and Hamrin (175), SOC-13 from Antonovsky (176) and NHHS from Stephens et al. (195).

**Study III**

In Study III, an interview guide was used and the interview began with open questions concerning care, job satisfaction and the residents. The question specifically concerning IT was ‘Describe your first thoughts when you heard about the IT support project and continue to how you perceive the IT project today’. The informants were encouraged to talk about all parts of the IT project and probes such as ‘tell me more about…’, ‘could you please clarify
what you mean by…’ and ‘can you give an example’ were used to encourage reflection and a more comprehensive description. Group interviews were chosen for study III because the methods ability to form and maintain aggregate opinions and perceptions that are formed in interaction with peers when the phenomena are of importance to all of them (201).

Procedure

Study I
The questionnaires were distributed to the staff with the help of the organization, sent home by mail or distributed at staff meetings. Staff members completed the questionnaire at work, mostly during staff meetings, or when desired during spare time. Questionnaires were returned with prepaid envelopes. Two reminders were sent.

Study II
The experimental group consisted of staff from two units, and staff from two other units of the same residential living facility served as a control group. The setting for the intervention was randomly selected by drawing lots between the samples. The first part of the IT support was implemented in January-May of 2002, and the last part, IT support aimed at the residents, in February of 2003, with the exception of one component of the IT support that was directed at residents (passage alarm in the garden). The passage alarm in the garden was ‘additional IT support’, i.e. not planned when the study started, and thereby installed in parallel with the 12-month follow-up (May/June 2003). Data, for all instruments except the study-specific questionnaire, were gathered before the IT support was implemented and 6 and 12 months after the first part of the IT support was implemented (Table 5). Staff members completed the questionnaires at work, during staff meetings. One of the researchers (ME) was present to answer questions and to collect the questionnaires. The absent staff received a posted questionnaire, and two reminders were sent.

Table 5. Instruments and data collection points used in Study II

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Baseline</th>
<th>6 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial aspects of job satisfaction</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quality of care aspects</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Psychosomatic health aspects</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>LSQ</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SOC-13</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Study-specific questionnaire</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study III
Group interviews were held with 14 staff members from the units using the IT support. One interview took place before implementation of the IT support, two during and one after all parts of the IT support had been implemented. All together, four interviews were held with four groups, i.e., totally 16 interviews. Members in the groups were the same, but some could not participate in all interviews because of illness or parental leave, and at the time of the last interview, one staff member had quit work. Groups were formed based on staff working place/unit and all three units using the new IT support were represented. The interviews were held by one of the researchers (ME) in a separate room in the unit, audio-recorded and lasted approximately one and a half hours. Before the interview, there was time for some informal chat and coffee. During the interview the researcher encouraged all group members to express their view of the topic and to response to the others in the group (201) when perceptions of the IT support were discussed. If the interviews were to take place on a day with few staff members, those being interviewed were replaced with extra personnel so that the interview could go on without interruptions and with the same informants each time.

Study IV
The relative/person most responsible for directly meeting the resident’s need or having contact with staff at the residential living facility was first asked to participate in the study. Data were gathered before the IT support was implemented and follow-ups were conducted 3, 7 and 12 months after that the last part of the planned IT support was implemented (LSQ, NHHS) (Table 6). The study-specific questionnaire was used at the follow-ups. Since no statistically significant differences were found over time only scores for the 12-month follow-up are presented in the thesis. Implementation of the first part of the IT support, directed at the relatives, started in May 2002 and the last part of the planned IT support, directed at residents, was implemented in February 2003. However, ‘additional IT support’ (i.e. not planned when the study started) was implemented in May/June 2003 (passage alarm in the garden).

<table>
<thead>
<tr>
<th>Table 6. Instruments and data collection points used in Study IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>.</td>
</tr>
<tr>
<td>NHHS</td>
</tr>
<tr>
<td>LSQ</td>
</tr>
<tr>
<td>Study-specific questionnaire</td>
</tr>
</tbody>
</table>

36
Data analysis

Study I
A principal component analysis, with varimax rotation, was performed for each questionnaire. Bartlett’s test of sphericity and Kaiser-Meyer-Olkin’s measure of sampling adequacy (KMO) were used to assess the factorability of the correlation matrices (191). When selecting the number of factors, the scree test, eigenvalues and interpretability of the factors were taken into account (191, 202) and factor loadings greater than 0.30–0.40 were considered meaningful (203). Missing values were substituted with mean values for respective items. Construct validity of the scale ‘psychosocial aspects of job satisfaction’ was also tested for known-group validity. Student’s t-test was used to test whether the factors of job satisfaction could discriminate between the subgroups; ‘staff members intending to stay at their present job’ and ‘staff members intending to leave their present job’. Cronbach’s alpha values were calculated for all factors and for each scale to assess scale reliability. Bivariate correlations were computed using the Pearson’s correlation coefficient and multivariate statistics with a stepwise multiple regression analysis to study the relationships between job satisfaction and perceived stress symptoms.

Study II
Data from the questionnaires were analysed using descriptive (mean, SD) and inferential statistics. Differences between experimental and control groups at baseline were analysed using Student’s t-test and Fisher’s exact test. For differences over time between and within groups, separate, repeated measures analysis of variance (ANOVA) tests were performed. Greenhouse-Geisser was used to adjust the degrees of freedom for the averaged tests of significance, when Mauchly’s test of sphericity was significant at p < 0.05 (191). When significant interaction effects emerged, within-subjects tests were performed for each group. Pair-wise differences were examined using Bonferroni as an adjustment for multiple comparisons. Missing values were substituted with mean values for respective items in factors/scales. A 5% level of significance was set for all tests.

Study III
The data were interpreted using qualitative content analysis according to Graneheim and Lundman (204). The interviews were transcribed verbatim, listened to and read through several times. Meaning units relevant to the aim of the study were searched for, condensed and labelled using a code. Codes were grouped together into categories. These steps were performed for each data collection point, i.e. once before, twice during and once after implementation of the IT support to account for the time aspect. Thereafter, themes
were formulated describing the underlying meaning, the latent content of the text (covering the whole period). Abstraction of the data was accomplished when creating codes, categories and themes.

**Study IV**

Due to the small sample sizes, differences over time were analysed using nonparametric statistics (Friedman test and Wilcoxon signed-rank test were used to analyse differences in ranks of score of respectively, four related groups and two related groups). Differences between independent groups were analysed using the Mann-Whitney U-test. Missing values were substituted with mean values for respective items in the factors/scales. A 5% level of significance was set for all tests.

**Ethical considerations**

The study was approved by the Uppsala University Research Ethics Committee (d no 03-028) (Study I) and by the Gävle Dala Ethics Committee (d no 19/2001) (Study I-IV). All participants received written information about the study, confidentiality and voluntary participation and the relatives or legal representatives gave their approval for the person with dementia to participate in the study. In addition, participants were informed, in the written information, that they had the right to leave the study at any time. Information meetings were held for both staff and relatives. Completion and return of the questionnaire was judged as participants (Study I, II and IV) tacit informed consent.
Summary of findings

Study I
Study I was conducted to further develop and test three questionnaires to be used in the staff study.

A principal component analysis of work satisfaction gave 8 logical factors, explaining 52.2% of the variance (personal development, workload, criticism, expectations and demands, cooperation, internal motivation, external motivation and position in the group). Patient care gave 4 factors (nursing and medical care, communication obstacle, documentation and communication ability) and staff health gave 2 factors (sleep disturbance and perceived stress), explaining 56.4% and 56.8% of the variance, respectively. Factors/included items in each scale were examined for their content and were named ‘psychosocial aspects of job satisfaction’, ‘quality of care aspects’ and ‘psychosomatic health aspects’. Construct validity was also tested using Known-group validity, which was in agreement with the underlying expectation. Individuals intending to stay at their present job scored higher on ‘psychosocial aspects of job satisfaction’ as compared to individuals intending to leave. Internal consistency (Cronbach’s alpha) was satisfactory for all factors measuring quality of care and psychosomatic health and for 5 of 8 factors measuring job satisfaction. Multiple regression analysis showed that older age, higher scores/satisfaction with workload, cooperation, expectations and demands, personal development and lower scores on internal motivation contributed to less stress symptoms among staff (R² 41%). For a more detailed description, see the article of Study I.

Study II
Study II was conducted to investigate the outcomes of the IT support among staff members.

When baseline scores for the study instruments were compared, the control group had statistically significant lower scores for the factors sleep disturbance (p < 0.002) (‘psychosomatic health aspects’ scale), sickness impact (p < 0.020) and socio-economic situation (p < 0.030) (LSQ).

The results showed significant results for group by time interaction effects for the total scale of ‘psychosocial aspects of job satisfaction’ (F = 17.203; df = 2; p < 0.001) and for the factors personal development (F = 9.521; df = 1.539; p = 0.001), workload (F = 5.201; df = 2; p = 0.012), ex-
pectations and demands (F = 4.558; df = 2; p = 0.019), and internal motivation (F = 7.261; df = 2; p = 0.003). These factors and the total scale also showed significant within-subjects effects for the experimental group (personal development (F = 40.096; df = 2; p < 0.001), workload (F = 15.131; df = 2; p < 0.001), expectations and demands (F = 9.113; df = 2; p = 0.003), internal motivation (F = 6.874; df = 2; p = 0.008) and the total scale of ‘psychosocial aspects of job satisfaction’ (F = 41.020; df = 2; p < 0.001)). Post hoc tests for the experimental group revealed a significant increase in mean scores between baseline and 6-month follow-up for personal development (p < 0.01) and the total scale of ‘psychosocial aspects of job satisfaction’ (p < 0.05), and between baseline and 12-month follow-up for personal development (p < 0.001), workload, expectations and demands, internal motivation (p < 0.01), and for the total scale of ‘psychosocial aspects of job satisfaction’ (p < 0.001).

For the scale ‘quality of care aspects’ there were significant interaction effects for the total scale (F = 4.667; df = 2; p = 0.017) and for the factor documentation (F = 4.415; df = 2; p = 0.021). Significant within-subjects effects emerged for the experimental group in the total scale (F = 12.352; df = 2; p = 0.001) and in the factor of documentation (F = 6.309; df = 2; p = 0.010), and post hoc tests showed significant improvements between baseline and 12-month follow-up (p < 0.001 total scale) (p < 0.05 documentation). The scale of ‘psychosomatic health aspects’ showed no significant interaction effects for either the total scale or the factors.

The results of LSQ and SOC showed significant interaction effects for the factors QFA (F = 4.395; df = 2; p = 0.022) and QFR (F = 3.936; df = 1.645; p = 0.033) (LSQ), the total scale of SOC (F = 3.860; df = 2; p = 0.033) and the subscale for meaningfulness (F = 3.986; df = 2; p = 0.030). When subsequently tested for within-subjects effects, results showed no significant effects for either the experimental group or the control group. For a more detailed description, see article of Study I.

To summarize, staff members’ job satisfaction and perceived quality of care improved in the experimental group compared to the control group. The factors personal development, workload, expectations and demands, internal motivation and documentation as well as the total scores of ‘psychosocial aspects of job satisfaction’ and ‘quality of care aspects’ increased over time in the experimental group. In the control group no significant differences were found over time. For the factors QFA and QFR (in the LSQ) and the total score of SOC and the subscale for meaningfulness the results showed significant interaction effects but no significant within-subjects effects for neither the experimental group nor the control group.

Staff members’ opinions of the IT support
Staff members’ responses to the study-specific questionnaire concerning the IT support were assessed at follow-up 2 (i.e. the 12-month follow-up) in the
experimental group. Results showed that staff members generally perceived the IT support as positive, see Table 7 and 8.

Table 7. **Staff members’ (experimental group, n=17) opinions of the IT support at the 12-month follow-up**

<table>
<thead>
<tr>
<th>Statements</th>
<th>n</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>My work with documentation in the electronic patient record has been facilitated by having the computer in the kitchen/living room.</td>
<td>17</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>My work with reading the electronic patient record has been facilitated by having the computer in the kitchen/living room.</td>
<td>17</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>My job situation has become calmer after the introduction of additional computers.</td>
<td>17</td>
<td>3</td>
<td>2–4</td>
</tr>
<tr>
<td>My computer experience has increased after the introduction of additional computers with different locations.</td>
<td>17</td>
<td>3</td>
<td>0–4</td>
</tr>
<tr>
<td>My computer experience has increased after computer training at the unit.</td>
<td>15</td>
<td>3</td>
<td>0–4</td>
</tr>
<tr>
<td>My job situation has become calmer after the introduction of email.</td>
<td>17</td>
<td>2</td>
<td>2–4</td>
</tr>
<tr>
<td>The information to staff has been improved with the help of email.</td>
<td>17</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>Email is an asset in our communication with relatives.</td>
<td>15</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>Email is an asset in the communication between staff members.</td>
<td>17</td>
<td>4</td>
<td>3–4</td>
</tr>
<tr>
<td>I use internet to seek facts that are relevant to my job.</td>
<td>17</td>
<td>4</td>
<td>0–4</td>
</tr>
<tr>
<td>My job situation has become stressful because of email.</td>
<td>17</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>My job situation has become stressful after the introduction of additional computers.</td>
<td>17</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>My job situation has become stressful because of the ‘night-time illumination of the lavatory’.</td>
<td>17</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>My job situation has become stressful because of the passage alarm in the indoor walkway.</td>
<td>16</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>Night-time illumination of the lavatory … helps the resident find his/her way to the toilet.</td>
<td>16</td>
<td>3</td>
<td>0–4</td>
</tr>
<tr>
<td>Night-time illumination of the lavatory … reduces the resident’s risk of falling.</td>
<td>16</td>
<td>2.5</td>
<td>0–4</td>
</tr>
<tr>
<td>Night-time illumination of the lavatory … makes the resident calm.</td>
<td>16</td>
<td>2.5</td>
<td>0–4</td>
</tr>
<tr>
<td>The passage alarm, in the indoor walkway, gives the resident increased freedom of movement.</td>
<td>13</td>
<td>4</td>
<td>3–4</td>
</tr>
<tr>
<td>It became calmer at the unit after the passage alarm was installed.</td>
<td>13</td>
<td>3</td>
<td>2–4</td>
</tr>
<tr>
<td>Being in the indoor walkway has a calming effect on the resident if he/she has been anxious/restless.</td>
<td>13</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>The resident experiences well-being when in the indoor walkway.</td>
<td>13</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>Fall detectors constitute a factor for increased security.</td>
<td>13</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>The IT changes give staff more time for residents.</td>
<td>16</td>
<td>3</td>
<td>0–4</td>
</tr>
<tr>
<td>My job situation has been generally facilitated through the IT changes that have occurred.</td>
<td>16</td>
<td>3</td>
<td>0–4</td>
</tr>
<tr>
<td>The IT changes have made my job, at the unit, more attractive.</td>
<td>16</td>
<td>3</td>
<td>2–4</td>
</tr>
<tr>
<td>The IT changes may make work in the care sector more attractive to job applicants in the future.</td>
<td>16</td>
<td>3.5</td>
<td>2–4</td>
</tr>
</tbody>
</table>

Response alternatives were 0) totally disagree 1) partly disagree 2) neither agree nor disagree 3) partly agree 4) totally agree, except for questions marked #, for which the responses were reversed, i.e. a median value of 4 means totally disagree.
Table 8. Staff members’ (experimental group, n=17) opinions of the innovations’ characteristics and adoption at the 12-month follow-up

<table>
<thead>
<tr>
<th>Statements</th>
<th>N</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>The IT support has contributed to…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>enhanced economy for the unit</td>
<td>14</td>
<td>2</td>
<td>0–3</td>
</tr>
<tr>
<td>improved quality of care</td>
<td>15</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>improved living environment for the residents</td>
<td>15</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>improved working environment</td>
<td>15</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>honour/status/good reputation for the unit</td>
<td>15</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>time savings for the staff</td>
<td>15</td>
<td>3</td>
<td>0–4</td>
</tr>
<tr>
<td>The IT support has been adjusted to…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the units’ needs</td>
<td>16</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>my needs</td>
<td>16</td>
<td>3</td>
<td>0–4</td>
</tr>
<tr>
<td>the care recipients’ (the residents’) needs</td>
<td>16</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>my values concerning good care</td>
<td>15</td>
<td>3</td>
<td>2–4</td>
</tr>
<tr>
<td>my past experiences</td>
<td>14</td>
<td>2</td>
<td>0–4</td>
</tr>
<tr>
<td>I experience that…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have knowledge about the IT support</td>
<td>16</td>
<td>3</td>
<td>2–4</td>
</tr>
<tr>
<td>I can handle the IT support</td>
<td>15</td>
<td>3</td>
<td>1–4</td>
</tr>
<tr>
<td>I use the IT support on a daily basis in my work</td>
<td>16</td>
<td>4</td>
<td>1–4</td>
</tr>
<tr>
<td>the IT support is integrated into care, i.e. it is used regularly</td>
<td>16</td>
<td>4</td>
<td>2–4</td>
</tr>
<tr>
<td>The benefits of IT support are…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>easy to describe for others</td>
<td>15</td>
<td>3</td>
<td>2–4</td>
</tr>
<tr>
<td>visible and observable for others</td>
<td>15</td>
<td>2</td>
<td>2–4</td>
</tr>
</tbody>
</table>

Response alternatives were 0) totally disagree 1) partly disagree 2) neither agree nor disagree 3) partly agree 4) totally agree.

**Study III**

Study III was conducted to describe staff members’ perceptions of the IT support.

The results showed two themes concerning staff members’ opinions and perceptions of the IT support during the process of implementation. The first theme was ‘Moving from fear of losing control to perceived increase in control and security’ and included the categories hesitating, a desire to change and perceiving advantages and improvements. The second theme was ‘Constant struggling with insufficient/deficient systems’ and included the categories perceiving shortcomings and perceiving insufficient knowledge and difficulties in handling the IT support.

‘Moving from fear of losing control to perceived increase in control and security’

Hesitating was described via informants’ descriptions of misgivings concerning the IT support, and some of the staff members reported being reluctant. Distrust concerning the IT support was also described at the first data collection points, e.g. staff said that it is human beings we are working with
and they used expressions such as robots, science fiction, unrealistic, unreal, crazy and waste of money. Misgivings were, for example, that residents could disappear from the indoor walkway and the garden, that residents could hurt themselves or other residents, i.e. staff not having control over the situation. Other misgivings were that residents would be frightened or worried by the night-time illumination or by being in the indoor walkway. They mentioned that the IT support could lead to increased workload, less control and loss of human contact for staff members. A desire to change was expressed via informants’ descriptions of themselves as being full of expectation, as seeing the possibilities and a need for the IT support or parts of it, and sometimes as having a positive wait-and-see attitude. Changed opinions were reported after the first data collection point, i.e. informants said that they were more positive and that some of their perceived misgivings had not occurred. Perceiving advantages and improvements in the care environment were expressed both from their own perspectives and from the residents’ and/or the relatives’ perspectives. For residents using the technology, it was described as a support, as a source of increased security, as freedom and freedom of movement, as making staff more easily accessible to residents, and as a source of peacefulness and/or stimulation for the residents when they were in the garden or indoor walkway. Staff described email as an easily available and complementary method of communication for a few relatives. For themselves, they reported that the IT support meant increased control, increased security, increased information and communication between staff members and between staff and management via email and increased support in their job.

‘Constant struggling with insufficient/deficient systems’

Shortcomings were described with regard to the IT support’s functioning, application, surrounding structure and design. For example, false alarms and misses were described when staff talked about the bed alarms and sometimes the fall detectors as well. Regarding the bed alarm, these false alarms or misses were reported for some residents/rooms during long periods, while for others it functioned satisfactorily. For the passage alarm in the garden, false alarms were described during implementation when birds sat on the fence. This was fixed and thereafter no shortcomings were reported. As regards the indoor walkway, informants reported that it had happened that staff forgot to put the device on the resident. The design of the fall detector was described as too big and bulky. Regarding email, informants reported junk mail and email intended for someone else. Perceiving insufficient knowledge and difficulties in handling the IT support were reported when staff talked, for example, about email and Internet. Concerning the other parts of the IT support, informants sometimes reported that they felt unsure of how the IT support functioned exactly. For example, they did not know that residents could turn off the night-time illumination by themselves if they wished.
Study IV

Study IV was conducted to investigate the outcomes of the IT support among relatives and to describe their opinions of the IT support.

The results showed that relatives’ opinions of the IT support, reported using 10 items, were generally positive, with mean values of 2.9–3.6 scores on a Likert scale in the experimental group, and mean values of 2.3–3.3 scores in the control group (score range 0–4); median values were 3–4 and 2–4, respectively. Median values for each statement are shown in Table 9.

The results of NHHS and LSQ showed that for relatives, in the experimental group, perceptions of practical/logistical irritations decreased during the study period (baseline to follow-up at 12 months) p = 0.026 (Friedman test Chi-square = 8.707; df = 3; p = 0.033). In the control group, there was an increase in the total Nursing Home Hassles Scale between baseline and follow-up at 3 months p = 0.028 (Friedman test Chi-square = 8.813; df = 3; p = 0.032). This difference did not persist when baseline scores for the control group was compared with follow-ups at 7 and 12 months. For the other subscales of NHHS, i.e. patient – staff hassles and caregiver - staff hassles, there were no significant differences over time in the groups. Concerning LSQ no significant differences were found for relatives’ life satisfaction for either the experimental or the control group. For a more detailed description, see article of Study IV.

Table 9. Median scores for relatives’ opinions about IT support at the 12-month follow-up

<table>
<thead>
<tr>
<th>Statement</th>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Night-time illumination of the toilet … -helps the resident find his/her way to the toilet.</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>- reduces the resident’s risk of falling.</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>- makes the resident calm</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Being in the indoor walkway has a calming effect on the resident if he/she has been anxious/restless.</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>The resident experiences well-being when in the indoor walkway.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The passage alarms, in the indoor walkway/in the gardens, give the resident increased freedom of movement.</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>The new IT support gives staff more time for residents.</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>IT may facilitate everyday activities for people with dementia.</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Fall detectors that sound when a resident falls constitute a factor for increased security.</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>IT may facilitate the care of people with dementia.</td>
<td>4</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Response alternatives were: 0) Totally disagree, 1) Partly disagree, 2) Neither agree nor disagree, 3) Partly agree, 4) Totally agree
Discussion

The aims of the study were to examine staff members’ satisfaction with work, life satisfaction and sense of coherence before and after increased IT support, to describe staff members’ opinions and perceptions of IT support during the process of implementation, to describe relatives’ opinions of IT support and to compare relatives’ perceptions of their irritations with care and life satisfaction before and after increased IT support. The results showed that staff members’ perception of job satisfaction and quality of care aspects improved in the experimental group. Furthermore, staff described ‘moving from fear of losing control to perceived increase in control and security’ and ‘constant struggling with insufficient/deficient systems’. Shortcomings that were described concerned the IT support’s functioning, application, surrounding structure and design as well as insufficient knowledge and difficulties in handling the IT support. Advantages and improvements that were described concerned both the care and staff job situation. The relatives were generally positive about the IT support and a decrease in practical/logistical irritations was observed during the study time in the experimental group. In addition, the thesis has contributed methodologically to further development and psychometric assessments of scales measuring staff satisfaction with work.

Staff members’ descriptions of the IT support and staff outcomes

The evaluation concerning staff satisfaction with work and life situation showed that staff members’ perception of ‘psychosocial aspects of job satisfaction’ and ‘quality of care aspects’ increased in the experimental group compared to the control group over time. An interaction effect was also observed for staff members’ perception of meaningfulness, as measured with the Sense of Coherence scale as well as for the total scale, and for quality of family relation and quality of close friend relationship, as measured with the Life Satisfaction Questionnaire. In the descriptive part of the present thesis, staff members described ‘moving from fear of losing control to perceived increase in control and security’ and at the same time a ‘constant struggling with insufficient/deficient systems’. Control is one of the central concepts in
the demand-control model, and according to the model, (167) high control and high demands (an active job situation) over a period of time lead to feelings of mastery, which in turn inhibit strain perceptions. Furthermore, studies (168, 205) have reported associations between control and job satisfaction. Control is also one of the central concepts in the Magnet Hospital model (169), where it is assumed that hospitals with work environments that promote professional autonomy and control and effective communication between nurses, physicians, and administrators have better results concerning staff and patient outcomes compared to hospitals with lower levels of these attributes. The value of control has also been shown in a study (206) describing the meaning of work for nursing assistants in long-term care, and control has been described as one of eight conceptions of technology in nursing (47). In the present thesis, it may be that the increased sense of control (Study III) contributed to the increase in staff members’ job satisfaction and perception of quality of care (Study II).

Being available for residents was something that staff members described (Study III) as an advantage of the IT support. Being able to write/read in the electronic patient record and still be together with the residents was something the staff mentioned as well as the possibility to sit down/be with residents in need of company/care instead of spending time on surveillance of residents who might walk away from the residential home or surveillance of residents at risk of falling (i.e., the use of the passive passage alarm and the fall detectors facilitated the work). According to Herzberg’s motivation-hygiene theory (164), focus on the work itself is one of the factors that contribute to increased job satisfaction. In the present thesis, the focus on residents’ well-being might be compared with focusing on the work itself and not having to focus on surveillance. This change in focus may be one factor contributing to the perceived decrease in workload (Study II). In a study by Hägström et al. (140), staff described that they constantly worried about residents who were left without supervision when staff needed to help other residents in their rooms. Staff (study III) also described that some of the residents did not like being monitored all the time, i.e. that staff with short intervals went to see the resident/look after the resident. The need for privacy and physical and personal space has been described in a study by Granéheim (207). According to studies (71, 78, 208), a great deal of time is spent on surveillance/supervision in dementia care by both informal and/or formal caregivers. People with dementia disappearing from their ordinary homes and care settings are a problem, sometimes also leading to falls, hypo- and hyperthermia, orthopaedic and soft tissue injuries (85).

Staff reported that having a computer in the kitchen/living room allowed them to be available for the residents, to have control over the environment, and facilitated easy access to and use of the EPR and email (Study III). An Australian study by Moyle et al. (132) showed that documentation was one aspect that staff members felt led to job dissatisfaction; they described
documentation as something that took them away from direct resident care. This can also be compared with an Australian study (50) in which over 30% of staff members thought that computers detracted from patient care. Another Australian study (209) using a qualitative approach showed that nurses were critical regarding computer systems and user-friendliness/ease of use. Because of the ‘hassles’ associated with accessing a system, e.g. problems with passwords and terminal access/having a computer to work on, it was often easier to ignore it. The location of IT support has also been emphasized by Magnusson (46). Thus, in the present study, the increase in the number of computers and the location of the computers, i.e. in the kitchen/living room, may have been an important factor in facilitating staff members’ daily work, something that was also expressed in Study III. This change may have contributed to the increase in staff members’ job satisfaction (Study II), perceived quality of care and especially the factor documentation (Study II) and an increase in documentation and reading in the electronic patient record, as perceived by the staff, (Study II [the study-specific questionnaires] and Study III). This is also emphasized in the theory of DOI (61) and in the study by Barnard and Gerber (47), i.e. that organizational structures also need to change to fit the innovation and the new way of working.

Staff also described that the IT support enabled them to increase residents’ freedom of movement (Study III) via the passive passage alarm in the indoor walkway and gardens. They said they felt more secure using the IT support (cf. Cohen-Mansfield and Werner’s survey study (124) in which outdoor areas were perceived as very important for people with dementia, but also in which the use of outdoor areas was pointed out as a security and safety problem, and therefore not used as much as possible). According to Swedish regulations, it is not right to lock people in, and use of IT support for surveillance is also regulated and demands special considerations; several persons need to be involved when decisions about IT support in dementia care are discussed (95, 185). These decisions or ethical dilemmas may be difficult for staff to encounter and deal with in their daily work, i.e. should they lock the doors or should they use technology/alarm for surveillance or should they take the risk of having unlocked doors and residents walking away from the residential home, with the risk of hurting themselves (56). For an overview of this topic, and recommendations aimed at supporting staff in the decision-making process, see Bjorneby et al. (56). Being responsible for providing good care and having to use coercion or restraints in the care of people with dementia, such as locking patients up, were reported in a qualitative study (210) of ethically difficult situations in the care of older people.

First the staff members described a fear of losing control (Study III), for example a fear that residents would walk away from the residential home, that the residents might hurt themselves or others when in the indoor walkway without the company of staff or relatives. A fear of not being there, not being physically present at the same place as the residents. Changes in place
and presence are discussed by Sandelowski (211) in an article on virtual nursing, life, presence, place and identity. Sandelowski points out that virtual nursing challenges nurses’ ideas of place and presence.

**Staff members’ view of advantages and improvements for the residents**

During the study, staff noticed that only some residents used the indoor walkway, and these residents were described as more relaxed when they were in the indoor walkway; this helped staff members fell more secure about the passive passage alarm and the fall detectors. Thus, staff could unlock some of the doors via the IT support and yet feel control and security, and they described advantages and improvements associated with the passive passage alarm, both from their point of view and from the residents’, e.g. the passive passage alarm was a source of increased security, freedom and freedom of movement, and a source of peacefulness and/or stimulation for the residents when they were in the garden or indoor walkway (cf. Sävenstedt et al. (212) and their descriptions of dignity, i.e. staff descriptions that IT support may have the potential to increase level of independency and reduction in confinement). Conclusions from Sävenstedt et al. (212) were that decisions about IT support should be based on whether IT support promotes aspects of well-being and dignity for the elderly as well as consider the needs of the concerned staff. These changes, as staff described in Study III, are examples from the IT support that may have contributed to the increase in score on the total scale of quality of care aspects as perceived by the staff members in Study II. This was also one of the organization’s objectives in implementing IT support, i.e. to enhance residents’ freedom of movement and to create a safer and more secure living environment. Also, one of the objectives when tracking and tagging devices are discussed, i.e. to increase freedom and independence, and to prevent people from walking away and getting lost (32). The control over/ability to access an outdoor area is also thought to be an additional benefit beyond the benefits of the outdoor experiences themselves (213). In a study by McMinn et al. (84), results showed that release from mandatory confinement indoors was associated with decreased verbal and physical aggression and use of nurse-initiated medication. A study by Namazi and Johnson (214) also indicated that agitated behaviours decreased under unlocked door conditions and with access to outdoor areas. In another study (37) in which technology was used for access control to different places in the organization, results also showed that the technology promoted a sense of security in the environment as experienced by staff and residents. According to the authors, the access control facilitated the residents’ freedom of movement and need for privacy, both of which promoted feelings of capability and security. Yet another study (31) showed that staff and relatives felt reassured by the use of a tagging system. Ethical issues were raised by professional organizations, but were not considered a contra-indication by relatives, clients and staff members.
When staff members’ (184) and patients’ (180) perceptions of the concept quality of care have been studied, the physical environment has been one of several emphasized aspects. In a Swedish report (183) on quality in elderly care, the opportunity to be outdoors was an area that received low values as assessed by relatives of persons with dementia. In the present thesis (Study III), staff reported that the IT support facilitated use of the outdoor areas. The garden and the indoor walkway were described as places where the residents seemed more relaxed and found peace and quiet as well as stimulation from the environment (cf. the aspects facilitating a shift of focus and containing scents and sounds revealed in Edvardsson’s thesis (122)). Edvardsson illustrated the physical environment as one of two dimensions describing the atmosphere, interacting with the dimension of people’s doing and being in the environment. For people with dementia, and others, there is a need for an environment adjusted to the individual’s functional ability (123, 125). Research showing the importance of the physical environment includes Cohen-Mansfield and Werner’s study of enhanced environments (82) and their survey study (124) of outdoor areas for people with dementia, as well as Yao and Algase’s study (125) of environmental ambiance and wandering behaviour. In the study by Yao and Algase (125), a high ambiance score for the environment was related to lower frequency of wandering episodes and shorter duration of wandering. The ambiance score was also a more robust predictor of wandering than was participants’ cognitive state. In the study by Cohen-Mansfield and Werner (82), residents’ behaviour was changed in a positive direction when they visited an enhanced environment. The ‘natural’ environment, i.e. a nature scene inside the house in one of the corridors, was preferred by the majority of staff and the relatives, and the majority also thought that the residents preferred the natural scene. In a study by Elmastahl et al. (127), results showed that larger communication areas/hallways were related to less disorientation and less ‘lack of vitality’ among the residents (cf. the increase in communication areas in the present study). In Study III, staff reported that some of the residents, who used to walk around, could sit for longer periods in the indoor walkway and garden. In the indoor walkway, residents often stayed in the pavilions, with big windows and a beautiful view of the garden just outside the pavilion. It may be that some residents perceived these areas as more relaxed, as providing pleasant stimulation, and thereby felt the atmosphere was better in these areas. Lawton (215) pointed out the importance of other interpersonal environments as an alternative to the day-room at institutions, as the day-room is often a hyper-social and high-stimulus environment. Berg et al. (174) stated that residents were affected by noise on the ward and in the living room, and that residents could upset each other (cf. Skovdahl (70) who reported that aggressive behaviour
is easily spread from resident to resident if the environment is perceived as too stressful and demanding).

It is important to remember that IT support is just that – support – and not intended to replace formal and informal carers. IT support may be of help to the person with dementia as well as the caregivers. For example, the night-time illumination was thought to be a support for residents. Nonetheless, in the interviews, staff also described this technology as a support for staff in helping the resident to the lavatory, i.e. staff could concentrate on helping the resident and did not have to turn on the light. Yet for some residents, the IT support did not function as intended, had negative effects, and was therefore not used, e.g. one resident was scared and worried by the night-time illumination of the lavatory (Study III).

Staff satisfaction with work

The results of the present thesis showed an improvement in the experimental group in the factors personal development, workload, expectations and demands (i.e., staff members’ perception of workload and expectations and demands decreased), and an increase in internal motivation as well as score on the total scale of psychosocial aspects of job satisfaction (Study II). It may be that the IT support gave staff the ability to focus on the work itself, as discussed earlier. However, introduction of IT support also entailed an education in itself, new responsibilities and a complementary mode of communication (an alternative and complementary strategy for interpersonal relations). The latter two factors have been shown to be motivational in work (165). In Study III, staff also described receiving more information after email had been introduced – information regarding the residential living home and the municipality. Furthermore, staff reported email communication with fellow workers, the manager and a few relatives, and some informants reported using the Internet to search for information. Benefits, positive opinions, were also shown in the results from the study-specific questionnaire (Study II). According to Kanter’s (216) theoretical work on workplace empowerment, an environment that provides access to the power structure is essential. Such access is achieved by, for example, opening communication channels, making system knowledge more accessible, providing access to operating data and an opportunity to acquire more skills and competence (216).

The timing of data collection must be discussed; score on the total scale of ‘psychosocial aspects of job satisfaction’ showed a significant increase at the 6-month follow-up, but only one of the factors (personal development) showed a statistically significant increase at the 6-month follow-up. It may be the case that diffusion/uptake of new innovations/technology takes time, and it may also be that there is an increased workload during the first months when staff members must learn how to use the new technology. At the first data collection points in the interview study (Study III), staff also mentioned
that they needed time for practice, were unsure of how to use the IT support and that they used their lunch time to check email. However, at the 6-month follow-up only the first part of the planned IT support had been installed, which might be another explanation to the results. Perceived stress symptoms and sleep disturbance were aspects we thought would be interesting to study, given that the introduction of new technology may also induce stress for the staff when they have to learn something new. We also thought this would be especially interesting to study at the beginning of the implementation, i.e. at the 6-month follow-up. However, results showed no statistically significant interaction effects for these factors or for score on the total scale of psychosomatic symptoms. According to Study I, age and the factors workload, cooperation, expectation and demands, personal development and internal motivation in the job satisfaction scale explain 41% of the variance in staff members’ perceived stress symptoms. In Study II, the interaction effect was not significant for stress symptoms, but when tested within the experimental group it showed a significant improvement at the 12-month follow-up.

Other factors with no significant interaction effects were criticism, cooperation, external motivation and position in the group (in the scale ‘psychosocial aspects of job satisfaction’), as well as the factors nursing and medical care, communication obstacle and communication ability (in the scale ‘quality of care aspects’). When changes over time were analysed for each group, for the factors with no interaction effects, results showed a significant improvement in the factors cooperation, external motivation, position in the group, nursing and medical care and stress symptoms for the experimental group (data not shown here). For the factors criticism, communication obstacle, communication ability and sleep disturbance, there were neither significant interaction effects nor significant within-subjects effects. For SOC and LSQ there were interaction effects for three factors and the total SOC scale, but no within-subjects effects. These measures, SOC and LSQ, did not provide the main outcomes, but were included because results (173, 178) have shown correlations between working conditions and life satisfaction, and working conditions and SOC. The changes in staff job satisfaction may be too small to give secondary effects on life satisfaction and SOC. SOC is also assumed to be a stable trait (176). This has been questioned by some researchers (177, 178), however. Measuring the subscales of SOC may also be questioned (176), though also here opinions differ among researchers (217).

**Staff descriptions of the shortcomings of the IT support**

Shortcomings of the technology were described in the theme ‘Constant struggling with insufficient/deficient systems’ (Study III). The informants described shortcomings/disadvantages with regard to the IT support’s functioning, application, surrounding structure and design. These findings are supported by other studies (9, 29, 37, 42, 218). For example, in a study by
Margot-Cattin and Nygård (37), findings highlighted conditions that have to be met by the system and described technical and human problems encountered during the implementation of new technology, such as the reliability of the system and keeping sensors on the residents. According to Doughty et al. (90), the balance between false alarms and missed genuine emergencies is one of the most important aspects of any alarm system. A high incidence of false alarms, in turn, may result in alarms being ignored and failures to detect emergency (misses) may result in reduced confidence in the system (90) (cf. Study III and staff descriptions of the bed alarm).

Results discussed in the framework of DOI

The results of Study III can also be discussed based on the theory of DOI. According to the theory (61), an innovation’s characteristics determine the rate of adoption: i.e. compatibility with needs, values and past experiences; relative advantages; complexity; trialability and observability. In the present thesis (Study III), results showed that the innovations were not always compatible with needs, values and past experiences, see the category hesitating. Caregivers’ reluctance and/or resistance to technology, telecare and telemedicine has also been discussed by others (9, 65, 212, 219). According to Bjorneby et al (219), opinions such as ‘technology is not good for them and might cause confusion’ may actually discriminate against people with dementia, i.e. potential users are not permitted to test technology. However, during the study, staff described ‘moving from fear of losing control to perceived increase in control and security’. In the category a desire to change, informants expressed changed opinions as well as seeing the possibilities of IT support. Relative advantages were expressed in the category perceiving advantages and improvements in care and in their job situation. However, also disadvantages were expressed in the category perceiving shortcomings, one of two categories in the theme ‘Constant struggling with insufficient/deficient systems’. The other category in the theme ‘Constant struggling with insufficient/deficient systems’ expressed informants’ perceived complexity of the system, described as insufficient knowledge and difficulties in handling the system (cf. (46)). The attributes trialability and observability were less discussed by the informants. Lack of discussion of trialability may be due to the fact that the innovations were there to be tested and had already been adopted by the organization. Observability was mentioned when participants were asked about effects of parts of the IT support. For example, when staff working the day shift were asked about the nighttime illumination, they sometimes referred to staff working nights. For a more comprehensive discussion of the results in relation to the theory of DOI, see the manuscript for Study III.
Relatives’ opinions of the IT support and relatives’ outcomes

According to Day et al. (123), it is important to evaluate changes in the environment from different perspectives, such as those of staff, relatives and people with dementia. Therefore, the perspectives in the present thesis also included relatives’ opinions of the IT support and their perceptions of minor irritations in the care. We assumed that the included IT support would, for example, facilitate contact between the relatives and the residential living home. However, none of the relatives who participated in the evaluation used email to communicate with the staff and only one relative used the home’s website to obtain information about the facility (see article Study IV). Nevertheless, according to the interviews with staff (Study III), there were relatives who used email, even if they were few, and these relatives had told them that email facilitated their contact with the staff at the residential living home. A Canadian study (220) of the support needs of caregivers to people with dementia showed that 39% had access to a computer and 28% were interested in receiving information and support via Internet. Results from Study IV showed that relatives’ perceptions of practical/logistical irritations decreased during the study time in the experimental group, but not in the control group. For the total scale of NHHS there was an increase in scores between baseline and follow-up at 3 month in the control group, i.e. an increase in the total scores on perceived irritations. However, this change was not significant at the 7- and 12-month follow-ups. Relatives’ opinions of the IT support were generally positive, something that has also been shown in other studies (10, 29). In the control group, median values were 4 for the statements ‘Being in the indoor walkway has a calming effect on the resident if he/she has been anxious/restless’ and ‘The passage alarms, in the indoor walkway/in the gardens, give the resident increased freedom of movement’, these parts of the interventions were visible for the relatives in the control group (cf. the theory of Diffusions of Innovations (61), where observability is one of five attributes determining the uptake of new innovations). The results showed no significant differences concerning life satisfaction over time. Other studies (221, 222) have shown positive caregiver outcomes, e.g. a decline in depressive symptoms for informal caregivers. However, the cited studies concerned informal caregivers receiving telephone support for people living in their own homes.

Methodological considerations

The strengths of the present thesis were the use of different designs and the use of different perspectives to evaluate IT support in dementia care. The use of a qualitative approach in combination with a quasi-experimental design
with quantitative outcomes, such as staff satisfaction with work and life situation, allowed us both to evaluate outcomes of the IT support and to describe staff members’ perceptions of the IT support during the process of implementation. Both approaches, qualitative and quantitative, have their strengths and weaknesses and may therefore complement each other and give a more comprehensive description of IT support in dementia care. The fact that there were several data collection points is another strength. There is a lack of studies in diffusion research focusing on the process of implementing new innovations. And according to Meyer (223), diffusion research has mostly collected data at one point, after the innovation has already been widely diffused. The context of the study, i.e. real-life conditions, also constitutes a strength, as much research in telecare/telemedicine has been feasibility studies.

The outcomes of the present thesis are based on self-reports. Other data collection methods such as direct observations related to the use of the passage alarm and the computer in the kitchen/the living room would also have been of interest, and could have been used for data triangulation. On the other hand, the focus of the present thesis was on describing staff members’ and relatives’ views on IT support in dementia care.

**Study I, II and IV**

The methodological weaknesses of Study II and IV were their non-randomized design, small sample sizes, high dropout rates and some factors/scales with alpha values below the advised minimum value of 0.70 (203) (see Table 4). Another limitation was the bias towards one organization. A randomized design was not possible, but the setting for the intervention was randomly selected by drawing lots between the two samples in the staff study. Attrition affected the experimental as well as the control group (Study II and IV). The reasons for dropping out during the course of the studies were, in Study II: quit work, changed workplace within the setting, parental leave, long term sickness, annual leave and decline/no reason, and in Study IV, mostly because the residents had died.

Threats to internal validity when using quasi-experimental research include for example selection biases, selection x history (possible effects of other changes or events during the study period, i.e. if only one of the groups are exposed to changes/events outside the experiment that might plausibly explain the results), attrition and special reactions of controls (224). These threats also concern the present research project. To reduce some of the threats to internal validity, a control group at the same residential living facility, with the same management, was chosen and during the project staff members in both groups, experimental and control, received activities such as supervision and information in an attempt to make them as equal as possible, with the exception of the intervention – the IT support. Thus, the importance of equality in human resource development as well as care develop-
ment in the groups was discussed with management and the project leader at
the residential living home before the project started and at several times
during the project. One of the researchers (ME) visited the setting once or
twice each month to see what was going on and to meet with the project
nurse responsible for the IT project in the residential living home. However,
by using a control group at the same residential living facility, sample sizes
become smaller, which means low statistical power and a threat to statistical
conclusion validity (224). At baseline for Study II, mean age of residents
living at the residential home and mean scores on GBS-E were higher in the
experimental units compared to the control units which might influence staff
members’ perception of their job satisfaction, e.g. care load might increase
with residents age and thereby also staff members’ perception of work load.
However, the other subscales of GBS and MDDAS showed no statistically
significant differences between experimental and control groups, and staff
perceptions of the physical and psychological workload showed no statisti-
cally significant differences (see Table 2).

Regarding selection biases, a pre-test (Study II) showed no differences in
staff members’ background characteristics, but three factors in the study
instruments showed statistically significant differences: sleep disturbance
(‘psychosomatic health aspects’ scale), sickness impact and socio-economic
situation (LSQ). In Study IV, there were no statistically significant differ-
ences between the groups on scores on the study instruments or age at base-
line. Recall, however, that ‘Pretest equivalence on a measure does not mean
that the groups are comparable in all dimensions relevant to the intervention,
but it increases the confidence one might place in this assumption’ (224) (p.
107).

Threats to external validity are, for example, the ‘Hawthorne effect’ (react-
ivity of experimental/investigation arrangements) and timing of measure-
ments (224). By using several post-intervention data collection points, we
were able to take this into consideration. An extra data collection point for
the staff about 12 months after the last part of the intervention had been im-
plemented would have been interesting. However, attrition then becomes a
greater problem (224), and during the data collection period in the present
project attrition had already been a problem, with staff leaving for various
reasons. High turnover rates (130) and absence due to illness (67) have also
shown to be a problem in elderly care. Systematic replications in other set-
tings and contexts are needed to extend the generality of the findings (224).

The risk of positive response bias has to be considered in the results from
the study-specific questionnaires dealing with staff members’ and relatives’
opinions of the IT support (Study II and IV). However, the responses are in
line with the other results. When participants were informed about the
evaluation, it was also pointed out that the IT support had been initiated by
the organization and that the researchers’ interest was in understanding the
benefits/advantages as well as disadvantages of the new technology. Staff
from the organization were responsible for information on the IT support and one of the researchers (ME) was responsible for information on the study. Another limitation of the study-specific questionnaires was that they had not been tested psychometrically, except with regard to face validity in the research group. Thus, the results should be interpreted with caution, and the questionnaires require further testing in the future.

Psychometric properties of the scales ‘psychosocial aspects of job satisfaction’, ‘quality of care aspects’ and ‘psychosomatic health aspects’ (used in Study II) were tested in Study I. The results showed support for the scales’ validity and reliability. The preferred factor solutions explained 52.2%, 56.4% and 56.8% of the total variance in ‘psychosocial aspects of job satisfaction’, ‘quality of care aspects’ and ‘psychosomatic health aspects’, respectively. Known-group validity showed significant differences in all factors of ‘psychosocial aspects of job satisfaction’ between individuals intending to stay at their present job and individuals intending to leave their present job. Internal consistency, measured using Cronbach’s alpha value, was over 0.70 for all factors measuring ‘quality of care aspects’ and ‘psychosomatic health aspects’, and in five of eight factors measuring ‘psychosocial aspects of job satisfaction’. Three factors measuring ‘psychosocial aspects of job satisfaction’ had alpha values below 0.70, indicating a need for further testing and development. The low alpha values may be due to low number of items in the factors (the factors external motivation and position in the group both have 4 items). The methodological limitations of Study I were the fact that a non-randomly selected sample was used and that the dropout rate was 32.7%. However, sample size was sufficient for factor analysis and included staff working in different forms of elderly care, urban as well as rural parts of a county council district.

The other instruments, used in Study II, have been tested for psychometric properties, and Swedish normative data are available for the LSQ. The Bonferroni adjustment for multiple comparisons was used when examining pair-wise differences (Study II) to reduce the risk of mass significance. In Study IV, scores on the dependent variable NHHS were low from the beginning, i.e. floor effects might have limited the possibilities for further changes. The NHHS used in the present thesis captures negative aspects of care, as perceived by relatives, and a measure of positive aspects may have resulted in a different picture. Research has shown that burden and satisfaction may coexist (118), and more research focusing on positive aspects is called for (118, 225).

**Study III**

Group interviews were used in Study III. The intention was to obtain rich data, and to encourage participants to stimulate each other, we also chose group interviews, as implementation of the IT support were something all staff took part in. According to Morrison-Beedy et al. (226), ‘…group inter-
action can assist in eliciting richer or more sensitive data’ (p. 48). In the results of Study III (see the manuscript of Study III) some of the quotations presented include two or more participants to illuminate participant interaction.

The weaknesses of group interviews are that participants may feel afraid to express their views in the group and that there may be a group culture that inhibits individual views (203).

When using a qualitative approach, trustworthiness can be discussed using the concepts of credibility, dependability and transferability (204). The context and the informants have been described in as much detail as possible to help readers evaluate the transferability of the results to other contexts. Credibility was achieved by prolonged involvement, interviewing the informants at several data collection occasions, using representative quotations from the interview data, and by discussing the interpretations in the research group to reach agreement on how the data were to be interpreted. The second author has read five interviews concerning staff members’ perceptions of the IT support, the third and last author have read three interviews each and all authors have read the condensed material. Most of the informants were LPNs working daytime, but efforts were made to also include night-time staff and a registered nurse to describe the research objectives from different viewpoints. Dependability was achieved through an open dialogue between co-researchers throughout the whole research process to minimize inconsistencies during data collection and analysis. And during the analysis, meaning units, codes and categories were constantly compared to establish congruence in the analysis process (204).

Suggestions for future research

In the future, more experimental studies of IT support in the care of persons with dementia, including several organizations, are needed. The present study evaluated a package of IT support, and further research is required to study specific parts of this support.

According to Day et al. (123) it is important to study environmental changes such as environmental attributes (e.g., design modifications for safety), specific rooms and activity spaces from different perspectives to achieve an environment tailored to the user. Therefore, in future studies, there is also a need to focus more attention on the residents and relatives and their perceptions of the IT support, for example via interviews with relatives.

Furthermore, resident outcomes, functional ability and care load should be studied when this kind of technology is implemented in care. Direct observations as well as standardized instruments could be used to study outcomes for residents when technology is implemented in dementia care. In the earlier phases of the dementia disease, interviews with the persons with dementia are important if we are to understand their perspectives on IT sup-
port in the care, support such as assistive devices for cognitive deficits as well as surveillance technology.

More qualitative studies are also called for when IT support is implemented in real-life conditions, as the caring situation and acts of caring may change when these technologies are in use, and these aspects need to be studied in real-life conditions. The use of new technology may also induce changes in staff skills (cf. (47)).

It is important that future studies also include a cost-effective analysis, even if it is difficult to appreciate/estimate some of the perceived advantages, as the staff mentioned.

Evaluations of IT support in dementia care should be conducted to ensure descriptions of the benefits and shortcomings associated with use of IT support in care settings with vulnerable patients. Hopefully, studies from a caring perspective can contribute to an approach to technological development that is need-driven and tailored to users. Evaluation studies in clinical practice must receive higher priority to ensure constructive development in the future – thus, research cannot only focus on technological development. Feasibility studies cannot be compared to evaluations of real-life conditions in which the technology is used among several residents/care recipients and caregivers in different settings. However, both types of studies are important in the development and implementation of new technologies, as there is a need for different approaches.
Concluding remarks

IT support in dementia care can improve job satisfaction and quality of care aspects in several ways, as perceived by the staff. The reasons for these changes may include an increased sense of control and security at work owing to the use of IT support.

Staff members’ and relatives’ opinions of the IT support were generally positive after the IT support had been implemented. During the process of implementation, various opinions and perceptions of the IT support were found among staff members, such as distrust, misgivings and possibilities, and shortcomings and improvements. Staff members’ perceptions of the benefits of IT support were that it contributed to improvements in care and in their job situation. Advantages and improvements in care were reported to have occurred for staff, residents as well as relatives. However, constant struggling with deficient technology was also described, which emphasizes the importance of user involvement in the development of new technologies and the importance of re-invention of the innovation to fit the organization’s needs.

Relatives’ perceptions of practical/logistical irritations with care decreased over time, and this may be due to the implemented IT support. Another explanation or contribution to the results may be that the increase in staff job satisfaction, in turn, decreased relatives’ perceptions of practical/logistical irritations with care.

The overall finding from the studies suggests that IT support is beneficial in dementia care, although shortcomings show that there is room for further improvements. IT support facilitated staff work in several ways and facilitated the use of outdoor areas and other areas in the residential home. Yet, we must remember that IT is a support and not a substitute for the care provided by the staff.

Results from the psychometric tests of the three scales ‘Psychosocial aspects of job satisfaction’, ‘Quality of care aspects’ and ‘Psychosomatic health aspects’ indicate that the scales’ overall psychometric properties were acceptable. Thus, the three scales can be used to measure staff members’ perception of their work environment in Swedish elderly care. In clinical practice, the scales may be useful in making annual evaluations of staff satisfaction with work, in assessing changes and they may serve as the basis for unit-level action plans.
From an organizational perspective, managers need to take into account the different views staff may have on IT support and encourage discussions before, during and after implementation in care. Such discussions would facilitate the implementation process as well as re-invention of the innovation and restructuring of the organization to suit the innovation if needed. Hopefully, this will result in optimal use of IT support and an increase in positive outcomes. The implementation process may take time, and benefits may not be shown in the first month if outcomes such as staff satisfaction with work are considered. The present results showed that most of the improvements were significant at the last follow-up. Thus, in order to assess more long-term outcomes, several follow-ups at different time intervals are recommended when IT support is evaluated in the care.

Described shortcomings in the results also underline the importance of follow-ups for each individual using IT support to observe whether function and effects are satisfactory or whether the IT support needs to be changed in some way. High incidence of false alarm or misses must be reported to management, and solutions relating to alarm type, application and surrounding structure need to be discussed. Technical problems have to be corrected as soon as possible, thus treated as very high priority. This, in turn, requires easy access to technical support.

If IT support is implemented in a care setting, access to IT support and the location is essential to keep in mind and demands special consideration, as results from the present thesis showed that access to additional computers placed at different locations were reported to have benefits for care as well as the staff members' job situation.

For technical staff, it is important to be sensitive to different opinions that may exist among users and to put time/effort into aspects such as access to and location of the IT support in the organization.

If investments are being made in IT support, the whole system must be taken into consideration. Obstacles to optimal functioning of a product may be caused by the product’s functioning and design as well as by application and the surrounding structure. A product that is not adapted/re-invented to suit the users'/organization’s needs, that is not applied correctly, a system characterized by deficient access to technical support, or a product that is not supported by the surrounding structure all serve as obstacles to optimal functioning of the system. IT support cannot merely be added to the workplace, it must be incorporated into the care system.
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My family, Amanda, Bea and Claes, thanks for always being there, for taking me away from the research world and for letting me be there, wrapped up in my articles and writing. I love you all so much.
Sammanfattning (Summary in Swedish)

Det övergripande syftet med studierna i avhandlingen var att beskriva och utvärdera IT-stöd i vården av personer med demens utifrån personalens och närståendes perspektiv. Specifika syften var att studera personalens tillförlitsställelse med arbetet, livstillförsäljningskänsla och känsla av sammanhang före och efter att IT-stödet hade införts, att beskriva personalens åsikter och uppfattningar av IT-stödet före, under och efter införandet samt att beskriva närståendes åsikter om IT-stödet och jämföra närståendes uppfattningar av mindre irritationsmoment i vården och livstillförsäljningsföre och efter IT-stödet. Dessutom vidareutvecklades och testades tre frågeformulär som därefter användes i utvärderingen.

En kvasiexperimentell design användes i två av studierna för att studera utfall av IT-stödet. En beskrivande design användes för att studera åsikter och uppfattningar av IT-stödet och en korrelativ design användes i metodstudien. Studierna som berörde IT-stödet genomfördes vid ett boende för personer med demens och i utvärderingen deltog 33 vårdpersonal (17 personer i en experimentgrupp och 16 personer i en kontrollgrupp) och 22 närstående (14 personer i en experimentgrupp och 8 personer i en kontrollgrupp). I den beskrivande intervjustudien deltog 14 vårdpersonal från de enheter där IT-stödet implementerades. I metodstudien deltog 299 vårdpersonal som arbetade inom äldreomsorgen, i såväl ordinärt som särskilt boende. Data samlades in med hjälp av frågeformulär och gruppirevjuer. IT-stöd som ingick i projektet var; passivt passagelarm i förbindelsegång och trädgårdar, fallsensorer, rörelsesensorer som kunde användas istället för ordinarie sänglarm, nattbelysning på toaletten kopplat till sänglarm, tillgång till fler datorer per enhet, en hemsida på Internet för boendet, tillgång till Internet för all personal samt e-post adresser för att möjliggöra kommunikation via e-post inom personalgruppen samt mellan närstående och personalen.

Resultatet visade att personalen uppfattade IT-stödet som ett stöd i vården av personer med demens. Personalen i experimentgruppen skattade och beskrev en högre arbetstillförsäljningsställning samt förbättringar i vårdkvalitet. Personalens skattningar av personlig utveckling, arbetsbelastning, förväntningar och krav, inre motivation och dokumentation samt det totala värdet för arbetstillförsäljningsställning och det totala värdet för vårdkvalitet förbättrades i experimentgruppen jämfört med kontrollgruppen över tid. Utifrån personalens beskrivningar av IT-stödet framkom två teman varav det ena berörde personalens upplevelse av förbättrad kontroll och trygghet med IT-stödet och
det andra temat berörde personalens upplevelse av brister i systemet (brister i funktion, design, omgivande struktur, tillämpning samt brister i egen kunskap och/eller förmåga att hantera IT-stödet). Personalen beskrev förbättringar och fördelar utifrån deras arbetssituation och utifrån vården (de boendes och närståendes perspektiv). Personalens inställning till IT-stödet före implementeringen var varierande, till exempel beskrevs farhågor och misstro samtidigt som möjligheter. Under studiens gång beskrevs en förändrad inställning till IT-stödet. Närstående var, i stort, positiva till IT stödet och närståendes uppfattningar av praktiska/logistiska irritationsmoment i vården minskade i experimentgruppen över tid.

Utifrån de olika åsikter och uppfattningar av IT-stödet som framkommit före, under och efter införandet av IT-stöd så framhålls vikten av diskussioner i personalgruppen tillsammans med chefer och tekniker för att underlätta implementeringen. Beskrivna brister visar på Vikten av en fortsatt utveckling och utvärdering av IT-stöd i vård och omsorgskontext för att främja en användar- och behovsdriven teknikutveckling. Trots beskrivningar av brister i systemet så framkom förbättringar som till exempel förbättrad kontroll och trygghet med hjälp av IT-stödet.
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