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ERGONOMIC LIFTING AND TRANSFERRING TECHNIQUES  
FOR SECURITY GUARDS WORKING IN HOIVAPIIRI  
– A PRACTICAL GUIDE

Degree Programme in Physiotherapy  
2015



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The purpose of this thesis is to create an educative tool to prevent wrong assisting and handling methods for security guards working partly in the field of health care. Understanding ergonomics and basics of human movement, assisting and transferring can be made safe and pleasant for both the client and the assisting person. Musculoskeletal problems were the most common reason for sick-days in 2012. In the field of health care, nurses are most vulnerable for musculoskeletal injuries when assisting or transferring the patient. Since security guards lack the education for ergonomics, basics of human movement and ergonomic lifting and transferring techniques, an educative booklet was made by the author covering the above mentioned topics.

The booklet contains theoretical and practical information. Information in the booklet is presented once to the client by the author, but no practical teaching or follow-up on the learning of the techniques is included. Techniques are chosen by the author based on the most common situations in which the security guards are assisting the clients. Practical information is demonstrated in a three picture series with text instructions.

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# 1 INTRODUCTION

Expanding private security services into the field of health care brings challenges. When combining the security and health care services, the educational standards must be met. Security guard working with people who have health related problems are educated for this need. In addition to the basic security guard education, they are educated in second level degree in the field of health care or they have completed extra studies in the field of first aid. (Website of the Turvatiimi) Since the security guards working partly in the health care are mostly encountering situations in which they are assisting human movement (247 Satakunnan Turvapalvelut Oy 2013) understanding of basic movement and ergonomics is needed in order to prevent musculoskeletal problems. (Tamminen-Peter & Wickström 2013, 23) The basic education of security guards does not include any health care related education with the exception of first aid. (Website of the Opetushallitus) The basic level education in the field of health care does not either include education in supporting human movement or functions in their work. An exception is made among the practical nurses who specialize into rehabilitation, in rehabilitation the education includes supporting daily activities in different environments. (Website of the Opetushallitus)

Employers are required to take care of the safety and health of their employees during their work by necessary means. Employer needs to consider circumstances related to the work and working conditions. In addition to this, the employer needs to consider aspects of working environment and the employees' personal capacities. (Työturvallisuuslaki 738/2002, section 8) Working station should be designed ergonomically, considering the characteristics of the work and employee's needs. In addition, the employer must provide necessary assistive devices related to the work, manual lifts and transfers which can cause detrimental effects to employees' health are made safe when it is not possible to use assistive devices and repetitive stress is as low as possible. (Työturvallisuuslaki 738/2002, section 24)

Musculoskeletal problems were the biggest problem leading into sick leaves in 2012. (Official statistics of Finland (OFS): Kelan sairausvakuutuslasto 2012)

Developing risk management from the basis of risk evaluation included with safe patient transfers provides the basis for prevention of musculoskeletal problems in health care. To further decrease these problems, focus should be targeted at ergonomic design of the working environment, using adequate assisting devices and agreeing on safe conduct of work. (Tamminen-Peter & Wickström 2013, 22)

## 2 PURPOSE OF THE THESIS

Aim of this study is to address the legal requirements for the employer. As a result of this study, the employer will get a tool with which one can teach proper ergonomics and lifting- and transferring techniques to his employees. Based on tool, a practical guide, which covers information about ergonomics, human movement and assisting properly, provided by this study, the employer should have a better view on which assistive devices could be useful for this type of work required by law. In addition, the current employees will get an educative tool with which they can further increase their knowledge and hopefully direct their thinking towards safer and more ergonomic working methods. As a result of improved assisting techniques addressed in the booklet, employees should have better understanding about assisting and therefore improves clients experience when assisted by stranger.

## 3 HUMAN MOVEMENT

Willingness to move is a natural instinct of human beings. Both movement and action can be initiated based on external stimulus through different stages or internally based on personal motives and goals. (Sandström & Ahonen 2011, 24) As a general definition, movement is transferring from one posture to another. Maintaining a chosen posture is challenging for the nervous system, but moving and controlling the movement is even more challenging. Through movement, human beings can reach a desired destination or a goal. Because the task of movement is difficult for the nervous system, the first step is to release degrees of freedom in the joints. This is done by recruiting the muscles to work together, or, in synergy. In addition to muscle work, movement requires predictive and sensory regulated reactive tuning. (Sandström & Ahonen 2011, 27)

Through sensory feedback, brains not only get information about body itself but also about the environment. We are sensing our bodies through multisensory system, which means that we are getting different kind of information through different systems from the same source. (Sandström & Ahonen 2011, 27) Balance organ, or vestibular organ, controls balance, directs function and other senses in a given space. (Sandström & Ahonen 2011, 28) Vision system is giving information about outside world, creates observations and directs motorics. (Sandström & Ahonen 2011, 30) Hearing system has three primary tasks which are detecting the source of an audio stimulus, locating it and lastly, recognizing the stimulus and interpreting the information. Although at first look the information received by hearing system seems chaotic, it creates an “auditive landscape” of the surroundings (Sandström & Ahonen 2011, 31) Lastly, even when eyes are closed in a dark space, human beings sense the position of the joints through inner feedback system called proprioception. Proprioceptive chain runs through our bodies from head to toes and the ideal function of this chain is essential in activating the necessary muscles to maintain an erect posture. Proprioception has a significant role in daily activities because it effects to motor abilities and therefore to the skill to function efficiently in our environment. (Sandström & Ahonen 2011, 34)

### 3.1 Natural movement patterns

Human beings move according to natural movement patterns which develop in childhood. All the individuals has learnt the basic set of movements and these serve as the basis for all the different movement patterns, such as turning sideways, rising up from the bed or standing up. These motor skills are the foundation for the more complex movements as well. (Tamminen-Peter & Wickström 2013, 73)

Movement can be either two- or three dimensional. In two dimensional movement, the movement occurs in front and back direction whereas three dimensional movement includes rotation of the trunk for support. Two dimensional movement is more strenuous on the muscles and requires more strength than three dimensional movement. As people get older, three dimensional movement becomes more common be-

cause the amount of moving in general is reduced and the motor abilities diminished. (Tamminen-Peter & Wickström 2013, 76)

Movement patterns are individual so in order to assist the best way possible, the assistant needs to know what are the natural ways to move for this specific client. For example, if an elderly person is used to move in a specific way it is easiest to also assist him to move in that same way. This is extremely important when working with people who suffer from memory related diseases, these people might have problems learning new movement patterns. (Tamminen-Peter & Wickström 2013, 77)

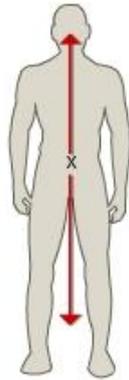
### 3.2 Biomechanics of moving

Mechanics, when studied by engineers, investigates structure and movement in relation to designing bridges and airplanes. Mechanics are equally applicable when studying structure and movement of organisms, this form of research is known as biomechanics. (McNeill 2005, 1) Biomechanics means studying the forces which affect and happen during movement and their effects in different parts of the body. By understanding the basic idea of biomechanics, the understanding of basic movement and loading is easier in addition with the principles with which we are using assistive devices. Outer forces encountered by our musculoskeletal system are countered by inner forces, muscles. (Tamminen-Peter & Wickström 2013, 78)

#### 3.2.1 Center of mass

Movement which occurs vertically, the center of mass in both upper body and whole body are important concepts because gravity affects to the body through these points. (Sandström & Ahonen 2011, 164) Center of mass is considered to be the point of the body in which all the body weight is focused. By moving the center of mass and the starting position of the movement, the basic movement of human being can be facilitated greatly. (Tamminen-Peter & Wickström 2013, 78) The center of mass in the upper body is located approximately 33 centimeters above the hip joint and the center of mass of the whole body is located two centimeters in front of the sacrum (Picture 1). (Sandström & Ahonen 2011, 164-165) When initiating movement, both of

these center of mass points are in an important role. The aim is to move the center of mass forward by swinging the leg forward, this causes the upper body to “fall” forward and the walking starts naturally and efficiently because to counter the “falling”, the person needs to take another step. (Sandström & Ahonen 2011, 165)



Picture 1. Center of mass. (Website of BBC)

The center of mass changes if the person is carrying an object, in this case the center of mass in question is both the center of mass of the person and the center of mass of the object. In patient transfers this means the joint center of mass for both the person assisting and the person who is being assisted. (Tamminen-Peter & Wickström 2013, 78) Further the load is from the lifters center of mass, the further the joint center of mass will be. In a case where the joint center of mass is beyond the base of support, the person doing the lift has to take a step in order to prevent falling. In order for the lift to be both ergonomic and efficient, the lifter should keep the load as close as possible throughout the lift. (Sandström & Ahonen 2011, 245-246)

### 3.2.2 Base of support

Base of support is the area inside the outlines of an object when it is standing (Picture 2). For a human being, base of support is formed by the area between the feet from the heel to sole of the foot. When the heel is towards the ground the toes are not an active part of the balance system. If the person has a poor balance control, the use of toes, especially toe flexors as a compensation might lead into deformities such as hammer toe, claw toe or mallet toe. (Sandström & Ahonen 2011, 166) A common compensation for improving balance with older people is to spread the legs for wider base of support in sideways direction. (Sandström & Ahonen 2011, 166) The base of

support can be made even wider by using an assistive device, such as walking cane. (Tamminen-Peter & Wickström 2013, 78)



Picture 2. Base of support in standing. (Duarte & Freitas, 2010)

### 3.2.3 Balance

For a human being able to stand, the basic requirement is the sense of balance. (Sandström & Ahonen 2011, 166) Balance is a complex skill related in controlling the upright position. Balance can be further divided into static and dynamic balance. Static balance refers to the ability to keep a certain posture such as sitting or standing. Dynamic balance refers to the mechanisms which keeps the posture when moving or when an outer force shocks the posture. This way balance can be divided into smaller skills which are: ability to maintain posture on a stable base, postural control on a moving base, postural control in movement and postural control when an outer force affects the posture. (Sandström & Ahonen 2011, 52) Essential parts of balance are the concepts of center of mass and base of support. Being able to stand balanced, a person must control the center of mass inside the base of support. If the point of center of mass moves beyond the base of support, the muscles need to work harder in order to keep the balance. (Tamminen-Peter & Wickström 2013, 79)

When assisting a person, moving the center of mass towards the edge of the base of support makes moving and assisting easier. For example standing up from the chair is easier when the base of support is made smaller by pulling the feet below the chair and center of mass brought forward by leaning forward. A hand support should be

made available for the client in order to ease the balance control. (Tamminen-Peter & Wickström 2013, 79)

### 3.2.4 Forces affecting the body

The body is affected by numerous inner and outer forces. Inner forces include muscle strength and forces affecting between the joints. Outer forces are required to initiate movement. These forces include gravity and normal force. In addition to these forces the body is affected by friction, resistance forces, for example by air or water, and lift. (Tamminen-Peter & Wickström 2013, 79)

Gravity affects everything and everywhere on earth. (Tamminen-Peter & Wickström 2013, 80) Gravity is the force with which the earth pulls an object towards its ground. (Sandström & Ahonen 2011, 157) Normal force is the force between objects and it is always perpendicular in relation to the surface. When a person is standing on the ground gravity pull the person towards the ground but normal force counters it and the person does not fall “through” the ground. The normal force can be greater or smaller than gravity depending on how much the person pushes towards the surface, when pushing with the legs the amount of normal force is affected by both gravity and the amount of force produced with muscles. The normal force is transferred to the ground through the bony structures of the body; in sitting, normal force is related through pelvic bones, on prone leaning on hands the normal force is related through arms, lower extremities and pelvic bone structures and on standing the normal force is related through the lower extremities. (Tamminen-Peter & Wickström 2013, 80)

Normal force prevents sliding and helps to keep the balance with friction. Taking a too long step causes the angle with which the heel touches ground to be too steep, sliding occurs between the two surfaces. In this situation, the amount of friction is not enough to prevent sliding and the person falls. In body control and walking, it is important to know how to utilize perpendicular normal force. (Sandström & Ahonen 2011, 159). Friction is the force which resists the movement between two surfaces. The friction force is always to the same direction as the contact surface and its effi-

ciency is affected by the properties of the two surfaces and the force which presses the two surfaces together. (Tamminen-Peter & Wickström 2013, 80)

When instructing a client in walking it is important to let the client know that the angle of the step cannot be too steep, in other words the step needs to be short. To reduce the impact force caused by the step, the weight should move quickly on the leg. This way the center of mass moves back inside the base of support. If the surface is slippery it is a good addition to have footwear which increases friction. (Sandström & Ahonen 2011, 159)

#### 4 ERGONOMICS

The term ergonomics has its roots in the Greek language; the word ergo means work and nomos laws of nature. (Website of the Työterveyslaitos 2013) Ergonomics is a broad term which covers a way of thinking, adaptive research and practical implementations. Ergonomics aims to design, by using guidelines and methods of planning or developing, the systems, equipment, working assignments and the environment to serve the individual. In short, ergonomics is adapting the needs of technology to serve the user, a human being, the best way possible. (Launis & Lehtelä 2011, 19)

When planning the working environment, the information about human structures, mechanisms, skills, needs and approaches has to be taken into consideration. Informational background of the concept ergonomics is formed by humans' physical and mental function when coping with technical solutions. This information can be adapted into ergonomical design principles and guidelines which are based not only on information, but also on studies of the practical situations. Ergonomics combines both scientific research and practical implementation. (Launis & Lehtelä 2011, 19)

According to the International Ergonomics Association (IEA), goals of the adapting ergonomical principles are combining and enhancing the co-operation between man and technology to provide efficiency, quality and reduce disorders during the pro-

cess. In addition to previous, the goals also include providing safety, well-being, health and development for the individual. (Launis & Lehtelä 2011, 20)

#### 4.1 Ergonomics in patient transfers

Physically the most demanding tasks in nursing are assisting the patient to move or manual lifts and transfers. The manual lifting in this context refers to activity which aims to move, lift, lower, pull, push, carry or roll an object by using muscle strength. The basic idea is to avoid moving the patient manually in a poor position. (Website of the Työterveyslaitos 2013)

Teaching how to lift patients has been included in the education of the health care professionals for a long time. The legislation considering lifting and patient care was renewed in the year 1992. In England, the Royal College of Nursing reconsidered their lifting policies and decided on the basis of the new legislation that two nurses should not lift more than 50 kilograms even in good conditions. The aim was to end the manual lifting and to use patient lifters instead. This directive was revised later and manual lifting would be allowed if it considered only a small part of the patients' body weight. (Tamminen-Peter & Wickström 2013, 58)

In the field of health care, when lifting and transferring the patient, the patient is also encouraged to be active during the lifting since the requirements for lifting people are different than lifting objects. This activates the client and reduces the load caused for the personnel who are doing the lift. When activating the client, the staff members have to take into consideration that the lift might require instructing the client and the actual lift might take a little longer. When co-operating with the client or multiple people, everyone needs to know when and how the lifting happens in order to avoid injuries. (Launis & Lehtelä 2011, 189)

The term "lifting" is somewhat misleading, it is more common to speak about transferring or sliding the patient. (Launis & Lehtelä 2011, 189) Tamminen-Peter and Wickström (2013, 58) present this policy in the following fashion in their book:

avoid lifting, instead transfer, slide or roll and use a lifting device for the patients who can't take support on their own legs.

Based on the studies, there are several factors which increase the loading of patient transfers causing problems in the musculoskeletal system, especially problems concerning back. These factors include: repetitive handling of heavy burdens above 10 kilograms up to 20 kilograms increases risk for back problems, many patient lifts a day, repetitively working with curved back or exposing the back for torque movements and the lack of working space or assistive devices. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 16.)

#### 4.2 Controversial lifting techniques

Some of the older lifting techniques have been found to overstrain the person who are using these techniques. Not only do they harm the person doing the lift, they also reduce the activity of the client significantly. These older techniques are still used in Finland due to the difficulty of changing the habits in the working places. In addition, the education is just now starting to adopt the newer techniques in their programs. The change should happen in co-operation with the working life and the professional studies. (Tamminen-Peter & Wickström 2013, 59)

One of the most common wrong lifting technique still in use today is the dragging lift (Picutre 3). In this technique two people lift from under the armpits of the client. This technique was discovered inefficient, loading for the assisting person and painful for the client. With hemiplegic clients whose hand is either partially or totally paralyzed, this lifting technique causes soft tissue damage in the shoulder area. On the other hand, if the client has strength in his own hands the grab from under the armpits makes the use of clients' own strength harder. (Tamminen-Peter & Wickström 2013, 59)



Picture 3. Dragging lift. (Janette Ahola, 2015)

When lifting the client alone, one of the most common technique to use is by assisting the client from the front, assisting person supporting the clients' knees with his own legs. This way the client can take support from the assistants' neck, shoulders, hips or any exterior support. By assisting the client this way, the natural pattern of standing up cannot occur because the client is not able to bend forward. This lifting technique can also cause damage for the assistants' neck area especially if the clients' legs don't hold as intended. (Tamminen-Peter & Wickström 2013, 59-60)

Traditional lifting (Picture 4), done by two assisting persons, has been known to be very strenuous for the back since 1980's. (Tamminen-Peter & Wickström 2013, 60) In this techniques, two persons lift the client from the edge of the bed while both are bent over to the bed while the patient takes hold behind the assistants' necks. This method was condemned in the end of the 1980's because it breaks every rule of safe patient transfers. This lifting technique is rare in Finland but few institutions were still teaching this method in 2000. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 19.)



Picture 4. Traditional lift. (Janette Ahola, 2015)

#### 4.3 Modified transferring techniques

As the biomechanical studies has shown the traditional assisting methods to be overloading especially for female employees, the concept of safe patient transferring has changed. In Finland the most commonly used methods are Durewall method and kinesthetic method. Both of which has shown to reduce both subjective and objective loading for the personnel. Also, the clients feel these techniques more pleasant than the old ones. (Tamminen-Peter & Wickström 2013, 60)

Durewall method is based on the idea that with the smallest movement possible one would gain the most efficient outcome without causing damage or pain. (Tamminen-Peter & Wickström 2013, 60) The Durewall method highlights that instead of lifting, the client should be pulled, pushed or slid whenever it is possible. Sliding should be made easier by reducing friction with hands or sheets made by sliding material. The actual lifts should be done using assistive devices whenever it is possible. The assisting person should also be working near the person keeping his back straight, not bent or twisted with small transfers at a time. Durewall method is based on co-operation with the client, this means that the interaction with the client is a key element and the assisting person should be telling the client what is coming next and how he should

react while himself using weight shift and wide grabs not to use too much strength. (Tamminen-Peter & Wickström 2013, 61)

Kinesthetic method as an approach describes and analyses systematically human movement and the meaning of movement for emotions, learning, daily activities and health promotion. Kinesthetic method provides also the tools to affect the above mentioned topics. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 60.) The aim of the method is to reduce the loading of the assisting person, increase the activity of the patient during movement and facilitate the movement of both the assistant and the patient. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 61.)

In every action done by a human being, the core idea relies in moving or movement. A person can learn new things in any point of their life if they are able to control what is happening to them. Without movement, the senses cannot differentiate between the qualities of sensations. When following this principle, it means that the client should be as active as possible and feel that they are active in every aspect of the transfer. In kinesthetic method the basis of assisting is using the remaining resources of the client as efficiently as possible and this way supporting the clients feeling of being able to control himself. The method emphasizes the interaction happening while the patient is touched when moving and in sensing the movement. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 61.)

Kinesthetic method utilizes the skeletal system and the support surfaces provided by environment when shifting weight. Weight transfer and supporting the weight of the body is the job of human skeletal system. For muscles being able to do dynamic work or movement, the weight needs to be off from the muscles. The weight of the body is divided in different sections of the body; head, upper body, pelvis, upper and lower extremities. These parts of the body are connected by movement parts; neck, shoulder joints, pelvic girdle and hip joints. The movement parts make the weight shifting possible. When assisting a client the assisting person should not hold from a movement part because this restricts free and natural movement of the client and also inhibits the possibility of doing a weight shift. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 60.)

If a movement part is locked, it joins two segments of the body together making the transfer harder. This can be seen in the difference between two- and three dimensional movement. In two dimensional movement the weight of the body is distributed equally throughout the body and therefore makes the movement relatively heavy. In three dimensional movement, when the client rotates the body, the weight making the other side lighter and easier to move. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 60.) Three dimensional movement is seen more optimal when assisting clients. Pushing and pulling are the initiating the movement, their co-operation creates tension into the body which reduces the strength required by the movement. To minimize the muscle strength required, the emphasis of movement is in utilizing different directions between body parts and between the body and the environment. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 61.)

#### 4.4 Assistive devices in patient transfers

Assistive device is a device or an instrument which facilitates, compensates, eases or balances impairments related to function and participation such as clients independent transferring. (Tamminen-Peter, Moilanen, & Fagerström 2010, 33) According to the research, using the assistive devices reduces the physical loading and improves the working posture. The amount of accidents related to the patient transfers, in addition with the loading, was recorded to be reduced when a proper assistive device was chosen for that particular transfer (Picture 5). (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas, 2007, 48) Assistive devices can be divided into groups according to their capabilities. Assistive devices listed here can either reduce friction, increase friction or give a better grip for the one who assists the patient. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas, 2007, 44)



Picture 5. Assistive device designed to help two people assisting. (Janette Ahola, 2015)

Assistive aids which reduce friction are commonly used in health care. A plastic bag or silk sheet are the simplest materials which are used in this purpose. When there is a need for friction, for example when assisting to stand up and the client needs some extra friction under his footing, assistive aids to increase friction are used. These aids prevent the client from sliding down when pushing himself up from the bed for example. Material for this kind of aids can be for example rubber or plastic. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas, 2007, 45) If the client who needs assistance is out of proper reach or normal hold is not sufficient enough, the assisting person should use assistive aids to improve his grip instead of pulling from the clothes or lifting under the armpits (Picture 6). (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas, 2007, 44)



Picture 5. Assistive device designed to improve grip. (Janette Ahola, 2015)

#### 4.5 Research comparing the old and the new transferring techniques

Effects of old and loading transferring techniques have been studied and compared into the new, modified transferring techniques. The aim of the study was to find out if the Durewall method and kinesthetic method were less strenuous than the old ones. In addition, the aim was to find the least strenuous method to use when assisting clients. This technique had to be safe and comfortable for the client, allowing maximal participation in transferring in regards to their functional capacity. (Tamminen-Peter 2011, 13)

The study included 12 female nurses who were divided into two groups and 18 elderly, functionally restricted clients. Both of the groups received education on both of the methods studied but in different order. In the study, the nurses' physical exertion was measured both subjectively and objectively. The clients participating to the study rated their own feeling of security, control and comfort and their knee extension activity was measured. (Tamminen-Peter 2011, 13)

Based on the results, the group which received kinesthetic assisting education last reached the highest level of skill. When using these new techniques, both measured and perceived physical exertion was reduced when compared to the old techniques. There were no significant differences between the new methods used. The patients also viewed the new techniques both safer and more comfortable. With the increase of nurses' skills in transferring, the patients felt more comfort, safety and control when transferred. When patients has the chance to take hold on something else than the nurse, the physical load of the nurse is greatly reduced. Lastly, the patients were more capable of activating themselves when the nurses learnt to give them enough time and space to do so. (Tamminen-Peter 2011, 4)

## 5 HOIVAPIIRI

In Pori, there is an around the clock on call service for clients called Hoivapiiri. Everyone who is working in Hoivapiiri has a minimum of second level education in social and health care, practical nurse for example. In addition to this they are educated in first aid and security services. The service includes the basic health care check-ups; checking the blood pressure, heart rate, blood sugar levels, oxygen saturation, temperature and assistance in toilet, moving or transfers. (Website of the Turvatiimi) Since November 2013 there has been a total of 1263 alarms concerning Hoivapiiri only, 534 of which were falls. (Figure 1) The amount of falls total up to 42,3% of all the alarms (Figure 2).

The on call security guard receives the alarm via safety phone which is a device with which the client can signal for help if they feel that their overall condition or the general health status is somehow altered in their own opinion. The safety phone includes an alarm button which is attached to a wrist band or into a necklace so that the button is always with the client. This service is available for both public and private sectors including private homes, elderly homes or nursing homes. Besides the elderly, the service can be useful for people with restrictions in their mobility, clients with special needs or staff members working in different nursing homes to provide safety. The service includes an around the clock alarm center service which receives the alarms and does the initial evaluation of the help needed. After the initial evaluation, if there is no need for an ambulance, the alarm center relays the alarm to Hoivapiiri with information received from the client. (Website of the Esperi)

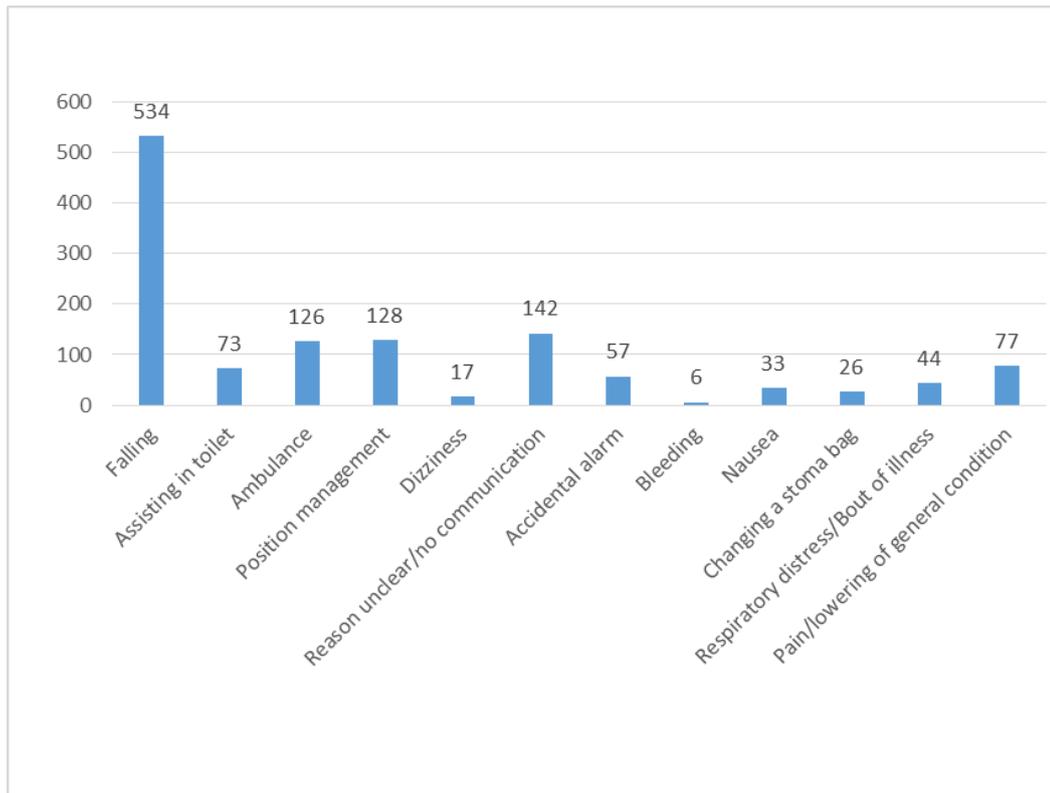


Figure 1. Amount of alarms in Hoivapiiri (247 Satakunnan Turvopalvelut Oy)

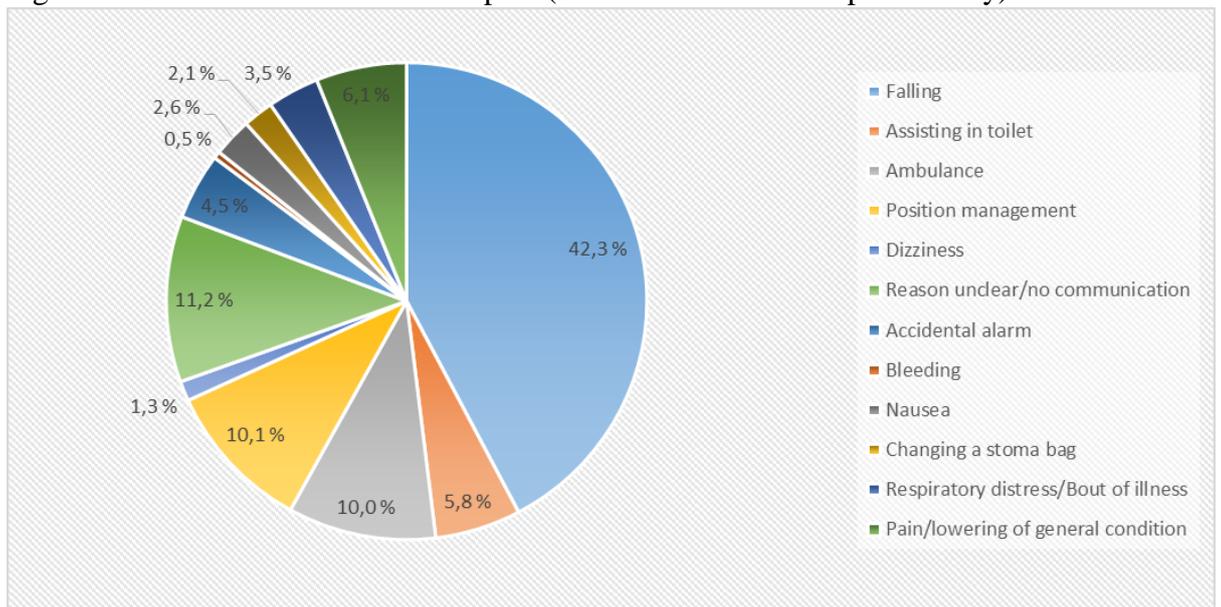


Figure 2. Division between the alarms (247 Satakunnan Turvopalvelut Oy)

## 6 IMPLEMENTATION

Based on the verbal interviews done by the author with 247 Satakunnan turvapalvelut Oy employees and the employer, it was clear that there was a need for an educational tool which would include information about ergonomics and proper lifting and transferring techniques in order to prevent musculoskeletal problems in the future. This information would be presented in a form of a practical guide. The employers' only request was to include information about proper lifting techniques.

In order to be able to transfer clients efficiently, the assistant needs knowledge about functional anatomy, biomechanics, natural movement patterns, basic principles of patient transfers and assistive devices. In addition, the assistant needs skills in controlling their own body, assessing the clients' movement capability, using assistive devices and activating and guiding the client. Lastly, the assistant needs to combine both skills and knowledge to different clients in different situations. (Eloranta, Kivivirta, Mämmelä, Salokoski, Tamminen-Peter, Ylikangas. 2007, 25.)

The information in the practical guide consists of ergonomics in patient transfers, Kela sickness benefit statistics 2012, biomechanics of movement (covering center of mass, base of support and balance), natural movement patterns and assisting accordingly. This information was included in order to provide theoretic background for the chosen transferring techniques. In addition to the theoretical background the information in the practical guide covers also assistive aids used in transferring, information about proper transferring techniques and pictures in which the chosen techniques are demonstrated and explained.

A practical guide is a print media. Print media can be used to instruct individuals instead of groups. (Koskinen-Ollonqvist, Parkkunen & Vertio 2001, 8) Print media is used when the aim is to share knowledge and the advantage is that there is a possibility to present information in a clear, minimalistic way. Another advantage is that the recipient can familiarize themselves with the information in their own time and if needed, go back to the material to refresh their knowledge. (Koskinen-Ollonqvist, Parkkunen & Vertio 2001, 9)

## 6.1 Methodology

This thesis is a practice based thesis. In a practice based thesis the aim is to develop the services of a company based on the needs of that company. Depending of the target group, the end product can be a book, guide, cd, exhibition, development plan or any other project. In addition to these, practice based thesis can also be planning and/or implementing an event. (Website of the Virtuaali ammattikorkeakoulu)

Practice based thesis includes two parts; practical implementation and reporting the thesis. In practical implementation the aim is to show the professional competences based on the knowledge and skill gathered from the theoretical background. In reporting, the research information is put into words. (Website of Hanna and Ville-Matti Vilkkä)

Practice based study is composed of practical implementation, theoretic framework, research and reporting. Combining research and practical implementation the aim is to develop, specify and renew a product to serve the individual with evidence based background. The research information acquired from the practice based study is gathered for further development of the practical implementation. The practical implementation is planned and implemented based on the current theoretic knowledge and the research information is acquired as feedback from the participants in the study. (Website of Hanna and Ville-Matti Vilkkä)

## 6.2 Thesis process

Thesis process began in the spring of 2014 when I started working in 247 Satakunnan Turvapalvelut Oy. I worked in Hoivapiiri which was described earlier and during the spring I interviewed in an informal manner my colleagues about the need for an ergonomic information package. When I discovered there was a need and motivation from my employer for such work, I contacted my teacher if this could be a possible bachelors' thesis topic. At this point it was agreed with both the 247 Satakunnan

Turvapalvelut Oy and my thesis tutor that I would plan a one day practical training session about ergonomics and ergonomic lifting and transferring techniques.

The aim of the practical training session was to teach the security guards working in Hoivapiiri about importance of ergonomics and proper lifting and transferring techniques. The education session was divided in two parts, lecture and practical training. In the lecture part, which was planned to last for 45min, the employees would have been introduced to the theoretical background. The theoretical background consisted of ergonomics, human movement and basics of patient transferring. After the lecture it was planned to have a practical training session, scheduled to last for 3 hours including breaks, to teach new ways to transfer clients and to discuss with co-workers and the instructor if there would have been any questions. After the lecture, the participants would have answered into a feedback questionnaire to tell their feelings about the lecture.

When all the agreements were signed I began working on my theoretical background for the thesis in the end of July 2014. During the autumn of 2014 I finished my theoretical background and I was able to plan the lecture accordingly. In the November of 2014 I contacted all the employees of 247 Satakunnan Turvapalvelut Oy and informed about the coming lecture, which was planned to be in Satakunta University of applied sciences Tiilimäki campus in December 2014. At this point, of all the employees, one replied that he would be willing to participate. In the first implementation day there were no participants so the lecture had to be postponed. Due to tight schedule and the coming Christmas holidays, I was unable to plan another date since I wanted to present this thesis already in February 2015. The plan was to write the implementation, discussion and introduction parts after the lecture during Christmas break.

I contacted my thesis tutor in January 2015 that my original plan was not successful and the thesis client showed some lack of motivation towards participating the lecture. She suggested that I would gather the lecture material into a form of practical guide and include the transferring techniques in picture format with explanations how to do them correctly, this way I would still have time to finish my thesis before February 2015 if I was productive (Table 1).

May 2014	Finding a thesis topic based on summer job.
August 2014	Working on theory.
September 2014	Working on theory.
October 2014	Planning the lecture based on theory.
November 2014	Informing the participants of the coming implementation.
December 2014	1 <sup>st</sup> attempt of the planned implementation.
January 2015	Re-planning the implementation with tutor teacher.
January 2015	Compiling the information of the lecture to a booklet and finishing written part of the thesis.
February 2015	Finishing and presenting the thesis.

Table 1. Thesis process.

## 7 DISCUSSION

Creating the practical guide was easy since I already had the theoretical background ready and in lecture format. I was able to use the PowerPoint slides in the practical guide with little modifications. I was also able to recruit my classmates to help me to take the pictures of me demonstrating the chosen transferring techniques. I finished the written part of the thesis during the end of January 2015 and planned my thesis presentation during early February of 2015.

For me the thesis process was a fairly fluent and easy to manage. I had a clear vision of my thesis from the very beginning of my process and I was not only able to use the thesis template as my study plan but also in a way to organize my thoughts of the

theoretical background during the process. The thesis template gave me a sense of reassurance as the table of contents kept updating during the process that I would be able to finish as planned. The only hindrance of the process was the failure to give the lecture as planned. Maybe there were some lacks in motivating the clients enough to make them see the worth of this information in the long run in order to prevent musculoskeletal problems. Also, one participant had had a night shift before the lecture so understandably was not able to join. Thanks to my thesis tutoring teacher I was guided quite fast back on track since I was at total loss during Christmas break and the beginning of January and had lost hope of finishing this thesis as planned since summer of 2014. I think the practical guide is a nice substitute for the lecture in written information and at least the transferring techniques are presented in picture format as well. Unfortunately this approach leaves out the possibility to ask questions from the instructor if there arises any.

Personally I feel that the aims of the study were not reached as well now that the lecture did not happen as planned. In the beginning I planned the aims with the legislation in my mind and in the lecture I was supposed to address the legal matters more clearly. Now that the information is transferred to a booklet, some information had to be cut out and legislation was part of it. Other than that I feel that the practical guide achieves all the other aims nicely and at least introduces some assistive devices which could be useful for this type of work.

For further research, I would propose that the techniques based on this study would be somehow re-evaluated in a recap type of seminar. Basically the core idea would be the same as in this thesis, to organize a practical session with the client and the aim would be to see how they feel about the practical guide; has their subjective feeling of assisting a client improved, are they more confident when going to assist a client and what would they want to learn more or if they have any questions. Another approach would be to evaluate, presuming that these techniques and instructions are applied, are there any changes in the amount of sick leaves or subjective feeling of musculoskeletal problems, and if it is due because the lifting situations are now safer for both the employee and the client. Also one further research field could be to expand this study, from ergonomic transferring and lifting to better ergonomics when working in general. The work of this studies client group, described earlier, consists

of mainly sitting in a car, driving for several hours during the shift with the exception of few walking breaks. The new study could address the driving ergonomics and what kind of exercises could help possible existing problems or how to utilize the walking periods in order to prevent musculoskeletal problems.

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