

Effectiveness and Efficiency of Assistive Technology

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Randomised controlled trials (RCTs) are likely to provide the most reliable information on the effects of healthcare interventions. A well planned and conducted RCT offers the best likelihood for the estimates of effect not to be biased by external determinants. The efficacy of a health technology refers to its performance under ideal circumstances, i.e. what are the health benefits under carefully controlled conditions. Effectiveness refers to the performance of a technology in regular clinical practice, i.e. what are the health benefits in day-to-day clinical practice. Randomised controlled trials are usually executed under ideal conditions. In order to assess applicability of these data to other health care settings, judgement will be needed (Malmivaara et al. 2007).

Evidence based medicine (EBM) involves conscientious, explicit and judicious use of current best evidence in making decisions about care of individual patients (Sackett et al. 2000). EBM integrates the best external evidence with individual clinical expertise and patients' preferences and expectations. For clinicians in daily practice it is impossible to systematically identify, critically appraise and summarize the literature, because of the tremendous number of scientific papers published each year. Systematic reviews offer clinicians a solution to this problem. They are also the backbone of clinical practice guidelines.

Systematic reviews can be defined as the application of scientific strategies in order to prevent bias with the purpose of systematically identify, critically assess and summarise all relevant studies on a specific topic. Meta-analysis is a systematic review using statistical methods for combining and summarising the results of different studies. Cochrane Collaboration is a worldwide non-profit organization that prepares, maintains, and disseminates systematic up-to-date reviews of health care interventions. Cochrane Collaboration also develops the methodology of both systematic reviews and original studies including randomized trials, observational studies and diagnostic studies (Cochrane Handbook 2008).

The challenges which the health care faces to-day relates to an increasing need of services especially due to population ageing and emergence of new technology (Muir Gray 2002). In addition, there is an increasing demand because of rising expectations. The resources do not grow as quickly as need and demand. As a consequence we have to promote health, prevent disease and increase the value obtained by using wisely the healthcare resources. The term value denotes here to efficiency (cost-effectiveness) of the services, and includes two main components. The first refers to allocating resources between or within specialties or patient groups, and the other to the quality of the services.

Although RCTs usually provide the most reliable information on effectiveness, the hierarchy of different study designs is not absolute (Glasziou et al. 2007). Observational studies have allowed strong inferences e.g. about the efficacy of insulin in diabetic ketoacidosis. The effectiveness of assistive technology is similarly often obvious without a controlled study setting, e.g. the ability of a paraplegic person to move with a wheel chair. In these instances before after comparisons may suffice. If the aim is to compare the effectiveness or cost-

effectiveness of different wheel chairs with each other on all relevant outcomes, randomized controlled trials give the most reliable estimates of effect.

Like in many fields of medicine, also in the field of assistive technology high quality randomised controlled trials assessing the effectiveness and cost-effectiveness are rare. In these instances the evidence from observational studies should be considered. The GRADE criteria for assessing the strength of evidence takes into consideration also evidence from non-randomised comparisons (Atkins et al 2004). In some instances there is no scientific evidence, and the evidence derives from observations of the clinicians. At all levels of decision making the scientific evidence should be coupled with knowledge of the experienced professionals, values of the patients or customers and the resources at hand. Evidence may be weak, but there is always some evidence, and the best available evidence should be used in decision making.

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Outcomes of mobility devices

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Methods and material

”Systematic Review of Mobility Devices Outcomes”, was the first systematic review of the outcomes of mobility devices with regard to an individual’s activities and participation. The systematic review was conducted by searching for original studies and systematic reviews of mobility device interventions in seven electronic databases. Included in the search were all controlled studies and all types of follow-up studies that used both baseline and follow-up data. The studies were accepted for inclusion when the participants were over 18 years of age and needed the following mobility devices: sticks, crutches, walking frames, rollators, manual wheelchairs and powered wheelchairs (including scooters). Epidemiological studies and other cross-sectional studies were not included.

Results

Literature search gave more than one thousand articles, of which eight were accepted for inclusion in the review, representing seven studies. Three of the studies were controlled studies and four were follow-up studies with both baseline and follow-up data. No randomised studies were found. Two studies examined electric powered wheelchair interventions, one rollators, one walking frames, one focused on individually adjusted wheelchairs and one on a special powered wheelchair. In one study three different types of mobility devices were examined. All studies were relatively new, starting from 2003.

The seven studies accepted for inclusion used 17 different instruments and scales to measure mobility device outcomes.

The outcomes of mobility devices were clinically significant in all studies. No general conclusions can be drawn as to the impact of mobility device interventions on user activity and participation but the conclusions need to be based on individual studies. In two studies, the mobility device was effective in terms of individually set activity and participation aims. One study showed an improved ability to participate in social activities. Two studies found that the mobility device significantly affected the quality of life. The study with the best quality showed that an outdoor wheelchair has a significant effect on the activities and participation of stroke patients and their quality of life.

Conclusions

Although the outcomes of mobility devices are often self-evident, more research of a high-quality is needed to be able to compare different alternatives. In the present studies very little is said about the intervention process, which need be described in detail to be able to compare mobility device interventions. Cost-effectiveness studies might be important since mobility devices cost a lot and it is expected that they are cost-effective compared to other interventions such as personal help. Active use is often considered to indicate user benefits. However, benefits cannot necessarily be measured by how much a device is used, since the use is situational; even if a device is seldom used, it may efficiently meet the user's functional need. The principal purpose of mobility devices is to promote an individuals activity and participation. Effects on activity and participation are therefore most important outcome indicators for mobility devices.

Cost-effectiveness and policy making: the case of four-wheeled walkers

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The aim of this study was to investigate effectiveness and cost-effectiveness of rehabilitation by means of walkers for persons with restricted mobility (four-wheeled walkers). The walkers were of a number of different brands and models.

The study group included 205 first time users with several different diagnoses. The study was designed as a pre/post study with follow-up three months after the delivery of the walker. The “functional diagnosis” of the user the walker models prescribed and labour time used by the staff were reported by the prescribing staff (physiotherapists and occupational therapists). Background data and various outcomes were reported through questionnaires by the users themselves.

The users reported a number of positive effects of the intervention:

- less need for help on a daily basis,
- increased possibilities to participate in "activities outside home",
- less problems in carrying out daily activities,
- significant improvement in generic quality of life, measured by means of the instrument EuroQol (EQ-5D).

The average cost of the walkers amounted to SEK 1 300. In addition, there were labour costs related to examinations and the delivery of the walkers, amounting to SEK 300. The direct costs per case amounts to about SEK 1 600 on average.

The only indirect cost where a change due to the delivery of the walker could be expected was “special transport service”. There was a slight, although non-significant, increase in this cost, after delivery of the walkers.

With the estimated gain in quality of life of 0,07 (on the scale of EQ-5D, ranging from 0,0 to 1,0), we derived a cost per quality adjusted years gained (cost/QALY) of SEK 24 000. This estimate is based on a period of one year, which in general is a pessimistic assumption. With a period of three years the cost/QALY amounts to about SEK 8 000.

In policy decisions, this means a very favourable balance between costs and effects. It is of interest to make a comparison with commonly used thresholds in health care. Here, cost/QALY-ratios below SEK 100 000 is considered very cost-effective, below SEK 500 000 moderately cost-effective (no strict interpretation of these thresholds). Obviously, first time use of the walker is very cost-effective, supporting high ranking in priority lists.

Reference

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Effects from lower limb prosthesis on daily life – a systematic review

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Introduction

Amputation of lower limbs in the western world is, in the majority of cases, the consequence of an obstructive peripheral vascular disease with or without diabetes mellitus. This condition is age-related and the incidence of amputations is rising due to an ageing population. Another common reason for amputation is a trauma, which affects a younger population and often is related to war. The development of new solutions in the area of prosthesis has been described and evaluated in the literature for many years. New technical solutions with microprocessor-controlled prosthesis are for the present predominate in the scientific literature. The goal of a successful rehabilitation with a prosthesis is to enable independence in mobility, activity and participation in individually-based appropriate daily life situations.

The aim of this study was to evaluate the quality of existing research studies in the area of leg prostheses targeting adults in terms of activity, participation and quality of life as outcome variables.

Material and methods

Literature was searched for in 14 different databases. The primary search focus was on studies with outcomes of lower limb prosthetic systems in terms of mobility, activity and participation. The search covered the years 1998 - 2008. We included studies with participants ≥ 18 years of age with one or two lower limb prostheses. Controlled studies and all types of follow-up studies with collected data on both baseline and follow-up were included. Two persons independently read all abstracts. After going through 435 abstracts, 363 were excluded in the first examination, due to the fact that they did not fulfil the inclusion criterias, were impossible to get or duplicates. The remaining 72 articles were ordered in full text and evaluated by the same two persons. Another 69 studies were excluded in this final examination.

Results

The remaining 3 studies were examined and evaluated for study quality. Study design, study method, internal and external validity, descriptions of included subjects and study intervention are all examples of quality aspects being examined and evaluated. The included studies deal with:

- 1) A report on prospective outcome for 18 transfemoral amputated individuals, treated with an osseointegrated prosthesis. A comparison of health related quality of life at a 2-year follow-up was compared to the preoperative situation.

- 2) A report on the effect of a silicone cover prosthesis provided to eleven trans-tibial amputee individuals. Outcome is a comparison in social behaviour, social discomfort and psychological well-being before and 3 months after delivery of the prosthesis.
- 3) A comparison between two different types of lower limb prosthesis. Twenty-one unilateral, transfemoral amputee individuals participated in different examinations, tests and questionnaires aimed at evaluating differences in function, performance, and preferences between prosthesis.

Outcomes of Ankle-foot Orthoses and Orthopaedic footwear

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Expenditure for orthopaedic footwear has been decreasing for the last 4-5 years after years of steady increase. The number of custom-made orthopaedic shoes provided from Assistive Technology Centre per year has been decreasing. The number of ready-made orthopaedic shoes provided per year increased until 2003, but after that it has been decreasing. Expenditure for ankle-foot orthoses increased during the years 2001-2003 in spite of a relatively steady number of grants. This is the criteria for analysing the development of orthopaedic footwear and ankle-foot orthoses during the last ten years.

Expenditure, number of grants, products, regulations of financial support and contracts on product purchase were analysed. The influence of the environment of the producers and two different projects on shoes and ankle-foot orthoses by the Assistive Technology Centre on the development in the period was also analysed. The first project (2003) was a follow-up of a hundred end-users of orthopaedic shoes from 2002, the second the response to a focus group analysis (2006) on the use of carbonfiber ankle-foot orthoses.

Regulations concerning financial support have expanded a few times during this period of time, also contracts have been reviewed every 3-4 years.

Assessment on the development is made and these factors observed in context to find explanations. Application information was analysed in order to find change in usage pattern or durability of the products for the last ten years due to changed methods of production, new products and new materials.

The main results show that new regulations regarding the amount of financial support, new contracts with new methods of production and products have increased the overall expenditure. But it may be concluded that follow-up projects and inspection on the producers service, cf. inspection year 2003, might reduce the number of grants as well as the expenditure. Regulations and contracts have supported development by encouraging new methods, new products and new materials. Nevertheless this does not seem to result in better durability or lower expenditure. But on the other hand one may ask whether it results in a better quality of products and more convenience for the end-users.

Effectiveness of upper and lower limb casting and orthoses in children with cerebral palsy

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Objectives

The objective was to summarize the evidence on the effectiveness of using upper and lower limb casting or orthoses in children with cerebral palsy.

Methods

Systematic reviews were searched from computerized bibliographic databases up to May 2003 for orthotic devices. Two reviewers independently identified, selected, and assessed the quality of the reviews using the Overview Quality Assessment Questionnaire complemented with decision rules. One reviewer updated the searches for reviews and randomized controlled trials (RCT) in Medline from January 2003 to October 2008.

Results

We identified five reviews on orthotic devices. These reviews summarized 5 RCTs and 27 observational studies. The methodological quality of the reviews varied widely. Based on the original studies included in the reviews on orthotic devices we found some short-term effects of lower limb casting on passive range of movement, and of ankle-foot orthoses on equinus walk. Evidence of upper limb casting or orthoses is conflicting. In the update search I identified two reviews and three RCTs. Similar to the findings from five reviews these two reviews found paucity of evidence on orthotic devices. One RCT found small short-term effects (5 or 12 weeks) of serial casting on passive and active dynamic ankle dorsiflexion, but no changes in function. Two trials on dynamic AFOs evaluated the same participants in random order twice over the course of a single day. Dynamic AFOs improved gross motor function compared to barefoot, and both dynamic AFOs and AFOs improved stride length, foot prepositioning for initial contact, control for equinus during gait and limited plantarflexion at push off. The dynamic AFO restricted ankle joint movements less than AFOs, but the AFOs reduced the median frequency of the electromyographic signal more suggesting better walking endurance. Long term effects of lower limb orthoses have not been studied.

Conclusions

There is paucity of evidence from primary studies on the use of casting and orthoses in children with cerebral palsy. The recent RCTs add to the understanding of the very short-term effects of the AFOs, but long-term effects remain to be evaluated in well-designed research.

Cost analyses of Assistive Technology

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The **overall cost** of an AT intervention includes product costs (related to purchasing, fitting, using and maintaining the selected AT product) and process costs (related to assessing the client, selecting and delivering the AT product, training the user, following-up, fullfill the related administrative procedures). For a proper understanding of the economic impact of an AT intervention, both components should be analysed in term of “social cost”. The presentation elaborates on the concept of “social cost” as the main indicator of the economic impact of an AT intervention, depicts a possible mathematical model, and describes how alternative AT solutions can be compared in terms of their social cost.

Product costs can be easily estimated by means of the SCAI (Siva Cost Analysis Instrument). It takes into account all costs borne during the product lifecycle including the human assistance – whether formal or informal – needed to operate the device. The social cost of the same AT device may be very different if used in different contexts. A recent study¹ investigated on the possibility to infer repeatable social cost figures for various categories of AT equipment. The first finding is that – not surprisingly – most AT solutions, though very expensive in terms of initial purchase price, lead to considerable savings in social costs, due to the reduced assistance burden. The second major finding is the marked variation in the social costs of different individual cases where similar AT solutions were implemented, suggesting difficulty in establishing repeatable social cost figures for a given device. As a matter of fact, the social cost depend on the individual context of the implemented AT solution, and on its inter-relationship with the other AT solutions composing the whole individualised AT programme.

Process costs can be analysed by tracking the costs borne by all actor involved (the user, the professionals involved, the Bodies responsible) through the various stages of the process: the *initiative*, the *assessment*, the *prescription*, the *authorisation*, the *decision*, the *delivery/verification*, the *use training*, the *follow-up*. A case study will be presented to show how these costs can be calculated and lead in certain cases to figures that are sometimes of the same magnitude of the product costs of even higher. Process costs are seldom considered as an issue in most AT public service delivery systems: today cost containment strategies are mainly based just on purchase prices negotiation. Conversely, maximising the process efficiency (e.g. by simplifying procedures) and increasing the process effectiveness (e.g. by ensuring high-quality assessment when selecting the product, and monitoring the product when in use to detect the outcome) may also lead to significant savings in AT interventions, while increasing the user’s satisfaction and reducing the risk of device abandonment.

Reimbursement policies can be better designed when evidence of process and product costs is available. The presentation will offer a preview of the findings of a Study carried out on behalf of the Italian Ministry of Health, to help take decisions on the reimbursement amount for each item of the National List of AT products eligible for provision (“Nomenclatore”). The method is different for custom-made products (es. individualized orthoses) and for off-the-shelf products (eg. a standard wheelchair).

¹ Andrich R, Caracciolo A (2007): Analysing the cost of individual assistive technology programmes. *Disability and Rehabilitation: Assistive Technology*, 2007; 2(4):207–234.

For custom-made products a spreadsheet has been developed - based on a mathematical model – able to track all physical production factors (eg. time spent by each worker, components and other resources used), value them according to given parameters, add appropriate indirect costs and markup and eventually lead to the product price. The proposed process for establishing the reimbursement amount involves three steps: the manufacturer fills-in the spreadsheet, leading to a proposed price; the Ministry carries out random audits on a sample of manufacturers, by means of on-site visits where the production cycle is observed to check whether it is consistent with the data declared in the spreadsheet; decision is finally taken as whether to accept the proposed price or redefine it on the basis of the audit.

For off-the-shelf products, a price monitoring system has been developed and implemented on the national information database of assistive technologies (www.portale.siva.it). The company responsible for the Italian market of each product listed in the database is required to declare the product configuration in terms of “Nomenclature” codes and the related prices to the public. Printouts can be obtained from the database showing comparative overviews for each “Nomenclature” code, with the products characteristics and prices distributions. In this way the Ministry avails a transparent tool to benchmark and negotiate the purchase price of the product, based on comprehensive knowledge of the market prices.

Assistive technology – user satisfaction with the services provided

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Summary

A survey was used (in march 2008) to assess the satisfaction of 2020 subjects (response rate of 35 %) in all ages in Norway, who had been provided with an Assistive technology devise (AT device) in October and November in 2007. The results show that most users are satisfied with the services given to them. To have a regular contact person is the most important factor (item) to determine the users' satisfaction.

Aims and satisfaction

The survey gives an answer to the following questions: To what extent are the users satisfied with the services when they were provided their AT devices? What are the most important factors in determining user satisfaction?

Background, technique, clinical detail, results and testing

There has been an increasing focus on objective measurements of outcomes of assistive technology products, services and training. Providers and payers of AT devices are calling for meaningful and reliable outcomes data on devices' use, performance, and efficacy as well as user satisfaction. The purpose of this survey was to evaluate the user satisfaction and to find out which factors are important in determining the satisfaction. The users were asked to rate, on a 5 point scale, their satisfaction with 12 different aspects (items) of the service delivery. 7 of the items were taken from the Kvazo instrument (a Dutch instrument which has been translated into English). The questionnaire was developed in cooperation with representatives from the user organisations. In addition the users were asked to state age, gender, county of residence, type of AT device provided, how often the AT devices were used, the effectiveness of the AT device and to consider whether their AT device was a complex or a simple one. The SPSS data program was used to analyse the data. The results show that all in all 82 % of the users were either very satisfied or satisfied with the services given when they were provided an AT device in October and November 2007. The results also showed that having a regular contact person is the most important factor in determining user satisfaction. Those who had a regular contact person were significantly more satisfied than those who did not have such a person. Age was also an important factor for user satisfaction. The user satisfaction was significantly higher among the elderly users, especially among those older than 80 years of age, and significantly lower among users under the age of 20. There were no significant differences between the other age groups. There was no significant differences when we compared other groups (complex/simple AT devices, high and low effectiveness, county of residence, different types of AT device provided, how often the AT device was used).

Discussion

There are different theories on what we measure when we ask the users (Lian et al 2005), and what can explain for the variation in degree of satisfaction. There are user orientated theories, relational orientated theories and structure orientated theories. The factors/items of greatest importance in this survey were the age of the user and whether the user had a regular contact person or not. The fact that age is important may mean that we measure certain aspects of the user. On the other hand, the results also show that the relational aspects are important for the user satisfaction (a regular contact person). This fact does not only reflect different aspects with the user, but also certain aspects with the service delivery system. This may mean that by asking the users, we can find out important aspects of the services we are providing.

Reference

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Technology and needs of people with dementia and their caregivers

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The aim of this presentation is to describe the findings of a review of studies that focused on technology supporting people with dementia and their caregivers. A literature search was carried out in eight scientific literature databases covering literature published between January 1992 and February 2007. A total of 46 studies providing original data and one review were included in this review. Analyses covered the aims of the studies, the technology used, study design, methods, outcome variables and results. The studies are difficult to compare because of the large variety of aims, technologies, design, and outcome measurements.

The results show that, the research is very much biased toward the residential care setting and toward moderate to severe stages of dementia. However, there are assistive technologies already available that could be tested in a home environment. Another bias is the emphasis on safety issues and caregiver well-being. Issues such as a lack of anything to do, lack of a feeling of security, social withdrawal, or restricted and limited access to outdoors, social isolation and problems with everyday activities at home are reported in studies looking at the everyday life of people with dementia. The few studies which tackled these issues, suggested that these problems can be somewhat alleviated by the use of technology.

In a vast majority of the studies, informal or formal caregivers were the main source of information, and the role of people with dementia was limited, if they played any role at all. In most studies, ICT was used, and the aim was to improve the quality of life of the informal caregiver and to reduce their care burden. In some studies, people with mild cognitive impairment or mild, moderate, or severe dementia used ICT for communication and recreation. No studies investigated the potential of technology in postponing residential care and no conclusions can be drawn about the cost-effectiveness of the use of technology.

National and international multidisciplinary research programs are needed to improve the knowledge on the possibilities and limitations of technology in supporting people with dementia and their carers. Research should focus on mild to moderate dementia and community living and cooperate with organizations of people with dementia and their family members. We need both qualitative and quantitative research to develop methods for user involvement and for studying use and usefulness. Technology can already be successfully used for supporting people with dementia and their family carers, but it requires assessment of their needs, individually tailored and reliable applications, personal assistance, and adequate social and health care services including follow-up of the situation of each individual.

Measuring Outcomes of Assistive Technology in Dementia

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The use of assistive technology by persons with dementia and their relatives has during the recent years gained increased attention and several comprehensive projects have been carried out. Different assistive technologies for persons with cognitive impairment and/or for their relatives are available today. This includes assistive technologies such as e.g. memory supports, time aids, specially designed telephones and for the relatives there are different kinds of alarms.

The use and effects of assistive technology in dementia are not well known. The field of quantitative assessment of assistive technology in dementia is quite new and the methodology is under development.

The aim of the present presentation is to outline some of the methodological challenges concerning measuring outcomes in dementia as well as to give some recommendations for practice.

Primarily the presentation will deal with the following issues:

- Dementia implies a progressive deterioration of e.g. cognitive abilities. This has implications for how to design studies.
- Before conducting assessment studies, the aim of the assistive technology must be clearly defined. This has important implications for choice of method as well as choice of outcome measures/instruments.
- How do we best collect data on quality of life of persons with dementia? This is an often studied and discussed methodological challenge when it comes to measuring outcomes in dementia.
- Which outcome measures are available when it comes to assessment of assistive technology in dementia?
- Relatives of persons with dementia are often involved in the care. How do we study the effects of assistive technology on the relatives' situation?

Systematic review: Outcomes of Environmental Control Systems and Smart Home Technology

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Introduction

Environmental control systems have been used for decades to enhance independence in everyday life for people with disability, while use of smart home applications is more recent. Most studies concern product usability, and no overview of outcomes in terms of activity and participation and related outcomes such as independence, quality of life, and user satisfaction has so far been available. The aim of this study was therefore to review scientific literature in order to identify outcomes of smart home technologies in terms of activity and participation, independence, quality of life, and user satisfaction, and further to assess the methodological quality of the identified research.

Methods and materials

A literature search was performed including controlled and pre-post studies on environmental control systems or smart home applications in real life environments, controlled by the user. Smart home was delimited to applications that assist the user in being active or in participation. Outcomes should target activity, participation, quality of life, independence, or user satisfaction. Hence studies only addressing input/control devices, smart home applications environment, security, and health were excluded.

Using keywords based on the inclusion criteria, 16 databases were searched. Original studies were searched for as well as systematic reviews in order to find possible secondary sources. When the search did not reveal already known articles, it was replicated with extended keywords. Besides, conference proceedings from three central conferences and two journals were hand searched. The search covered the years 1993–2007.

The first search identified 106 documents and the second 544. The studies were first screened based on title, abstract, and exclusion of duplicates, leaving 86 documents that were retrieved in full text and examined by two reviewers independently. This resulted in exclusion of 81 documents that did not meet the inclusion criteria, leaving five articles representing four studies for assessment of methodological quality. This assessment is not finalised and will not be reported upon.

Results

Three studies were pre-post studies including 5–8 participants (1,2,5), while one was a randomised controlled study involving 46 persons in the intervention group and 67 in the control group at baseline and 34 and 44 persons at follow-up (3,4). Their mean age varied from 27 to 60 years of age (range 6-82). Also diagnosis varied, yet most participants had

physical impairments. Two of the interventions can be considered as smart home technology (1,3,4) and two as environmental control (2,5) systems, even though the applications in several respects were similar.

The outcomes were overall positive, even though the results varied. Improvement of activity and/or participation was found in three studies (1,3-5) increased independence in two studies (2-4), improved quality of life in one study (1), and high satisfaction was found in one study (5).

Discussion

Even though outcome evaluation within the area of assistive technology still is in its infancy, it is surprising that so few studies have been performed and that most studies are rather small, making generalisation difficult. Even so the results indicate that environmental control studies and smart home technology are promising technologies in terms of increasing activity and participation, independence and quality of life for people with physical impairments. However, more studies are warranted.

Reasons for the low number of identified studies are probably due to the focus of the review, i.e. outcomes studies and studies on active user participation. Several of the identified studies were cross-sectional, but even though they are not outcome studies as such, they might still render interesting information about use of environmental control systems and smart home applications.

Enabling Occupation – The Users' Perspective of Environmental Control Units (ECU) in Everyday Life

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Background

Background of this study is on the fast developing Assistive Technology and the discussion in the Finnish society of supporting people with disabilities to live independently in their own homes as long as possible. Behind of this study are also the interest to meaningful occupation and its influence to wellbeing.

Objectives

Objectives of this study are to investigate the meaning of the ECUs in everyday life to the users and their experience of the use of the ECUs. The participants were ECU users, persons with disabilities, who have received their ECUs from the Kuopio University Hospitals Assistive Technology Centre. Data of this study is results of the North Savo ITSE project questionnaire of ECU users responses at the spring 2002 (n=23) and seven theme interviews of the ECU users (n=7). Interviews were done during the fall 2007. Collected data was analyzed by content analysis.

Results

As a result of the analysis three main categories were formed: influencing the well-being, master one's life and impact of technology. The participants were able to choose the time of their occupational performance and to shuffle one's posture with their ECUs. Possibility of independent occupational performance influenced participants' self-esteem and autonomy. Participants found ECUs dependable, but professionals' lack of knowledge of ECU technology, its possibilities to adapt for the people with disabilities and meaning of ECUs could hinder the use of ECUs. Environments architecture and attitudes were sometimes obstacles to full use of ECUs. Participants viewed technology development as a possibility in the future, but besides the technology, personal assistance is needed. ECUs are meaningful devices for their users and enable them to live more independently.

Discussion

This study supports results of the previous studies which have investigated the ECU use. All of them have established that ECUs are well used and that they have beneficial effects on the user's quality of life [5, 6].

This study brings to discussion few issues of environment and ECU assessment process. One is professionals' lack of knowledge of benefits ECUs and implementation of ECU technology for people, with different type problems of functioning. Lack of knowledge may be the reason that all those who would benefit ECUs are not referred to an assessment of ECU [4]. In other hand lack of knowledge can also lead to not use of ECU if the helpers do not know how to handle equipment or where to place the equipment so it is possible to use it [2]. Also environment changes, helpers chances, functioning of the ECU user chances, all these chances needs to follow up and adjustments of ECU [1]. Education and information is needed for helpers, rehabilitation workers, doctors and builders about ECU. Multidisciplinary teams' roles should be clear e.g. occupational therapists and engineering, because it has effects to ECU process [3]. The challenge is to keep up with developing technology, train professionals, users and helpers to use it. Systematic follow up is also needed to keep up ECU use. People with disabilities will have more technology and domestic appliances at home which need to be integrated to ECU.

This study is a small sample of ECU users. However it does provide the necessary feedback to KUH device centre and its assessment team to develop these services further. It has had already impact on the services and follow-up e.g. those who asked have received a reassessment of their ECUs. Due to the fast technical development, additional research is needed to improve the applications and the meanings of the ECU's for their users. It is also important to study more the barriers of the environment to the use of such technologies. Further studies are needed to review the assessment and installation process and also to evaluate the economical benefits of the ECUs. However this study does give an overall picture of clients' satisfaction with ECUs in the Kuopio University Hospital region.

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