

Economic effects of the Municipality Occupational Therapy Services in Norway

M . Kamrul Islam • Bodil Ravneberg



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Uni Rokkan Centre
Nygårdsgaten 5
5015 Bergen
Phone +47 55 58 97 10
Fax +47 55 58 97 11
E-mail: rokkansenteret@uni.no
<http://rokkan.uni.no/>

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M. KAMRUL ISLAM

BODIL RAVNEBERG

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M. Kamrul Islam
Dept of Economics and HEB
University of Bergen

Bodil Ravneberg
Uni Rokkan Centre

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Summary

For every society, it is important to know the effective and efficient health care interventions that ensure a more efficient use of scarce health care resources. Care of dementia is extremely resource demanding and has a great impact on both the formal care systems and the condition for informal carers. Occupational therapy (OT) is likely to be useful in dementia care. It is also recommended by the occupational therapists that a stair lift is the right solution for old or many younger individuals with disabilities who want to stay independently in their own home. From the policy perspective, nonetheless, the questions of cost-effectiveness of such interventions are vital.

This study aims to assess whether municipality occupational therapy is a cost-effective service option for home-based persons with reduced function in Norway. Two types of subjects have been considered for the analyses: older patients with dementia and people who use and are supposed to need a stair lift in their apartments.

To get the information regarding the OT intervention and its effects on the differences in health care quantities used by the dementia patients between case (OT users) and control (usual care users) groups, a rigorous literature review has been conducted. Based on our literature search, we have considered the study from the Netherlands (the study based on randomized control trials). We estimate economic benefits/costs from the point of societal perspective. Employing the number of health care units used per patient during three months follow-up period that estimated in the study from the Netherlands, and using Norwegian wages/prices for different health care units, we present a hybrid estimate of the economic effects of OT intervention for the dementia patient in Norway. All costs have been calculated from the employee costs multiplied by a percentage for employer premiums as social taxes, holidays, and employee other benefits. Overall, our estimates indicate that community OT intervention for people with dementia is cost-effective in Norway. Our estimates demonstrate that with a probability of 95 %, on average it saves NOK 42,427 (95 % CI: 33,678 and 51,176) over three months per successfully treated dementia patient with OT. The main cost savings are from reduced informal care for the intervention group (NOK 48,387.42), around 90 % of total costs are owing to informal care costs.

Based on the information collected through a small scale interviews with the user of a stair lift and potential-user (persons that have been concluded to need a stair lift, and are waiting for the installation), a quantitative cost-effectiveness analysis has been conducted. From the self-assessed descriptions provided by the informants, it is rather apparent that having a stair lift is effective in improving the users' daily livings, quality of life, and reducing informal cares time. Based on some restrictive assumptions, it seems that the intervention is cost-effective as well.

From a societal view point, particularly in terms of informal care costs, our tentative conclusion is that community OT appears to be a cost-effective intervention strategy for the patients with dementia in Norway. Similar conclusion can also be drawn for the stair lift intervention. Yet, to be more confident on our conclusions, we recommend further comprehensive research on these issues.

1. Introduction

1.1 Background

Municipality health care service is gradually more responsible for more patients at all ages with temporarily or permanent reduced function. Some patients also need follow-up after the treatment from hospital. It is important to know the new effective and efficient healthcare interventions that increase independence and wellbeing of the patients and decrease the burden on care givers, resulting in a more efficient use of scarce health care resources. It is believed that to reduce the excessive pressure on hospital and municipality health care services, more focus on health promotion and prevention measures may be required. In particular, a well-functioning rehabilitation service is essential for the fully treated patients with the functional disabilities who have been transferred from the hospital to follow-up and treatment in their own home. An investment in the home-based occupational therapy service may be a key approach to confine the excessive need for more resource demanding seats in the institutions. This approach may also facilitate to reduce the informal care costs.

Care of dementia is extremely resource demanding and has a great impact on both the formal care systems and the situation for informal carers. Dementia is one of the three major diseases regarding healthcare consumption and is a major cause of disability and burden of care in elderly people (Wimo et al, 1998; Wimo et al, 2006). Dementia disorders are today considered to be a major driver of costs in health care and social systems. It is of great interest for policy makers to have an estimate of dementia disorders' contribution to global social and health care costs, particularly in light of the demographic prognoses.

Wimo et al (2007) estimate the worldwide cost of dementia in 2005 from a societal viewpoint. Costs are estimated by merging prevalence estimates, country and region specific data on Gross Domestic Product per person, and average wage with results from previously published cost-of-illness studies in different countries. Direct medical and nonmedical costs as well as costs for informal care are added. They find that the total worldwide societal cost of dementia, on the basis of a dementia population of 29.3 million persons, is estimated to be US\$315.4 billion in 2005, including US\$105 billion for informal care (33 %) that constitutes a major cost component. It seems that 77 % of the total costs occurred in the more developed regions, with 46 % of the prevalence.

The incidence and prevalence of dementia is increasing in the Norwegian population. Almost 80 % of nursing home patients suffer from dementia, of which 70 % have Alzheimer's disease (AD)– a chronic progressive subtype of the dementias characterized by cognitive impairment, impaired competence in activities of daily living (ADL) and behavioral disturbances. This entails the need for more nursing and care of patients living at home or in public nursing homes. Consequently, any treatment that could reduce the practical consequences of AD is important for the patients and their caregivers. Recent estimate shows that there are currently about 66,000 people with dementia in Norway, and it is expect that about 250,000 people, both the patients and

their families, are affected by the disease¹. Because of an aging population, it is predicted that the numbers of patients and the related health care costs will increase significantly in the next five decades (Melis et al, 2009).

There is increasing interest in non-pharmacological treatments that can help people with dementia to cope with everyday life and also reduce pressure on their caregivers. Occupational therapy (OT), in particular, is expected to be of value in dementia care because of the huge challenges in daily performance and decrease of quality of life that dementia brings to patients living with dementia and for their caregivers. By facilitating the personal capacities of the older persons with dementia, changing the cognition on patient behaviour and caregiver role and supervision skills, etc OT is shown to be effective in improving quality of life for dementia patients and their carers (Graff et al, 2006; Graff et al., 2003).

A stair lift is a technical aid or assistive technology for the individuals who can not do their daily activities independently with out this device. Specifically, this device is very important for those individuals who are living in block of flats of 4 floors or less. If the block of flat exceeds 4 floors, the building regulations impose an ordinary elevator in the building. A stair lift may also be installed in private flats or houses to enable the person with reduced ability to walk stairs to stay independently in their own home. From the policy perspective, nonetheless, the question of cost-effectiveness of such intervention is crucial.

World Federation of Occupational therapists (WFOT) has documented that in comparison to Denmark and Sweden Norway has half as many occupational therapists per 100,000 inhabitants. This imbalance may not be explained by the differences in the health systems. Studies on the economic effects of OT are available for other developed countries, but there is no study for Norway. A research-based scientific knowledge (as NETF logically would like to have) is required to know the potential economic costs and benefits of these services in Norway.

1.2 Aim of the study

To assess whether municipality occupational therapy is cost-effective service option for home-based patients that could be provided through the municipality health services in Norway.

Specific objectives

- To what extent occupational therapy intervention is a cost-effective service option for the people with dementia in Norway?
- To what extent installing a stair lift would improve individuals' (those who need it) activities of daily living and participation in the community and reduce of formal and informal care?

¹ see <http://www.regjeringen.no/nb/dep/hod/dok/regpubl/stmeld/20052006/stmeld-nr-25-2005-2006-/5.html?id=200933>.

- What are the economic consequences of these interventions?

1.3 Outline of the study

The report is organized as follows. The next section describes the background about the subjects/patients and the intervention of the study. Section 3 illustrates reviews methods for estimating cost-effectiveness analysis of the OT intervention. The findings of the review along with a hybrid estimation of the cost-effectiveness analysis of the OT intervention in Norwegian context are given in Section 4. Section 5 summarizes the qualitative findings of the effects of having or not having a stair lift if someone needs it. Section 6 contains a discussion and conclusions with some recommendations for the future research.

2. Background about the Subjects and the Intervention

The project considers economic effects of occupational therapy provided to the home residents' people. Two types of patients/subjects have been considered for the analyses:

- Older patients with dementia.
- People who use and are supposed to need a stair lift, either in the block of flats or inside their apartments/house (as recommended by the occupational therapists).

2.1 Subjects with Dementia

Dementia is a common term for a group of brain diseases that usually occur in old age, and that leads to impaired cognitive function and mental, motor and behavioural symptoms. Alzheimer's disease is the most common cause of dementia, and about two third of those who have dementia, have this disease. Aging is the most important risk factor for Alzheimer's disease. There is no known specific single cause of the disease; however, it is believed to be an interaction between genetic factors, environmental factors and aging.

The prevalence of dementia is one of the most important factors determining the costs of dementia care (Wimo, et al, 1997). The prevalence of dementia depends mostly on the age structure of the population. Prevalence is low in people under the age of 60, and increases with age. It is estimated that approximately 10 out of every 1000 people age 60–69 have dementia, but the corresponding value reaches 50 percent in 90+ year old adults (Fratiglioni, 1998). There is some variation between countries, which however may not reflect real underlying differences in prevalence, but rather seem to reflect methodological difference among the studies (Corrada et al, 1995).

Nevertheless, the occurrence of the dementia is based on prevalence rather than incidence figure. The reason is that the number of studies of the incidence of dementia is scanty. After searching the literature, and taking account of methodological differences between different studies, Fratiglioni (1998) summarized some of the evidence and found all incidence figures to be similar. There are two persons per 1000 people ages 65–69 who become demented during one year. However, among the population aged older than 90 years, this number increases to 70–80 new cases in one year per 1000 people (Fratiglioni, 1998). Alzheimer's disease is the most frequent dementing disorder, accounting for 80 percent in the oldest age group.

2.2 What stair lifts do and who need it?

The function of a stair lift system is to help someone who is otherwise not able to get up and down the stairs in their home. A stair lift compensate for reduced function in

climbing stairs. The users may be of any age-group with a permanent dysfunction in climbing stairs.

A stair lift is mounted either on the rail of a stairway, or on the wall, depending on the layout of the stairs. The lift may have a seat to sit on, or a platform to carry the person in a wheelchair. The lifts are run by a motor which allows the user to direct the stair lift either up or down the stairway. It may also be controlled by a helper.

In Norway, the building regulations impose an elevator in buildings of more than 4 floors. Stair lifts are not installed in the common stairs of such buildings. Therefore, a stair lift may be important for individuals who are living in block of flats of 4 floors or less, or live in a flat/house with more than one level.

2.3 The Intervention: Home based Occupational Therapy

Occupational Therapy, often abbreviated as OT, incorporates meaningful and purposeful occupation to enable people with limitations or impairments to participate in everyday life. The World Federation of Occupational Therapists defines occupational therapy as a profession concerned with promoting health and well-being through occupation. OT gives people the «skills for the job of living» necessary for «living life to its fullest.»² The College of Occupational Therapists (in London) describes OT as follows: «Occupational Therapy enables people to achieve health, well-being and life satisfaction through participation in occupation» (COT, 2006). The primary goal of OT is to enable people to participate in the activities of everyday life. Occupational therapists achieve this outcome by enhancing the individual's ability to participate, by modifying the environment, or by adapting the activity to better support participation.³ OT relies on understanding the importance of an activity to an individual, being able to analyze the physical, mental and social components of the activity, and then adapting the activity, the environment, and/or the person to enable them to resume the activity. Occupational therapists address the question, «Why does this person have difficulties managing his or her daily activities (or occupations), and what can we adapt to make it possible for him or her to manage better and how will this then impact his or her health and well-being?»

OT jobs allow patients who bore serious physical or psychological diseases/disabilities restoring to a normal life as possible. The occupational therapists have a variety of work tasks in the community. They work with individual persons and their families and with groups of people. As a part of the rehabilitation, reduced function may be compensated with assistive technology. OTs also work with the environment to enable activity and participation in the community by ensuring universal design when plans and regulations for the community and society are formed.

² See, <http://www.aota.org>

³ See, <http://www.wfot.org/information.asp>

3. Methods/Design

Two of the initial challenges in the design of the project are:

- How to identify the patients/subjects and
- How to define what OT service entails.

Moreover, classifications and valuation of formal and informal care tasks is another challenging task. To handle these challenges a well designed randomized controlled trial (RCT) would be the ideal approach. Due to time and resource constraints, the current project has not gone for the RCTs, rather has tried to cope with these challenges by using alternative approaches which required less resources.

3.1 Dementia

The first part of the project has considered the economic effects of OT for the older patient with dementia. For this part of the project we distinguish economic costs and benefits of the patients with dementia using OT (case) and the patients with dementia that are not getting any sort of institutional home care (the control group).

3.1.1 Changes in health care quantities due to intervention: Estimation strategy

To get the information regarding the OT intervention and its effects on the differences in health care quantities used by the dementia patients between case and control groups, a rigorous literature review has been conducted. The review facilitates us to know the differences in health care quantities (e.g. use of formal and informal health services etc) for both the groups, and costs related with the OT intervention (e.g. wages, other costs) for the dementia patient.

Review method: Search strategy and inclusion criteria

The methodology used is a systematic search of the databases. In particular, a systematic search is conducted for articles published till July 31, 2009 through MEDLINE (via Pub Med). The inclusion criteria for the search are: the cost-effectiveness studies; consider OT intervention for the dementia patient and studies that used a quantitative methodology. The review uses the following key words: «cost-effectiveness» AND «dementia» AND «occupational therapy» OR «ergo therapy». Once the searches are completed, the title, key words, and abstracts are reviewed for final selection.

3.1.2 Costs and benefits estimation strategy

The economic benefits/costs have been estimated from the point of societal perspective. This societal viewpoint includes all costs that our society meets as a consequence of this OT intervention or recommendation (Drummond et al, 2005). Therefore, estimations include not only the costs of health care services delivered by different health care workers but also the costs for gains and losses in productivity of the informal care givers. Moreover, to assess the economic effects of OT, we need to separate other multidisciplinary efforts made in rehabilitation. So that the economic

estimations would be solely for the OT but rather not included the effects from other related services.

The quantities measured have been multiplied by unit costs (prices) to obtain the costs incurred in Norway. Market prices for OT, visits to the general practitioner, day centre, home care or household support, and other resources, such as visits to the physiotherapist and hospitalization have been based on Norwegian published data sources. All costs have been calculated from the employee costs multiplied by a percentage for employer premiums as social taxes, holidays, and employee other benefits.

3.1.3 Informal care costs estimation

Informal care cost is the one of the highest cost components of dementia care cost and time is the main input of informal care. From the social perspective, it is widely accepted and recognized that time cost must be included in any costing or cost effectiveness analysis (Gold et al, 1996; Max, 1998). However, costing informal care is a complex area where no consensus on methodology exists. There are two competing approaches of valuing informal care. One is the *opportunity cost approach* and the other is the *market value approach* (also called *the replacement cost approach*).

An opportunity cost approach uses a wage rate that reflects the cost of the person's time in the next best alternative employment. The fundamental assumption is that people will take their opportunity cost into account when allocating their time: they will work an extra hour, for example, if the compensation they receive exceeds the value they place on their time in other activities (Gold et al, 1996). In other words, the opportunity costs are the benefits that are forgone because a resource – in this case the caregiver's time – is not used in the best possible way (Karlsson et al, 1998).

On the other hand, the market value approach captures the economic costs of informal care-giving time by using a wage rate for paid employees providing similar services (Hu et al, 1986; Rice et al, 1993; Ward and Brown, 1994; Harrow et al, 1995, Cavallo and Fattore, 1997). According to this approach lost time is valued against the cost of professional formal care, for example the cost of professional home help. The idea is that the alternative to informal care is professional home help; the informal caregiver's time and the professional caregiver's time are assumed to be perfect substitutes. The valuation of the informal caregiver's lost time is then based on the cost-savings due to a reduced need for professional time.

From a practical point of view there is no single theoretical approach is likely to prove to be perfect in the real world. All approaches have some practical problems (for detail, see Islam, 1999). Theoretically, the use of the opportunity cost approach can generally be seen as preferable to the market value approach because it gives a true sense of the economic costs of the caregiver's services. A key issue for implementing this approach is to determine what the alternative use of the caregiver's time actually is. If the alternative for the caregiver is working in the labour market, the cost for informal care should be valued as the production lost or income lost (production and income losses should never be added in estimating costs, as this would introduce double-

counting) when he or she has given up work. This should be used in the estimation of labour cost.

Since it is not possible for us to know the precise information about every single carers (i.e. do not know the alternative use of the each carer's time), in this project, therefore instead of using opportunity cost approach, we rather use market value approach. Nevertheless, the social care studies usually classify different care giving activities, such as, communicating with patient; organizing or using transport; dressing or supervision clothing; eating, supervising and cleaning up; looking after appearance of patient; supervising patient etc (see Netten, 1993). If we were able to get the wages for the each specific care giving task then by using market value approach we could impute the different costs for the average time spent on the different activities. Since it is not possible for us to obtain information for each care giving activities separately but rather we may get information on the aggregate time that devoted to all informal care. Therefore, in the base line analysis of our estimates, we use the middle-aged cleaning persons' wages as the proxy for caregivers' time cost and estimate the average costs for informal carer.

3.1.4 Sensitivity analyses

To examine the robustness of the estimates, we have done some one way sensitivity analyses. Particularly, considering the variability or dispersion of the health care resources used by the dementia patients, we have calculated 95 % confidence interval for the estimated cost differences for both the case and control group. Where appropriate (and information available), we have also tried to estimate the cost differences based on the different prices for different health care units and have performed a sensitivity analysis on these figures. In particular, to estimate average informal care cost, in sensitivity analysis, we impute domestic home carers' wages as a proxy of the costs for the informal carer.

3.2 Stair lift Installation

The second part of the project has assessed the economic effects of having a stair lift for those who need it. As to estimate the effects we have selected two groups of people:

- Those who have the stair lift installed
- Those who have been deemed to have a stair lift, but have not been installed yet.

3.21 The effectiveness of having a stair lift

Based on the information collected through a small scale interviews with the user of a stair lift (case) and non-user but need and waiting for a stair lift (control), a cost-effectiveness analysis has been conducted. Due to small numbers of cases (having a stair lift) and controls (not having a stair lift), it may not be reasonable to estimate a quantitative cost-effectiveness analysis; but rather it would be rational to do some qualitative analysis. Hence the project intends for a qualitative approach as to assess the economic effects of having a stair lift or not.

Through a structured questionnaire with face to face interview, the surveys facilitate us to know the effectiveness of having or not having a stair lift (see Appendix A for the questionnaire). Where appropriate, using before and after information (for those who have already a stair lift) as well as the current situation, the qualitative analysis provide us the information on the changes of the peoples' health, differences in daily activities and the use of health care services, and differences in the use of informal care for the two groups of people.

3.22 The costs related with a stair lift

The OT assesses the potential user, work on the motivation where necessary, liaise with the assistive technology centre and prepare the applications for the lift and the installation. To estimate cost of having a stair lift, the market price of a stair lift and cost related with the installation of the lift as well as occupational therapists professional time, should be included in the total cost component.

4. Results: Dementia

4.1 Literature search results

To estimate the changes in health care use due to OT intervention for the dementia patients, this project has used previous studies. After searching literature, in total 4 articles are initially identified as potentially fitting the selection criteria. Articles are excluded where the title and abstract made it clear that the paper do not fulfil the inclusion criteria.

After studying the abstracts we find two review articles and from the rest of two articles, we find one published cost-effectiveness study that could be matched with our inclusion criteria. Based on our literature search, we have considered a study from the Netherlands by Graff et al, 2008. The study has conducted a RCT with a focus on costs and benefits of OT intervention. By dividing into five subheadings, the summary of the study is presented below as: i) Aim; ii) Study design and settings; iii) Outcome measure; iv) Main findings of the studies; v) Conclusions.

4.2. Summary of the published study

Graff, Maud J.L et al. Community occupational therapy for older patients with dementia and their care givers: cost effectiveness study. *BMJ*, 2008; 336:134–8.

- i. Aim: To estimate the cost effectiveness of community based occupational therapy compared with usual care in older patients with dementia.
- ii. Study design and settings: From April 2001 to January 2005, a single blind randomized controlled trial has been conducted at memory clinic, day clinic of a geriatrics department, and participants' homes. 135 patients aged ≥ 65 with mild to moderate dementia living in the community and their primary care givers are selected. Patients are randomly assigned by blocked randomization (block size of four) to the intervention (10 sessions of OT at home over five weeks) or control group (usual care with no OT), which is stratified by level of dementia (mild or moderate). Intervention comprise 10 sessions of OT over five weeks, including cognitive and behavioural interventions, to train patients in the use of aids to compensate for cognitive decline and care givers in coping behaviours and supervision.
- iii. Outcome measure: Incremental cost effectiveness ratio has been estimated as the difference in mean total care costs per successful treatment (that is, a combined patient and care giver outcome measure of clinically relevant improvement on process, performance, and competence scales) at three months

after randomization. Bootstrap methods have been used to determine confidence intervals for these measures.

- iv. Main findings of the studies Significantly more pairs in the treatment group «improved» compared with the usual care group (37 % with treatment vs 2 % with usual care; ARI 36 %, 95 % CI 23 % to 47 %). Primary caregivers receiving OT felt more competent than those who did not. The researchers show that OT is more effective than drugs or other psychosocial interventions in helping people with dementia and their caregivers. The intervention cost €1183 per patient and primary care giver unit at three months. Costs of visits to a GP or hospital doctor are comparable between groups, but they are lower in the intervention group for other health care services and for admissions to hospital or to nursing homes or homes for the elderly. The main cost savings are from reduced informal care in the intervention group. Overall, on average community OT intervention saves €1748 (£1279, \$2641) over three months.
- v. Conclusions: From a societal view point they conclude that community OT is an effective and cost-effective (especially in terms of informal care giving) intervention strategy for patients with dementia and their care givers.

4.3 Cost-effectiveness of OT intervention for the Dementia patients: a hybrid estimation based on the study from the Netherlands

Adapted from the study from the Netherlands, Table 1 provides the mean and corresponding standard deviations (SD) of the number of health care units used per patient during three months of follow-up for both the cases and controls. The values provided in table 1 have been estimated through different instruments (for details see Graff et al, 2008). In particular, the primary care givers kept a diary to record the patients' visits to the general practitioner, physiotherapist, social worker, or other health care providers specifically related to the dementia.

Table 1: Mean (SD) number of healthcare units used per patient during three months of follow-up

Attributes	Occupational Therapy (N=67)	Usual care (N=65)
Occupational Therapy (OT) Home Visit	9.3 (1.8)	0.0
Occupational Therapy (OT) additional hours	7.4 (1.4)	0.0
Physiotherapy visit (hours)	3.4 (6.5)	4.2 (8.1)
Social worker visit (hours)	0.8 (2.1)	1.0 (2.7)
General practitioner visits	0.1 (0.5)	0.2 (0.8)
Hospital specialist visit	0.2 (0.8)	0.2 (0.8)
Nursing home care (hours)	47.7 (79.2)	37.4 (61.1)
Domestic home care (hours)	19.0 (45.6)	23.2 (48.7)
Day care (days)	3.4 (9.7)	5.0 (9.7)
Meals on wheels (days)	14.9 (30.3)	15.8 (30.3)
Admission to hospital (days)	1.6 (6.8)	2.1 (8.6)
Admission to institution (days)		
Nursing home	1.6 (7.9)	2.4 (13.3)
Home of Elderly	0.8 (6.8)	0.9 (6.9)
Informal care (hours)	913.5 (666.5)	1125.8 (830.2)

Source: Adapted from Graff et al (2008).

4.31 Base-line Results

Based on the number of health care units used per patient during three months follow-up period (see table 1 that estimated by Graff et al, 2008) and using Norwegian wages for different services (depending on the availability of the price/ wages information on different services), Table 2 provides a hybrid estimate of the economic effects of OT intervention for the dementia patient in Norwegian context.

Table 2: Total costs by healthcare units used per patient (based on Norwegian unit prices/wages)

	OT (N=67)	Usual care (N=65)	Norwegian Unit Cost/Price (in NOK) ^a	Norwegian unit cost with social contributions (in NOK) ^b	Total cost with social contribution (OT) (in NOK)	Percentage (%)	Total cost with social contribution (Usual Care) (in NOK)	Percentage (%)
OT Home Visit (hours)	9.3	0	187.53	277.54	2581.16	1.11	0.00	0
OT additional hours (hours)	7.4	0	187.53	277.54	2053.83	0.89	0.00	0
Physiotherapy visit (hours)	3.4	4.2	187.53	277.54	943.65	0.41	1165.69	0.43
Social worker (hours)	0.8	1	187.53	277.54	222.04	0.10	277.54	0.10
GP visits (hours)	0.1	0.2	256.41	379.49	37.95	0.02	75.90	0.03
Hospital specialist visit	0.2	0.2	---	---	---	---	---	0.00
Nursing home care (hours)	47.7	37.4	195.23	264.24	12604.43	5.44	9882.72	3.61
Domestic home care (hours)	19	23.2	190.1	257.30	4888.71	2.11	5969.37	2.18
Informal care (hours)	913.5	1125.8	154.0	227.92	208,204.92	89.92	256,592.34	93.66
Total cost					231,536.68	100.00	273,963.55	100.00

Note: ^{a, b} All wage rates are from 1 May 2009 and hourly wages calculated by occupations as follows:

- Occupational therapist (10 years' service) NOK 365,700, – in a year divided by 1950 = NOK 187.53 per hour. In addition, there is 12 % holiday pay, 14.1 % employer and 21.9 % pension (Bergen municipal pension fund), that is NOK 277.54 per hour with social contributions.
- Physiotherapists earn NOK 365,700, divided by 1950 = NOK 187.53 per hours. In addition, there is 12 % vacation pay, 14.1 % employer and 21.9 % pension (BKP).
- Social worker wages NOK 365,700 divided by 1950 = NOK 187.53 per hours. In addition, there is 12 % vacation pay, 14.1 % employer and 21.9 % pension (BKP).
- GP wages: GPs wages varies widely from doctor to doctor, however, there are some GPs with fixed salaries are municipal employees and we use average wage rate per hour for these GPs as NOK 500,000 – in a year divided by 1950 = NOK 256.41 per hour. In addition, there is 12 % holiday pay, 14.1 % employer and 21.9 % pension (Bergen municipal pension fund).
- Nurses in elderly care (institutional) wage NOK 380,700 in a year divided by 1950 = NOK 195.23 /hour. In addition, there is 12 % holiday pay, 14.1 % and 9.35 % employer's pension (Utilities and Landspensjonskasse).
- Domestic home care wages NOK 370,700, divided by 1950 =NOK 190.10 per hours. In addition, there is 12 % vacation pay, 14.1 % employer and 9.35 % in pension (KLP).
- Informal care: Use middle aged cleaning person wage NOK 300.000 pr year divided by 1950 = NOK 154 per hour. In addition, there is 12 % vacation pay, 14.1 % employer and 21.9 % pension (BKP).

Table 2 provides the estimated costs from a societal viewpoint. The estimated costs included both direct costs within and outside the health care service and indirect costs outside the health care service. The quantities measured are multiplied by unit costs

(prices) to obtain the total costs concerned. The OT intervention cost NOK 4635 per patient. The usual care group received no OT.

Table 3 presents the total cost differences for difference health care unit between patients with OT intervention and patient with usual care.

Table 3: Cost differences by health care units used per patient (based on Norwegian unit prices)

	OT (N=67)	Usual care (N=65)	Total cost with social contribution (OT) (in NOK)	Total cost with social contribution (Usual Care) (in NOK)	Cost differences OT intervention– Usual care (in NOK)
OT Home Visit (hours)	9.3	0.0	2581.16	0.00	2581.16
OT additional hours (hours)	7.4	0.0	2053.83	0.00	2053.83
Physiotherapy visit (hours)	3.4	4.2	943.65	1165.69	-222.04
Social worker (hours)	0.8	1.0	222.04	277.54	-55.51
GP visits (hours)	0.1	0.2	37.95	75.90	-37.95
Hospital specialist visit	0.2	0.2	0.0	0.0	0.00
Nursing home care* (hours)	47.7	37.4	12604.43	9882.72	2721.71
Domestic home care (hours)	19.0	23.2	4888.71	5969.37	-1080.66
Informal care (hours)	913.5	1125.8	208,204.92	256,592.34	-48,387.42
Total cost			231,536.68	273,963.55	-42,426.87

¥ It is rather unexpected that those receiving OT also need more nursing home care than those receiving usual in the Netherlands, could be due to the institutional differences, e.g. between Norway and the Netherlands.

As seen in Table 3 the costs differences for visits to a general practitioner (-NOK 37.95) and social worker (-NOK 55.51) are almost similar and hospital specialist doctor visits are equal in both groups. Costs for other health care, such as the physiotherapist services (-NOK 222.04) and domestic home care (-NOK 1080.66) are lower for the OT intervention group but higher only for nursing home care (NOK 2721.71). The main cost savings are appeared from the reduced informal care services for the intervention group (-NOK 48,387.42), around 90 % of total costs are due to informal care costs. Overall, the economic effect of the OT intervention reveals that on average OT intervention saves NOK 42,427 per successfully treated patient during three months of follow-up.

4.32 Sensitivity analysis

A sensitivity analysis has been done by imputing the ‘domestic home carer’ wage rates as a proxy for the informal carers’ cost. After imputing this wage rate, as seen in table 4 the

total costs per patient increase further for both the groups. On average, the total cost per patient with OT intervention is found to be NOK 258,375.31 and the corresponding costs for the patient with usual care is revealed NOK 307,039.55, implies that the cost saving further increase to NOK 48,664.

Table 4: Change total cost if use domestic home care wage cost as the hourly informal care cost

	OT (N=67)	Usual care (N=65)	Norwegian Unit Cost/Price (in NOK) ^a	Norwegian unit cost with social contributions (in NOK) ^b	Total cost with social contribution (OT) (in NOK)	Percentage (%)	Total cost with social contribution (Usual Care) (in NOK)	Percentage (%)
OT Home Visit (hours)	9.3	0	187.53	277.54	2581.16	1.11	0.00	0
OT additional hours (hours)	7.4	0	187.53	277.54	2053.83	0.89	0.00	0
Physiotherapy visit (hours)	3.4	4.2	187.53	277.54	943.65	0.41	1165.69	0.43
Social worker (hours)	0.8	1	187.53	277.54	222.04	0.10	277.54	0.10
GP visits (hours)	0.1	0.2	256.41	379.49	37.95	0.02	75.90	0.03
Hospital specialist visit	0.2	0.2	---	---	---	---	---	0.00
Nursing home care (hours)	47.7	37.4	195.23	264.24	12604.43	5.44	9882.72	3.61
Domestic home care (hours)	19	23.2	190.1	257.30	4888.71	2.11	5969.37	2.18
Informal care (hours)	913.5	1125.8	190.1	257.30	235,043.55	90.97	289,668.34	94.34
Total cost					258,375.31	100.00	307,039.55	100.00

This sensitivity analysis reveals that our average cost saving estimate is highly sensitive and depending on the wage rates that we impute for the valuing informal carers' cost.

Using Graff et al' s (2008) estimated standard deviations on different health care units for both groups, we further estimates a 95 % confidence intervals for our estimates. Table 5 reports the confidence intervals for individual health care components and average total costs per patients as well as the cost differences between OT intervention and usual care (last column, table 5).Table 5: 95 % confidence interval (CI) for the mean costs by health care units used per patient.

	Unit cost with social contribution (OT) (in NOK)	Number of unit of health care used for OT (N=67)	St dev (SD)	95 % confidence Interval of total cost¥		Number of unit of health care used for Usual care (N=65)	St. dev (SD)	95 % confidence Interval of total cost		Cost differences OT intervention–Usual care (in NOK) 95 % confidence interval	
				Upper limit	Lower limit			Upper limit	Lower limit	Upper limit	Lower limit
OT Home Visit (hours)	277.54	9.3	1.8	2700.79	2461.54	0	0	0	0	2700.79	2461.54
OT additional hours (hours)	277.54	7.4	1.4	2146.87	1960.79	0	0	0	0	2146.87	1960.79
Physiotherapy visit (hours)	277.54	3.4	6.5	1375.63	511.67	4.2	8.1	1712.22	619.15	-336.59	-107.48
Social worker (hours)	277.54	0.8	2.1	361.60	82.47	1	2.7	459.72	95.37	-98.12	-12.89
GP visits (hours)	379.49	0.1	0.5	83.38	-7.49	0.2	0.8	149.70	2.09	-66.32	-9.58
Hospital specialist visit	---	0.2	---	---	---	0.2	---	0.00	0.00	0.00	0.00
Nursing home care (hours)	264.24	47.7	79.2	17615.71	7593.15	37.4	61.1	13807.77	5957.67	3807.94	1635.48
Domestic home care (hours)	257.30	19	45.6	7698.17	2079.24	23.2	48.7	9015.64	2923.10	-1317.47	-843.86
Informal care (hours)	227.92	913.5	666.5	244579.77	171830.07	1125.8	830.2	302,593.0	210,591,62	-58,013.3	-38,761,6
Total cost				276,561.9	186,511.44			327,738.1	220.189.0	-51,176.2	33,677.6

Note: ¥95 % confidence intervals are calculated as: (Mean health care unit \pm 1.96* $\sqrt{\text{variance}/N}$)* Unit cost with social contribution (2nd column)

As seen in Table 5, the 95 % confidence interval of the costs saving for the physiotherapist services ranges between NOK 107 and NOK 337, for the domestic home care services it ranges NOK 844 and NOK 1317, and for the informal care services varies between NOK 38,762 and NOK 58,013. In general, the 95 % confidence interval of the total average cost savings ranges between NOK 33,678 and NOK 51,176 per patients.

5. Results: Stair lift

Based on the information through face-to-face interviews, this section provides a summarized version of the information received from the interviewees. We first summarize the information received from the user of a stair lift, followed by a summary of the information got from the informants those supposed to have a stair lift, however, not having one yet. In the following summarized version, we have highlighted the information about interviewees' demographics, living conditions and daily activities, and how they cope with their disabilities and to what extent they need formal and informal care, information on different health care consumptions as well as their quality of life.

5.1 Informants *with* a stair lift

5.11 Informant #1:

Philip is 59 years old, single and lives alone. He suffers from rheumatism and had a mini stroke three years ago. Presently he lives on the 3rd floor in a low-rise building without elevator. The building has five floors, cellar included. He uses stitches indoor and has two outdoor electric wheelchairs in addition to a work chair in the kitchen. He waited half a year for the stair lift to be installed in the building.

Philip is dependent upon domestic home care two hours per week and home nursing care once a week for about fifteen minutes. He has not been to the doctor for a while and does not get any sort of physical treatment. His son helps him a couple of hours every week.

Philip does the shopping and attends Bingo more or less every evening. He travels around in his wheelchairs and takes the bus very often. He likes to go out as often as he can. After getting the stair lift he says it is much easier to get out and about than it was previously without the stair lift.

His quality of life improved very much after having the stair lift installed. He is very happy for it. He is very happy to be able to live on his own. Without the stair lift this would not have been possible, he says. He also says that it is much cheaper to stay in his flat as the rent does not cost very much, less than NOK 2000 a month. He wants to stay there as long as he can and his wish is to manage everything in his life with as little help as possible.

Cost related with the stair lift: NOK 184,000

5.12 Informant #2

George 70 years old is married with two grown-up children. He lives on the 2nd floor in a high house with eight floors. He lives together with his wife, daughter and grand-daughter. George suffers from diabetes and post polio syndrome. He is paralyzed in his upper arms and cannot stand up anymore. He has three electric wheelchairs, a car, an electric hospital bed, a «flush»-toilet and an electric rest chair.

George has had a wheelchair-lift for about fifteen years due to a few steps from the 1st floor and out of the building. The lift is installed from the basement to the 1st floor. The lift is «parked» in the basement from where he can get out. When he wants to get from the 1st floor to the 2nd he uses the ordinary lift in the building.

George needs help to get to the bathroom, to change wheelchairs, to take a shower, to wash clothes: in sum – to do the housework and personal care. Gets this help mainly from his wife, daughter and son. He visits the doctor about twice a year. He drives the car and takes the lift without any help. The occupational therapist is now planning to help him rebuilding his bathroom, as his daughter is about to move out of the flat. He gets no help from other instances.

George says that installing the lift changed his life to the better and saved lots of time and energy from himself and his family. Before the lift his family had to lift him up the stairs every time.

Cost related with the stair lift: NOK 153,500

5.13 Informant # 3:

John is 75 years old and married. He lives at the 4th floor in a low-rise building together with his wife. He has had several prolapses in his back, and has so called «drop-feet» which means that he cannot lift his feet very well and cannot walk without straps on his feet.

The lift was installed in the building last year from the basement to the 4th floor. His car has also been rebuilt so that he can drive using his hands. Because of the lift and the car he has a very-well functioning social life, he says. The lift together with the car has improved his quality of life and for his wife as they are now more able to go out and have a social life.

He uses the lift for carrying heavy things such as bags of food or wood from the basement for the fireplace in the apartment. He tries not to use the lift every time he needs it, as it is very important for him to get some exercise during the day. His wife used to help him a lot before with carrying stuff up the stairs. Now with the lift, daily life is much better, both for himself and his wife.

He has physiotherapy service every week as well as acupuncture. Before he got the lift, he went twice a week to his physiotherapist and did a lot of physical exercises on his own in addition. He has been to his doctor once during the last 3 months.

Cost related with the stair lift: NOK 205,000

5.14 Informant # 4

Ann is 82 years old and has had a stair lift installed in her house for the last 4–5 years. She lives together with her husband in a semi-detached house with two floors. They have rebuilt their house so that she can stay at home as long as possible. Ann has a progressive muscle disease that started when she was in her sixties. Now she uses an electric wheelchair indoor and outdoor and she has several other assistive technologies such as electric chairs, bed and flush toilet.

She needs help from others all day long. As she says, she can read, think and talk and use a computer. That's all. She cannot eat. She therefore gets home nursing care one hour twice a day – medicine and food (through a probe).

She cannot live in her house without the lift. She is very contempt with it. It makes her life a lot easier and enables her to use the first floor and to get out of the house anytime with the help of others.

She has two personal assistants that assist her in her daily life 40 hours pr. week. In addition her husband helps her a lot and does some of the housework. She has also one hour home care every 14 days. She has physical treatment two hours pr. week. She also visits her doctor about four times a year.

Cost related with the stair lift: NOK 86, 500

5.15 Informant # 5

A woman of 72 years old lives in a house with three floors. She has had a lift from the 1st floor to the second floor since 1997. She also has a lift from the second floor to the third floor, but this one she has paid for herself. She has two wheelchairs, one electric for outdoor and one manual for indoor. She suffers from rheumatism. Her main disease, however, is a yellow staphylococcus infection in one knee and in one hip, she got the infection when she was hospitalised in the 90's. She has two prosthesis, one in her knee and one in her hip. She cannot walk and she is not able to pick up things from the floor, for this she uses special assistive devices. She needs assistance when getting into the stair lift and when she is changing wheelchairs.

She is very happy for the lift as it has enabled her to live in her own house for more than 12 years. She loves her home and wants to manage everything by herself with as little help as possible. She says that to her, the value of the stair lift cannot be measured in money as to her it is a matter of well-being and life and death. She is so happy to live in her house and would never have been this happy in an institution for elderly people. She also says she is entitled to more services from the municipality, but she resists this, as she wants to be in activity all day long. She does not want to be passive. She insists on managing her daily life on her own. She cooks all her meals on her own, she is just about able to shower and go to bed and toilet without assistance. She cannot go to the store and buy food, but she has solved this problem by ordering food from a store that brings the stuff to her house. When she needs to go out by car, she uses the municipality transport services for wheelchair users.

She is very fond of gardening work, in fact she loves it. This means everything to her, it makes her happy. With the help of the stair lift and the wheelchair she can get out and around the house. She has physiotherapy one hour pr. week. In addition she has home care services one hour pr. week. She also sees her doctor several times pr. year. She has been hospitalised for several years altogether (8 surgeries) during the last 10 years, but she has not been to the hospital this year.

She gets a little help from her brother who lives nearby; she also gets some help from two girlfriends/neighbours.

Cost related with the stair lift: NOK 86, 500

5.16 Informant # 6

Woman, 85 years old. Widow with 3 grown-up children. She lives in a block of flats with three floors. She has had the stair lift for about 8 years. She got the stair lift due to embolism and stomi.

She manages her daily life more or less herself with the help of her children. She can cook for herself, and her family helps with washing clothes and cleaning the house.

Twice a week, 2 hours pr. day, she participates in rehabilitation activities at an institution for elderly people. She uses the stair lift everyday and can walk around with the help of a rollator. She says that the stair lift improved her quality of life incredibly when she got it.

Cost related with the stair lift: NOK 121,500

5.2 Informants *without* a stair lift

5.21 Informant #1

Elizabeth is a 67-year old married woman. She lives in a house together with her husband and her mother (her mother lives on the top floor). The house has three floors. She needs two lifts, one indoor down to the 1st floor and one outdoor from the garden up to the street. She has not yet got the lift and talks about all the problems she has moving around in the house and around outside.

She has rheumatism and has had a small cerebral thrombosis in 1986. Her arms and legs are very weak and she has problems with her balance and can hardly walk without assistance. She is able to walk alone downstairs, but not upstairs. The toilet is for instance downstairs. She can only use one arm at the time. She is totally dependent upon her husband who is home on a long term sick leave. He helps her during the day. She also gets help from her mother who is 90 years old and a friend. She spends most of her day in her living room, she hardly goes out.

In addition to the help from family and friends, she receives home care one hour pr. week (such as washing and so on). She sees the physiotherapist twice a week and the doctor once a month. She gets home nursing care once a week.

Estimated cost related with the stair lift if install: She is supposed to receive two stair lifts one for inside house and another one for outside. The estimated cost for the stair lifts are- inside: NOK 65 300, and Exterior: 72 000; total cost: NOK 137,300

5.22 Informant #2

Louisa 70 years old, lives in a house. She just became a widow as she lost her husband last week. Her house has two floors, but she lives more or less in the upper floor where she has everything she needs. Downstairs is a freezer and guest bedrooms. She says that she looks forward to be able to use the 1st floor more, to tidy and get access to her freezer.

Louisa has COPD (chronic obstructive pulmonary disease). It is very hard for her to walk down to the 1st floor, she goes out primarily to fetch the newspaper and to the store, this takes much longer time now than before – like half an hour to buy a few groceries.

Now she tries to avoid using the stairs as much as possible as it takes a long time to walk down and she has problems getting enough oxygen. Regarding assistive technology she has a shower chair, an electric working chair and a «walking chair». She is also waiting to get a small lift installed so that she can use her bath tub.

She needs the stair lift for getting to the 1st floor, to carry heavy bags of food and so on. She thinks her health will improve when she gets the stair lift.

Now, since her husband died, she will get home care service every second week, one hour and ten minutes each time. She also get home care nurse every day for 10 minutes or so. The nurse just pops in to see whether she is all right or if she needs anything. She can make food on her own, but she cannot do anything that needs physical activity, like hovering or wash the floors.

She has been hospitalised three times during the last three months. First time she stayed at hospital for a week, the second time for two weeks and the third time also for a week. She visits the hospital once a month, for control, screenings and so on (lungs, stomach, cancer). She sees her doctor three times a year.

Estimated costs of the stair lift if install: NOK 92,500

5.23 Informant # 3

Helena is a 74-year old and married woman. She Lives in the 4th floor in a low-rise building together with her husband. Her husband has also a very poor health. She is waiting impatiently to get the lift installed. She has been waiting for the lift for around 6 months and has called the services several times and asked for it. She is so tired of sitting in the sofa all day long. She can hardly walk because of severe pain in her hips and back, she has also had two heart operations. She has been in this situation and for the last year. She can walk a little bit using her walking chair, otherwise she cannot walk, nor stand.

She needs help for absolute everything during day and night, getting dressed, making food, washing clothes, shopping, toilet, etc. Her husband helps her getting dressed, that's all. She has a bath chair, a working chair in the kitchen and to walking frame for indoor and outdoor use.

She gets a lot of help from her three sons that are living nearby – shopping, taking the rubbish out, and so on. A friend does the housework for her several times during the week, a few hours each time. Her neighbours also help her a lot, especially walking up and down the stairs.

She and her husband get meals on wheels three days pr week. She visits her doctor every 3rd month.

It takes half an hour for her to walk down the stairs every time. After that she is very exhausted as she is kind of dragging herself using her arms only. She really thinks her life would have been better if she had had the lift earlier.

Estimated costs of the stair lift if install: NOK 191,500

5.3 Overall comments on the cost-effectiveness of *having and not having a stair lift*

From the above self-assessed descriptions by the users and expected to be use one of the stair lifts, it is rather apparent that having a stair lift has changed their daily life, improved the quality of life, and definitely reduced the need of formal and informal help. Nevertheless, based on the information, it is not possible for us to quantify the effectiveness or changes in quality of life of the current user of the stair lifts. Moreover,

it was not possible for us to grasp how much formal and informal care has been reduced (since interviewees have not exactly capable to report) after having the stair lifts or how many hours of formal and informal care is needed for those who yet waiting for a stair lift.

However, particularly if we see the following statements, it may give us some indications about the reduction of informal care⁴:

- ‘installing the lift changed his life to the better and saved lots of time and energy from himself and his family’
- ‘saved lots of time and energy from himself and his family’,
- ‘his wife used to help him a lot before’.
- ‘it takes a long time to walk down’
- ‘It takes half an hour for her to walk down the stairs every time’

It may be possible for us to convert the total monetary expenses related with a stair lift into the number of hours cost for the informal care. By recalling our earlier estimates (for the dementia part of the study), if we assume an hour informal care cost is NOK 227.92 (per hour wage for a cleaning person with social contributions), then for the first interviewee’s the stair lift costs could compensate 673 hours of informal care services⁵. Analogously, for the second informant stair lift costs could pay off 807 hours and for the third informant it could compensate 899 hours of informal care services. If we average all 9 informants total cost of having a stair lift, then on average, the total cost of a stair lifts is equivalent to 656 hours informal care/user⁶.

One may convert the per user cost into different formal healthcare services cost by diving per hour unit cost of the services as well, for example, per user cost equivalent to (NOK 149,422/277.54) 538 hours of OT’s time cost. If we were able to know the precise information on different formal and informal healthcare uses reductions (due to having a stair lift), then per user cost could be distributed on the different units of healthcare uses.

Let us first assume that quality of life and other healthcare uses would be the same before and after having a stair lift for a present user as well as the potential user of a stair lift, but having a stair lift only reduce the need for informal care. If we further assume that the reduction of informal care is one hour everyday (e.g. informal care reduction if not take help for getting in and out form the house), then on average the stair lift cost equivalent to around 1.8 years (i.e. 656 hours) informal care cost.

Moreover, if we assume that a stair lift could function properly for 5 years, then due to a stair lift the society could save more than 3 years informal carers’ costs which is approximately $(3 \times 365 \times \text{NOK } 227.92) = \text{NOK } 249,572$.

⁴ Though our intention was not only focus on informal care, lack of information on the precise changes (i.e. after having a stair lift) on formal healthcare services uses, means we have to relied on indirect estimations approach. Since it is not clearly demonstrated by the informants how much the use of different formal healthcare services have potentially been reduced (due to having a stair lift), therefore we have emphasized on the reduction of informal care which seems rather perceptible.

⁵ The calculation is straightforward; cost related with the stair lift (e.g. NOK 184,000) divided by per hour informal care cost (227.92).

⁶ Total costs for all 9 stair lifts = NOK 1,344,800. Per user costs= NOK 1,344,800/9=NOK 149,422, which is equivalent to NOK 149,422/227.92=656 hours informal care costs.

If we go for a more conservative estimate, say the reduction of informal care is half an hour everyday then on average the stair lift cost equivalent to around 4 years informal care cost. Again, if we assume that a stair lift could operate for 5 years properly, then due to a stair lift the society could save more than 1 year informal carers' costs which is approximately $(1 \times 365 \times \text{NOK } 227.92) = \text{NOK } 83,190.8$.

Based on our assumption and from the above ad hoc calculations, one may conclude that for the selected group of people stair lift intervention may be a cost-effective device. This device could not only improve users' quality of life and social participation but also potentially effects on the use of formal healthcare, and indeed, on the use of informal carers' time, which seems to be cost saving for the society as well.

6. Discussion and Concluding Remarks

There is growing evidence that a diverse range of non-pharmacological interventions including occupational therapy, cognitive rehabilitation and tailored support for caregivers may be effective in the management of mild-moderate dementia (Graff et al, 2006; Loewenstein et al 2004; Thompson et al, 2007). This could also be true for different assistive devices for the individuals who can not do their daily activities independently with out these devices. A stair lift is considered to be an important cost-effective assistive technology for old or many younger individuals with disabilities who want to stay independently in their own home. To reduce the avoidable pressure on hospital and other municipality health care services, cost-effective health promotion and prevention measures may be needed.

In a recent study, researchers in the Netherlands show that OT can be an effective treatment for dementia. The study considers a group of 132 patients (67 with OT intervention and 65 with usual care) with mild to moderate dementia and their caregivers are divided into two sub-groups. One received home-based sessions of OT, from an experienced therapist and the other sub-group did not receive OT. To get the changes in health care units due to OT intervention, we exploit Graff et al.'s (2008) study. To estimate the economic effect of OT intervention (i.e. total cost savings due to intervention) in Norway, the quantities got from the Graff et al.'s (2008) have been multiplied by different unit costs (prices) based in Norway.

Overall, our estimates indicate that community OT intervention for people with dementia is cost-effective. The main cost savings are from reduced informal care for the intervention group (NOK 48,387.42), around 90 % of total costs are due to informal care costs. For the intervention group, the mean costs per patient of all care for the three months are NOK 231,537 (95 % CI: NOK 186,511 and NOK 276,562) and NOK 273,964 (95 % CI: NOK 220,189 and NOK 327,738) for the control group. This implies that from a societal point of view community OT is an effective and efficient intervention strategy. Our estimates demonstrate that with a probability of 95 %, on average it saves NOK 42,427 (95 % CI: 33,678 and 51,176) over three months per successfully treated dementia patient with OT.

From the self-assessed evaluations of the users of a stair lift and those who expected to have a stair lift, it is rather obvious that having a stair lift has changed their daily living, improved quality of life, formal healthcare services and definitely reduced informal care. Having a stair lift may also reduce use of different health care units. Lack of the details quantitative information on the use of different formal and informal health care unit means it is difficult for us to make any precise quantitative estimates of the cost-effectiveness or cost savings of the stair lift intervention. However, with some plausible assumptions it seems that stair lift potentially effects on the informal carers' cost (say, if reduction is half an hour to one hour per day), which seems to be cost saving for the society as well.

Two sorts of caveat need to be noticed, particularly related with OT intervention on dementia patients. Firstly, our estimates are based on the health care quantities

estimated by Graff et al.'s (2008) and hence any strengths and limitations of that study would also affect our estimates. One of the strengths of Graff et al.'s (2008) is that they use randomized controlled trials (RCTs) and carried out the economic analysis from a societal perspective and hence the study is empirically robust. Graff et al.'s (2008) find that the main cost savings are from reduced informal care. Estimations are based on the hours invested by caregivers according to guidelines from the Netherlands which reflect on average costs for caregivers. However, in their calculations details of the time invested by caregivers are not provided (Draper, 2008). Moreover, the extent to which the lower costs are due to improved function in the dementia patients or increased competence in the caregivers is unclear (Draper, 2008).

Secondly and importantly, our cost-effectiveness estimates are based on a strong assumption that OT intervention in Norway is as effective as in the Netherlands. However, due to differences in health care delivery systems in Norway and in the Netherlands as well as differences in patients and health care providers' attitudes, norms and belief, this assumption may not be reasonable. Hence our estimated average cost savings due to OT intervention in Norway may also be exaggerated, and consequently questions could be raised concerning our estimates. Moreover, in our estimates the main cost savings are from reduced informal care which is around 90 %. This could be due to the fact that lack of information on wages/prices for the different comparable health care units in Norway (as with the study from the Netherlands) means we are not able to include and value all health care units in our analysis which may exaggerated our informal care costs estimates. Nevertheless, previous studies have estimated that the opportunity costs of informal care make up about one third of the total cost of care (Jönsson et al, 2006) but Graff et al (2008) constitute 60–65 % of total costs is due to informal care- a difference that needs to be reconciled.

Our stair lift part of the study is based on a small numbers of respondents' self assessed evaluations about their quality of life and other formal and informal health care uses. Recall bias or reporting bias may not unlikely in this case. Moreover, since we do not select stair lift users or potential users randomly, and because of small number of sample, our respondents may not represent the true population (i.e. all users and potential users of stair lifts) accurately.

Having in mind these limitations of our study, it may not be desirable to make a concrete conclusion on the cost savings due to the OT intervention on dementia patients or the stair lift intervention in Norway. Nevertheless, from a societal view point, particularly in terms of informal care costs, our tentative conclusion is that community OT seems to be a cost-effective intervention strategy for patients with dementia in Norway. Similar conclusion can also be drawn for the stair lift intervention. To be more specific and confident on our conclusion, further thorough research is absolutely needed.

6.1 Future Research

On the basis of our study, for future research some specific recommendations can be made:

1. To estimate the genuine differences in health care consumption by patients with OT intervention and control group in Norway, a well designed RCT based on Norwegian population is recommended for the future research. Moreover, well educated and well trained occupational therapists are needed to perform this complex community OT intervention. Furthermore, particularly in dementia research, Wimo (2007) acknowledges RCTs of 12-month duration are required for a cost effectiveness analysis because major cost-driving events such as institutionalization take longer to emerge. Twelve-month outcomes will be required with and without booster sessions for adequate evaluation of this study.
2. To evaluate cost-effectiveness of the stair lift intervention, a well designed RCT could be useful for the future research.
3. One cost rarely considered in the cost-effectiveness analysis is the cost of training and professional development. In future research, this cost component should be included in the estimation.
4. It seems that the main cost savings for OT intervention are from reduced informal care. This may also be case for the stair lift intervention. By estimating the details of the time invested by different caregivers and valuing the corresponding 'caregivers' time' through opportunity cost approach could be a significant contribution of the estimation of the true social cost of informal care. Future study on the cost-effective analysis of OT intervention for the dementia patients as well as stair lift intervention should follow such an approach.

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APPENDIX A

INTERVJUGUIDE

Prosjekt: Økonomisk effekt av ergoterapi

BAKGRUNNSVARIABLE

Kjønn, alder, sivilstand, yrke, funksjonshemming, type hushold, når ble heisen installert.

OM BOLIGEN

Boligtype, romfordeling, hvordan er boligen tilrettelagt?

Hva slags tekniske hjelpemidler bruker du?

Hvor i huset er heisen installert

Hvor lenge stod du/har du stått på venteliste for å få heis?

Hvem i kommunehelsetjenesten/hjelpemiddelsentralen hjalp/hjelper deg med å få heis?

Hvordan har du opplevd denne prosessen?

AKTIVITETER

Beskriv dine daglige gjøremål og hvordan du kommer deg rundt i og utenfor huset

Hva gjør du selv og hva må du ha hjelp til

Hvilken type tjeneste er du *mest* avhengig av?

Hvor mobil er du innendørs og utendørs?

*AKTIVITETER UTEN HEIS (spørsmål til personer uten heis)

Hvorfor trenger du heis?

Trenger du mer hjelp fordi du ikke har heis, i så fall hva slags hjelp?

Hvem er det som hjelper deg? (e. g. slektninger, venner)

Hva går hjelpen til:

For eksempel:

organisering, transport;

påkledning eller veiledning

spising, tilsyn og rydding;

tilsyn,

Hvor lang tid tar det å gjøre disse oppgavene på en vanlig dag

Hvor ofte har du besøkt / brukt følgende tjenester i løpet av de siste tre månedene:

Fysioterapi

Sosialarbeider

Lege

Spesialisthelsetjeneste

Sykehjem (timer)

Hjemmesykepleie (timer)

Barnehager (dag)

Måltider på hjul (dager)

innleggelse på sykehus (dager)

Opphold på institusjon (dager)

Pleiehjem

Aldershjem

Hvilke gjøremål kan du ikke gjøre fordi du mangler heis?

Hvordan virker det å ikke ha heis inn på din livskvalitet?

AKTIVITETER MED HEIS (spørsmål til personer med heis).

Hvordan har heiset hjulpet deg i dagliglivet?

Hvilken type hjelp har heisen «erstattet»?

Utfører du flere daglige aktiviteter selv nå etter at heisen ble installert?

Trenger du mindre eller mer hjelp til noe nå, utdyp?

Hvor mye er uformell omsorg redusert på en vanlig dag, angi timer pr. dag

Er du mindre, eller er du mer avhengig av tjenester fra kommunchelsetjenesten?

Hvilke tjenester trenger du mindre eller mer av?

Hvor ofte har du besøkt/brukt følgende tjenester i løpet av de siste tre månedene

For eksempel

Fysioterapi

Sosialarbeider

Lege

Spesialisthelsetjeneste

Sykehjem (timer)

Hjemmesykepleie (timer)

Barnehager (dag)

Måltider på hjul (dager)

innleggelse i sykehus (dager)

Opphold på institusjon (dager)

Pleiehjem

Aldershjem

Opplevde du en helsemessig forbedring?

Fysisk forbedring og økt tilgjengelighet?

Ble det slik du hadde håpet på?

Hvordan mener du heisen fikk innvirkning på din livskvalitet?

Hva slags innsparing av ressurser vil du si heisen medførte for deg og for kommunehelsetjenesten?