

**ZDRAVJE STAROSTNIKOV**

**HEALTH OF THE ELDERLY**



**Proceedings**

Edited by  
Ana Petelin and Nejc Šarabon







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# Zdravje starostnikov

## *Health of the Elderly*

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Edited by Ana Petelin and Nejc Šarabon



2018



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# Nutrition disorders in the elderly living period

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## *Abstract*

*Introduction:* A healthy and balanced diet is an important factor in healthy lifestyle in all age groups. It is important to be aware that dietary needs change with age and adjust the daily diet regime accordingly. The purpose of this paper is to review existing research in the field of malnutrition of the elderly, present the most common nutritional disorders and the causes for them in order to prevent malnutrition and to reduce the morbidity among the elderly and thus maintain or improve nutritional status.

*Methods:* A descriptive method of working with a review of domestic and foreign professional literature in the database EBSCOhost, PubMed, Web of Science, Wiley and the shared bibliographic-catalogue database (COBIB.SI) was used.

*Results and discussion:* In the literature review, it was found that in older age frequently occur dietary and metabolic disorders, which are the cause of a poor quality of life in later life.

*Conclusions:* There are many reasons for insufficient food intake for older people, but appropriate education and awareness programs and timely, appropriate identification of malnourished individuals and those with risk of malnutrition, can help reduce the frequency of nutrition disorders.

*Keywords:* healthy nutrition of the elderly, malnutrition of the elderly, prevention of malnutrition, nutrition disorders

A healthy and balanced diet helps older people to maintain a high quality of life (Liang-Kung et al., 2007; WHO, 2015), since they favor the absence or delay of various disorders, such as cardiovascular disease, diabetes, cancer and cognitive impairment (GBD, 2013). Much attention is paid to over-feeding, although malnutrition, especially in the elderly, is more wide-

spread (Margetts, 2003; Cederholm et al., 2017), which was long unknown or „skeleton in the hospital closet“ (Butterworth, 1974). The European Society for Clinical Nutrition and Metabolism - ESPEN (European Association for Clinical Nutrition and Metabolism) highlighted the diverse nutritional needs of the elderly and the effect of nutrition on the functionality of the elderly (ESPEN, 2010). In Slovenia there is a problem with overweight on the one side, and frequent malnutrition among older persons in institutional care and patients on the other (Fajdiga et al., 2012; Gorjup Požnenel and Skela Savič, 2013; Hlastan Ribič and Kranjc, 2014).

The purpose of this review is to present existing research in the field of malnutrition in the elderly, to present the most common nutritional disorders and their causes in order to prevent malnutrition and reduce morbidity among elderly.

## Methods

### *Review methods*

A descriptive working method with a review of relevant domestic and foreign professional literature was used. As a measuring instrument, we used the medical information system PubMed, search in databases EBSCOhost, Web of Science and Wiley and a mutual bibliographic-catalog database (COBIB.SI). The literature review period lasted from May 2017 to April 2018. The following keywords were used: healthy nutrition of the elderly, malnutrition of the elderly, prevention of malnutrition, nutrition disorders.

In COBIB.SI, we entered the keywords and the requirement „articles and other components“ and limited the search request to the year of publication 2010 and less. Upon elimination, we obtained three relevant hits.

In EBSCOhost, we entered keywords using the Boolean operator AND, in various combinations: healthy nutrition of the elderly, malnutrition of the elderly, prevention of malnutrition, nutrition disorders, nutritional assessment, elderly. In determining the search criteria, we selected „Academic Search Elite“, all searched terms. The limitations in the search for results were: the possibility of viewing an abstract, a research published in English, the period of publication from 2010 to 2018. On the basis of the obtained results, we have eliminated inappropriate and repetitive.

We also searched for PubMed, Web of Science and Wiley in terms of keywords and exclusion criteria, we did not limit the year of publication. We reviewed titles and summaries and selected relevant scientific and technical contributions.

In the literature review we included some basic monographs in the field of nutrition and gerontology and web resources.

## Results

### *Nutrition in the elderly*

Dietary recommendations dictate the energy input of nutrients in a balance with energy consumption. Ingestion of nutrients should be in the appropriate ratio and quantity, arranged in several daily meals (NIJZ, 2016). The amount of fat consumed should not exceed 30 % of total energy intake, and unsaturated fatty acids must prevail (Fats and fatty acids in human nutrition, 2010). Trans fatty acids must be avoided, with a maximum of 1 % (Nishida and Uauy, 2009) and cholesterol, the limit value of which is 300 mg / day (NIJZ, 2016). The intake of simple sugars is limited to less than 10 % of the total energy intake of carbohydrates, which is 50-70 % (WHO, 2015). The recommended daily intake of dietary fiber is at least 30 g (NIJZ, 2016). The need for protein in adults is approximately 0.8 g / kg bodyweight / day, which is 15 to 20 % of the daily energy needs (WHO, 2015). Bauer et al. (2013) found that greater protein intake (1-1,2 g / kg body weight) is needed for older (> 65 years), for maintaining good health, for recovery after illness and maintenance of functionality, while Volpi et al. (2013) recommend even higher daily protein intake of 1.2 to 2.0 g / kg of body weight. Baum et al. (2016) note that the ingestion of easily digestible proteins with a very high proportion of essential amino acids reduces the need for a diet with very high protein intake. Metabolic age changes affect the needs for micro-nutrients, therefore it is necessary to provide an adequate amount of vitamins (D, B<sub>12</sub>, B<sub>6</sub>, E and C) and minerals (Calcium, Iron, Zinc) (NIJZ, 2016). Some authors note the importance of sufficient intake of vitamin B<sub>12</sub> for the prevention of cognitive disorders or the slowing down of Alzheimer's dementia (Moore et al., 2012; OHTAC, 2013). A distinguished Slovenian food expert dr. Dražigost Pokorn writes that the energy needs of the elderly are lower due to reduced metabolism and lower body activity, after the age of 85, due to oxidative stress, protein synthesis (Pokorn, 2003) is complicated, as is confirmed by recent studies (Cerović et al., 2008; Gabrijelčič Blenkuš et al., 2010; NIJZ, 2016). With age, the hormonal activity of the gastrointestinal system changes, peristalsis, nutrient absorption and digestive enzymes are reduced, which affects digestion, nutrient utilization and appetite reduction (Hlastan Ribič, 2008), therefore it is important to take nutrition recommendations into account and raise awareness among the elderly about the proper dietary regime.

### *Nutrition and metabolic disorders*

Sorensen and others (2012) state that in Denmark malnutrition affects about one-third of patients in the hospital. The Australian study shows that 40 % of elderly people living in community-dwelling homes are malnourished, in hospitalized elderly people is a low percentage of malnourished or endangered between 30 and 60 (Demény et al., 2015), while Heersink and others (2010) indicate an even 72 % of undernourished in hospital care (in the UK). The study, which was conducted in 211 Turkish homes for the elderly, found 33.6 % of the

malnourished (Tasar, 2015). Donini et al. (2013) confirm a high proportion of malnourished (37.6 %) and nutritionally endangered (75.5 %) also in Italy, with a higher proportion of those living in elderly homes. Gorjup Požnenel and Skela Savič (2013) found on sample 117 residents of the social welfare institution that 17.9 % of malnourished people and 32.5 % of the elderly between 75 and 95 years of age were at risk of malnutrition, while Poklar Vatovec (2013) on sample 20 residents of the social welfare institution is finding out five at risk of malnutrition and none malnourished. Cerovič et al. (2008) found that among the home living elderly population, there are less undernourished than among the elderly in institutional and hospital care.

Physiological and metabolic changes lead to an age-related progressive decline in muscle tissue and its function, which is further contributed by unbalanced nutrition and insufficient physical activity (Wang et al., 2012), which in turn increases the risk of fragility (Strojnik et al., 2016; Gabrijelčič Blenkuš and Jakovljevič, 2017).

Inadequate nutrition refers to deficit, surplus or imbalance in the intake of energy and/or nutrients (WHO, 2017). ESPEN has published a conceptual tree of prevailing eating disorders and defined nutrition, lack of micronutrients and malnutrition (loss of weight due to starvation, cachexia - disease-related malnutrition, sarcopenia and weakness or fragility) as nutrition disorders (Cederholm et al., 2015).

Malnutrition is the result of underutilized food intake and leads to a change in body composition (decrease in body weight) and body cell mass, leading to reduced physical and mental function and disorders in the clinical outcome of the treatment of illness (Sobotka, 2011) and presents a burden on patients and healthcare institutions (Barker, 2011).

The age-related decline in muscle mass and the increase in fat and abdominal fat is referred to as sarcopenia (Sumbul, 2013) and affects slightly more than a tenth of older adults after the age of 60 and also to half the elderly after the age of 80 (Wang et al., 2012; Ribeiro and Kehayias, 2014). Kaiser and others (2010) state that vitamin D, proteins and antioxidants, such as carotenoids, selenium and vitamins E and C., need to be monitored for the prevention of sarcopenia.

The term cachexia defines loss of body weight, reduction of fat and muscle mass due to the underlying disease and related metabolic changes (Evans, 2008; Rotovnik Kozjek, 2009; Sumbul, 2013) and as a result of the negative protein and energy balance (Ebner et al., 2013). Nutrition and metabolic disorders also include overweight problems, which represent the world's leading health problem, as 39 % of people are overweight and 13 % obese (WHO, 2018). Sobotka (2011) lists even more than 40 % of older people with overweight and 20 % obese. One of the indicators of obesity is the body mass index (ITM) above 30. Weighted individuals have an ITM of over 25 (Sobotka, 2011; WHO, 2018). Fajdiga and colleagues (2012) note that in Slovenia almost half of the popula-

tion is aged 50 or over, over-fed (45.1 %) and almost a quarter of the obese (23.9 %). A survey by Hlastan Ribič and Kranjc (2014) shows the trend of rising fat and very obese people. The smallest share of overextended and obese is one of the oldest adults in the group of 80 years or more (Fajdiga et al., 2012).

#### *Development factors of eating disorders*

The ability to eat in the elderly is affected by various factors, such as physiological: lower energy needs, reduced physical activity, decreased muscle mass and altered metabolism. The functions of the digestive system are weakened, leading to a reduction in saliva flow, dysphagia (difficulty swallowing), reduced gastric secretion, decreased digestion of digestive juices, and weaker taste and smell of food. Common cause for energy and nutritional malnutrition is aggravated chewing (dental pathology and oral cavity with prosthetics). The ability to eat is influenced by disease conditions (diarrhea, celiac disease, dementia ...), side effects of drug use, drug interactions and social and psychological factors (emotional problems, depression, loneliness, anorexia, alcoholism), mobility problems (inaccessibility of foods or Insufficient self-sufficiency), financial deficits, social isolation, abuse and sometimes even stubbornness (Pečjak, 2007; Cerovič et al., 2008; Smolin and Grosvenor, 2008; Gabrijelčič Blenkuš et al., 2010; Bernstein, 2016 and Nordqvist, 2016). Malnutrition affects all physical systems and causes a decrease in the immune system, increased susceptibility to disease, more complications in treatment, decreased muscle mass and, consequently, increased falls, heart failure, weakened wound healing, social isolation, disturbed thermoregulation, cognitive functions (Smolin, 2008 BAPEN, 2016) and lower quality of life and higher mortality in the elderly (Fielding et al., 2011; Ribeiro and Kehayias, 2014).

#### *Malnutrition prevention guidelines*

A Special Interest Group (SIG) was established in ESPEN, which underlines the importance of timely detection of malnutrition and proper treatment (Muscaritoli, 2010). ESPEN recommends the use of the screening tools Nutritional Risk Screening 2002 (NRS-2002), the Mini Nutritional Assessment-Short Form (MNA-SF) for Seniors in Homes and the Malnutrition Universal Screening Tool (MUST) for hospitals (Kondrup et al., 2003; Cederholm et al., 2017).

Research in hospitals, homes for the elderly and residential communities shows deficiencies such as lack of time intended for eating for the elderly, not enough varied food and inadequate staff qualifications (Merrell et al., 2012; Agarwal et al., 2016) and many other factors, related to staff, type and food preparation, and the environment (Nieuwenhuizen et al., 2010). Similarly, deficiencies have been shown in older people receiving home care, such as limited time, insufficient knowledge and frequent change of staff (UKHCA, 2012), and Watkinson-Powell et al. (2014) recommend the social integration of the elderly, help with the purchase of foods and the preparation of a meal, and take

into account the desire for home-prepared fresh food, because pre-prepared meals are often nutritional unbalanced, with high levels of salt and saturated fats, with too little fruits, vegetables and dietary fiber (Celnik et al., 2012; Howard et al., 2012).

### Discussion

When reviewing literature, it was found that many foreign studies dealt with the malnutrition of elderly people in hospital and home care. Research shows a high proportion of malnourished in hospital care (Heersink et al., 2010; Sorensen et al., 2012) and a longer lagging period of malnourished patients (Sorensen et al., 2008) as well as a high proportion of malnutrition and risk for malnutrition in social care homes (Donini et al., 2013; Nazemi et al., 2014; Tasar, 2015) and residential communities (Demeny et al., 2015; Zainudin et al., 2016). According to Gabrijelčič Blenkuš et al. (2010), there is lack of research in the field of elderly nutrition in Slovenia, with too little systematic measures to improve the condition that would be adapted to the local environment. We have developed recommendations for dietary treatment of patients in hospitals and elderly in retirement homes (Cerović et al., 2008), which also partly cover home living elderly who are fed with meals from retirement homes, there is still a large share of home living people that have inadequate eating habits and inadequate nutritional support due to lack of recognition for various reasons. In institutional care there are recommendations for dietary screening (Cerović et al., 2008) and dictate screening once a week using a validated MNA questionnaire in home care and the NRS-2002 in assessing the nutritional status of hospitalized patients. The National Institute for Health and Care Excellence - NICE (British National Institute of Health and Clinical Excellence) provides guidelines for the elderly's dietary support and recommends additional professional training for all employees involved in elderly care (Fletcher, 2011).

### Conclusions

A healthy, balanced and age-adjusted diet has a significant impact on the functionality of the elderly person (ESPEN, 2010). The introduction of effective nutrition measures would, among other things, allow for more effective and cheaper treatment of age-related illnesses (Resolution, 2015), alleviate the decline in cognitive abilities (Vauzour et al., 2017) and prevent the emergence of non-communicable chronic illnesses associated with inappropriate nutrition, movement and lifestyle. With appropriate programs for educating older people on healthy eating, we could act preventively and prevent the development of eating disorders, modern-day illnesses, and the advancement of pre-existing conditions of the disease, and finally save financially. In order to understand aging, it is necessary to strengthen the knowledge of geriatrics and gerontology in all areas of education in health, social care, public administration, education, etc. In addition to knowledge, a wider awareness of the importance of aging for all generations is needed (Skela Savič et al., 2010), and emphasize the

holistic approach to providing a healthy lifestyle and prepare appropriate implementation activities (Koch et al., 2014).

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# Dance and Exercise as Therapy in Patients with Parkinson's Disease – Case Study

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## *Abstract*

*Introduction:* Dance has been used as therapy for different medical conditions – physical and mental – for a number of years. The purpose of this study was to find out how dance and exercise influence body posture and certain motor and cognitive functions in a patient with Parkinson's disease (PD).

*Methods:* The subject was a 74-year-old man with PD. The data was collected with PDQ-39 and a questionnaire about health, which was composed on the basis of literature on PD. We used standard balance tests, attention, memory and functional tests and postural assessment. The workouts were scheduled two times per week for 8 weeks. The length of a single session was 1.5 hours. Each session consisted of a seated warmup with elements of contemporary dance and ballet, stretching exercises for shortened and overworked muscle groups and strength exercises for weak muscles. The dance part included dance moves that were systematically upgraded to the point where the subject was able to perform three Standard dances at the end of the program.

*Results:* We noticed improvements in all tests. The biggest improvement was made in body posture, attention span and memory. The subject also pointed out better overall feeling and less tiredness.

*Discussion:* Dance and exercise therapy turned out to be an efficient asset to improve motor and cognitive functions. Stretching and strength exercises that improve body posture and decrease muscle rigidity also seem to be very effective in patients with PD.

*Keywords:* Parkinson's disease, dance therapy, health, physical activity, exercise

Parkinson's disease (PD) is a slow-advancing neurodegenerative disease that starts because of unknown factors, although it is believed to involve both genetic and environmental factors. It is the second most common disease behind Alzheimer's, and there are more than 7000 patients with PD and other parkinsonisms in Slovenia (Trepetlika, 2018). The most afflicted are people over 60 years old, recent studies also confirm that men are under greater risk (Elbaza et al., 2016). Clinical picture includes tremors, rigidity, bradykinesia and loss of balance (Mesec, 1995). There are more than 40 symptoms of the disease, including non-motor symptoms such as depression, apathy, tiredness and dementia. (Trepetlika, 2018). All of these influence the patient's quality of life.

There are more and more confirmed cases that physical exercise slows down or decreases motoric complications. Animal tests have shown that exercises encourage the synthesis of dopamine in other dopaminergic neurons, which in turn decreases the symptoms of the disease (Sutoo, Akiyama, 2003). Research also shows that physical exercise slows down the symptoms of PD and if it is introduced in early phase of the disease, it can slow down its progress (Fox et al., 2006).

National Parkinson Foundation (2016) recommends that PD patients perform stretching exercises, aerobic activities and strength training. Dance, as one of the recommended exercises, has appeared as a therapy in 1950 and is now used to improve cognitive, emotional and motor functions and for social networking (Premelč, 2016). Dance can be effective in balance and walking problems as well as decreasing psychological problems, improving cognitive functions, motor functions and quality of life in patients with PD (Lewis et al., 2014; Hashimoto et al., 2015). The popular opinion is that dance can have a great psychological impact because of the challenges that are presented with dance steps and timing. Some of the challenges are memory, learning and spatial awareness (Lewis et al., 2014).

Westheimer et al. (2015) found that a sound signal with a uniform rhythm (from music or metronome) helps people with PD walk synchronously with rhythm, and lines drawn on the floor help to improve the length of the steps and reduce the sliding steps. Dhimi et al. (2015) believe that rhythmic music in dance could contribute to activation of neurons for motor control and increase in blood flow to the regions of hippocampus and frontal, temporal and parietal lobe regions. This could consequently facilitate neuroplasticity and improve movement, balance, and cognitive abilities.

Research has shown greater progress and longer lasting effects in the group where dance therapy was performed than in the group that carried out only physiotherapy exercises. (Hashimoto et al., 2015; De Natale et al., 2017).

Some studies of patients with PD report cognitive impairment in as much as 30-70 % of patients. The most impaired abilities are: the working memory, response inhibition, planning, organization and control of the goal targeted

behavior and the abilities that represent the foundations of voluntary activities and are linked to the areas of the prefrontal cortex (Georgiev, 2018).

Due to all the positive effects that dance activity offers, we anticipated that our dance and exercise program will have a beneficial effect on memory, attention, motor skills, and above all the posture of a patient with PD, which is the least studied in the area of PD.

## Methods

The subject of the study was a 74-year old patient, diagnosed a year ago with idiopathic PD. The main symptoms in his case are muscle rigidity, decreased mobility, stooped posture and slow voluntary movements. He was measured before the first and after the last training unit. We used the following tests, which are described in the literature: Timed Up and Go (Moharić, 2009), Berg Balance Scale (Moharić, 2009), Tandem stand with closed eyes and Stork balance stand test (Moharić, 2009), Trail Making Test (Schieber, n.d.), Stroop test (De Natale et al., 2017), Memory Assessment Scales (Williams, 1990).

We also used *Memory test for motor task*; number of the trials in which subject learns a certain simple movement pattern. First, the observer demonstrates the movement pattern, second he adds the explanation and in the third step, the observer and the subject perform the movement together. In the fourth step, the subject performs the movement alone, accompanied by the verbal explanation from the observer. All the following attempts include independent memory learning. We used two basic steps of low impact aerobics, namely a Grapevine and the big mambo. We evaluated the *body posture* by observing the person standing up and while moving, from the front and the side view. We compared the angles of the joints with the model of the ideal body posture. During the evaluation, we took photographs in the first, fifth and eighth weeks of the study.

## Intervention

The workouts were scheduled twice per week for 8 weeks. 1.5 hour sessions were consisted of a seated warmup with elements of contemporary dance and ballet, stretching exercises for shortened and overworked muscle groups (m. pectoralis, m. iliopsoas, m. quadriceps) and strength exercises for weak muscles (trunk and back muscles, muscles of the upper arm and shoulder girdle, gluteus muscles). In the first five weeks, the muscles were stretched with a dynamic and static method, and later, when the muscular tone slightly deteriorated, we also performed the PNF (proprioceptive neuromuscular facilitation) method, which according to research is considered to be one of the more effective methods for increasing mobility (Sharman et al., 2006; Hindle et al., 2012). With some exercises we included manual stretching with the help of a partner, since this was the only way we could put the muscle in the optimal position for stretching. Subject started with eight repetitions in one set and gradually in-

creased the number of sets and repetitions in order to develop the endurance of the postural muscles that were weak in the patient and reflected poor posture. Third and fourth week there were 2 sets with 8 repetitions, the next two weeks we upgraded to 10 repetitions and in the last two weeks the patient was able to perform 3 sets with 8 repetitions. The dance part included dance moves that were systematically upgraded to the point where the subject was able to perform three Standard dances at the end of the program. We chose three different dances, depending on the dynamics and style, namely: tango, slow fox-trot and slow waltz.

## Results

The greatest progress in motor skills was observed in some of the subtests of the BBS. In initial measurements we observed that the subject turned with short steps and whole body (“en bloc”) which is typical for patients with PD. At week 8, the patient was turning more rapidly, and had a greater natural hand movement while walking. The results are consistent with timed up and go test, as this test was also performed faster. Improvement was also observed in other tasks of the BBS, and it is necessary to mention the 2 points improvement in the examination of the looking over the shoulder. In initial measurements, the patient did not transfer weight when looking over the shoulder and the movement was performed only in the neck. In the final measurements at week 8, the subject transferred weight to the opposite leg, and the turn began at the pelvic girdle. The improvement in the weight transfer from one leg to the other is also reflected in the improvement in the speed of performing the test of alternating touch of the box with the legs. An important improvement was observed in the tandem stand with closed eyes, where the subject improved the time for as much as 18 seconds, indicating a better ability to maintain a balanced position despite disturbances. The Stroop test showed a significant improvement in version B, where a conflict situation occurs at the level of automatic processing.

*Table 1: Differences between initial and final state in motor functions.*

<i>Variables</i>	<i>Initial</i>	<i>Final</i>
TUG	12.29s	9.27s
BBS	49	56
Sitting to standing	4	4
Standing unsupported	4	4
Sitting unsupported	3	4
Standing to sitting	4	4
Transfers	3	4
Standing with eyes closed	4	4



Variables	Initial	Final
Standing with feet together	4	4
Reaching forward with outstretched arm	4 *(29cm)	4 *(34cm)
Retrieving object from floor	4	4
Turning to look behind	2	4
Turning 360 degrees	2 *(9.47s)	4 *(2.8s)
Placing alternate foot on stool	4 *(14.69s)	4 *(11.59s)
Standing with one foot in front	4	4
Standing on one foot	3	4
ST (L)	7.39s	11.12s
ST (R)	4.54s	7.44s
Tandem stand with closed eyes	3.37s	19.76s

*TUG, Timed up and go test; BBS, Berg Balance Scale; ST (R), Stork test right foot;  
\* Additional parameters*

*Table 2: Differences between initial and final state in cognitive functions – memory assessment scales.*

Variables	Initial	Final
List learning	8th trial	4th trial
Prose memory	5/9	7/9
List recall	11/12	12/12
List recall - recognition	12	12
Verbal span	10/18	10/18
Visual recognition	6/7	7/7
Visual reproduction	2/6	5/6
Names-faces	7/10	9/10
Delayed visual recognition	4/6	6/6

Table 3: Memory and attention span – differences between initial and final state.

Variables	Initial	Final
MTMT Grapevine	4th trial	3rd trial
MTMT Mambo	8th trial	5th trial
Stroop test (A)	25s	22s
Stroop test (B)	96s	64.6s
Trail making test (A)	84s	79s
Trail making test (B)	260s	240s

MTMT, Memory test for motor task

Posture

The photograph shows the poor body posture of the subject, which is shown in the severe forward flexion of thoracolumbar spine, bent knees and increased muscle tone that hinders movement, which is typical for patients with PD.



Figure 1: Comparison in posture between week 1, 5 and 8, side and frontal view.

## Discussion

Dance and exercise therapy has proven to be an effective means of improving motor and cognitive abilities. We used dance as a means of improving mobility and cognitive abilities, while the strengthening and stretching exercises were primarily aimed at improving the body posture.

Studies using auditory cues provided reliable evidence for improved walking speed, stride length and cadence (Nombela et al., 2013). Extrinsic cues are known to facilitate movement, and may provide the input for sequential movements, such as stepping, by reducing the reliance on deficient automatized processes (Hallett, 2008). In PD, observed improvements in gait are thought to be due to synchronizing movement to the temporal expectation of a regular beat, replacing the impaired internal timing function. Dance also involves many weight transfers from one leg to the other, and is therefore probably a positive influence on walking and coordination skills.

In the memory tests, we saw the greatest improvement in the speed of cognitive processes - learning the list. In the initial measurements, the subject needed 8 attempts to list all 12 words, and after the 8th week he needed only 4 attempts. Significant progress was also observed in visual memory, where the subject had to draw a pattern from memory, after we distracted him. The results also indicate the improvement of other tests of current and delayed memory. Patients with PD in other studies also exhibited impairment on tests of explicit memory. Beato et al. (2008) suggest that levodopa therapy presents a positive effect on spatial working memory but no effect on complexity.

The progress was most evident in the body posture, which was the most annoying for the patient before the beginning of therapy. It should be noted that the images were taken just after the end of the 1st, 9th and 16th training units and that the posture changes during the day because of the load. There is still a lot of work to do on the endurance of postural muscles that have become weak due to improper posture. It is apparent that the main problem arises from the muscles of the shoulder and pelvic girdle and the back. When we stretched the psoas muscle, both the posture and walking were improved. That is because it plays a role in lifting the leg while walking and maintaining a balanced neutral position. By improving thoracic mobility, we achieved greater mobility in the upper part of the body and easier turning and looking over the shoulder. The hunched posture strongly affects back pain, as there is a greater strain on the vertebrae (Bloch et al., 2006; Margraf et al., 2010). Pain also affects the general mood of the patient and his ability to perform day-to-day tasks. When the patient's body posture was improved, the overall functionality of the body improved, the patient was able to walk more easily and perform daily tasks with less pain.

## Conclusions

Based on the results of this and previous researches, we could therefore say that dancing and exercise are effective rehabilitation methods for patients with PD. Considering that we have conducted a case study, it would be wise to repeat the study on a larger sample, where we could also monitor the long-term impact of dance and exercise on the course of the disease. Due to the positive effects of dance and exercise on the motor and cognitive abilities and the general well-being of the patient with PD, these methods could be carried out by the kinesiologists with appropriate knowledge in the centers and societies for patients with PD (such as Trepetlika). It would also be necessary to investigate the effects of dancing and exercise in other disease conditions (eg Alzheimer's disease, dementia, ...). We would recommend stretching exercises for shortened muscle groups on a daily basis and at least three times per week (preferably every day, as a greater range of exercise provides better effects) for dancing or exercise.

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# Role of physical activity and nutrition in prevention of frailty

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## *Abstract*

*Introduction:* As the process which leads to frailty and disability can be slowed down or even completely reversed, it can be appropriate for early interventions. Early interventions can be found in multiple fields, specially in physical activity and nutrition.

*Methods:* Systematic literature review and good practices review was conducted to obtain the results on two tasks of the Work package 6 – the Management of Frailty at Individual Level JA ADVANTAGE: Nutrition, Physical activity.

*Results:* Malnutrition or being at risk for malnutrition increases the risk of frailty and its consequences. With regard to the importance to recognize malnutrition and risk of malnutrition, the Mini Nutritional Assessment is a well validated tool to be used for screening and assessment. Physical activity and exercise in frail elderly are effective and relatively safe and may reverse frailty. Both, health nutrition and physical activity give best results when they are combined.

*Discussion and conclusion:* Frail patients who are at elevated risk for falls and fracture need Vitamin D supplementation. The Mediterranean diet is associated with lower risk of frailty. Assuring a protein intake of at least 1-1.2 g per kilogram of body weight per day is beneficial. Exercise interventions in frail elderly persons can increase strength and power, have potential to maintain or even slightly increase fat-free mass, and are effective in improving aerobic capacity and balance. Consequently, fall incidence is reduced and quality of life improved.

*Key words:* frailty, nutrition, physical activity

**F**railty is a progressive age-related decline in physiological systems that results in decreased reserves of intrinsic capacity, which confers extreme vulnerability to stressors and increases the risk of a range of adverse health

outcomes (WHO, 2017). Phenotypic definition of frailty is the most common. Muscle and bone, which gives muscle its support, are in the centre of phenotypic frailty. One of the key determinants of body mass, muscular mass and body composition is the dietary and metabolic state of an individual. An individual can be influenced by the quality and quantity of consumed food and relative and absolute energy intake, macro and micro nutrients influence an individual's condition. Frailty, in terms of clinical dietary and metabolic status of an individual, includes components that are linked to malnourishment (Landi et al., 2015). Even without malnutrition, elderly are prone to lose lean body mass and thus frailty because of decreased physical activity (Elmadfa & Meyer, 2008) and age associated sarcopenia. Weight loss in elderly is associated with increased risk for hip fracture and weight gain with decreased risk for hip fracture with consistent dose response for weight gain and weight loss and irrespective of current weight or intention to lose weight (Ensrud et al., 2003; Lv et al., 2015). Based on current evidence, dietary protein caloric intake, protein quality, as well as the vitamin D status of older individuals should be checked by clinicians and/or dieticians and individual prescription of nutritional supplements should be considered (Beaudart et al., 2016).

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Stable body mass or slight increase of body mass with age is desired. Studies confirm that increased body weight contributes to a lower mortality in persons aged 65 and older (Flegal, Kit, Orpana, & Graubard, 2013). With age we lose muscle mass and gain fat tissue (Elmadfa & Meyer, 2008). Men with constantly normal weight over the life course have a good prognosis in late life. Men who are either constantly overweight or who changed from overweight in midlife to normal weight in late life have a poorer prognosis and more frailty and disability in late life. Findings support the view that a healthy lifestyle, including weight control, should be maintained throughout life (Strandberg et al., 2013).

Reduced physical functioning is the most dominant sign of frailty (Fried et al., 2001). The ageing associated loss of muscle mass seems to be one of the major causes for reduced physical abilities in older age and consequently disability and frailty (Roubenoff 2000). There is abundant evidence from prospective and clinical studies that physical activity not only delays but also prevents or reverses frailty. For instance, a recent observational study (Rogers et al., 2017) showed that physical activity might attenuate frailty. Mild physical activity was insufficient to significantly slow down the progression of frailty, moderate physical activity reduced the progression of frailty in some age groups (particularly ages 65 and above) and vigorous activity significantly reduced the trajectory of frailty progression in all older adults.



The aim of this study was to examine the role of nutrition and physical activity in perspective of frailty, using a systematic literature review.

## Methods

Descriptive research methodology was used to review peer-reviewed medical literature. A systematic literature review was conducted as it enables the obtainment of data from various sources and ensures a holistic understanding of the research subject. The literature search was conducted using the following databases: PubMed, The Cochrane Library, Embase, UpToDate, Cumulative Index of Nursing and Allied Health Literature (CINAHL), by means of several combinations of selected search words in the English language and their synonyms were prepared and used with Boolean operators AND or OR, searching in title, key words and in abstract. For nutrition the following key words were selected: Geriatric Nutritional \*() OR Elderly Protein deficiency \*() OR Frailty Energy intake \*() OR Frailty D vitamin \*() OR Osteoporosis Nutrition \*() OR Frail Nutrition \*() OR Frail Vulnerable Nutrition \*() OR Functional decline Protein deficiency \*() OR Older person Sarcopenia \*() OR Frail D vitamin \*() OR Aged Dietary supplements \*() OR Cognitive decline \*() OR Calcium Nutrition \*() OR Calcium Older adult \*() OR Geriatric Nutrition \*() OR Disability Nutrition \*(); searching in title, key words and in abstract. For physical activity the following key words were selected: Frail Muscle strength \*() OR Frailty Activity \*() OR Elderly Exercise \*() OR Older adult Functional ability \*() OR Aged functional decline \*() OR Older person Mobility \*() OR Geriatric Disability \*() OR Inactivity Vulnerable Elderly \*() OR Physical activity Aged Function \*() OR Training Aged \*() OR Functional outcomes Geriatric \*() OR Physical interventions Vulnerable \*() OR Sports Older person \*() OR Patterns of activity Older adult \*() OR Leisure activity Elderly \*(); searching in title, key words and in abstract.

The selection criterion for articles to be included in the review was that they were published during the last 15 years, i.e. between 2002 and 2017. Key words were selected from a proposal of key words that was prepared by the task leader and the working group focusing on Nutrition and Physical activity as part of the European Commission project “Joint Action on Frailty prevention – JA ADVANTAGE”, Work Package 6 – Management of Frailty at Individual Level.

Articles regarding current policies and guidelines on frailty prevention in older people which were published in peer-reviewed scientific journals, as well as international documents, standards, guidelines and research studies performed in the EU were reviewed. Information from editorials, letters, interviews, posters and articles with no access to full text were not included in the study.

Grey documents which were identified and proposed by the task leader and the working group were also reviewed and included in the study. Grey doc-

uments were identified by means of an opportunistic search, meaning a targeted or focused one, based on the information that each partner in the project Consortium was able to find regarding their own country (Spain, Austria, Belgium, Croatia, Cyprus, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovenia and United Kingdom). The term grey literature was used to describe information which is not published commercially or is otherwise hard to find including government reports, non-governmental organizations (NGO) reports, theses, technical reports, white papers, etc. From initial 39885 search results on Nutrition 28 papers were selected and from 6200043 search results on Physical activity 25 papers were selected for review.

## Results

### *Nutrition*

Malnutrition or being at risk for malnutrition increases the risk of frailty and its consequences (Clegg et al., 2013; Ensrud et al., 2003; Goisser et al., 2016; Strandberg et al., 2013; White et al., 2012). Prevalence of malnutrition depends on the setting and criteria used and ranges from 2 % to 60 % (Elmadfa & Meyer, 2008; Guigoz, 2006; Kaiser et al., 2010; White et al., 2012). In the sample from 24 studies from 12 countries, prevalence of malnutrition was 50.5 %, 38.7 %, 13.8 % and 5.8 % in rehabilitation, hospital, nursing home and community, respectively (Kaiser et al., 2010). The combined prevalence of being at risk for malnutrition was 46.2 % with 41.2 %, 47.3 %, 53.4 % and 31.9 % in rehabilitation, hospital, nursing home and community, respectively (Kaiser et al., 2010).

With regard to the importance to recognize malnutrition and risk of malnutrition, the Mini nutritional assessment (MNA) is a well validated tool with acceptable sensitivity/specificity to be used for screening and assessment (Guigoz, 2006).

Older people with higher protein intake lose lean body mass slower, lose less when losing weight and increase muscle mass more if they increase weight (Houston et al., 2008). When high protein intake (1.3 g/kg) is combined with regular exercise, adults and elderly can lose weight and still increase their net muscle mass (Verreijen et al., 2017). Although higher protein intake increases total and not femoral neck bone mineral density (Dawson-Hughes & Harris, 2002) it still significantly decreases risk of hip fracture (Wu et al., 2015).

Vitamin D insufficiency (<50nmol/l) is significantly associated with frailty in men, but not in women (Shardell et al., 2009). The Mediterranean diet is associated with lower risk of frailty (Goisser et al., 2016). Supplementation of vitamin D improves muscle strength particularly in people aged 65 and older and in those with 25-OH vitamin D level below 30 nmol/l (Beaudart et al., 2014).

### *Physical activity*

Muscle mass and strength decrease with ageing. This process is accelerated after the age of 70 (Larsson et al., 1979). Reduced strength may lead to frailty which is characterized by unintentional weight loss, low physical activity levels, slow gait speed, exhaustion, and weakness (Fried et al., 2001). The main reason behind strength and power decline is sarcopenia, loss of muscle mass with age due to motor neuron death, immunological factors, hormonal change, increased sedentary lifestyle and malnutrition (Narici & Maganaris, 2006).

On the other hand, strength training has potential to reverse or slow down these processes even at older age (Harridge et al., 1999). Different training interventions have been shown to increase strength in healthy older adults as well as in frail. Supervised center-based interventions seem to be more effective than home interventions at improving strength in frail older persons (Binder et al., 2005; Pahor et al., 2006; King et al., 2002; Fairhall et al., 2014). Researched interventions were of different durations, ranging from 8 weeks up to 2 years. Even the shortest trial duration was enough to increase strength (Serra-Rexach et al., 2011).

An important parameter of strength training is exercise load, i.e. intensity, usually expressed in % of 1RM. Low exercise load studies reported strength gains less frequently. Siegrist et al. (2016) reported no strength gains after 16 week of a supervised exercise training program (1 hour/week) with strength and power training, challenging balance and gait training with increasing, but in general low, levels of difficulty. With fitness machines and loads of 60 % of 1RM substantial strength improvements were obtained (about 20 % in isometric exercises and about 100 % in lifting weights). Similar effects were seen in a study by Binder et al. (2005), who used exercise loads of 70-80 % of 1RM. In the oldest group of old persons, 70 % of 1RM load managed to improve leg press strength by 20% after 8 weeks of hypertrophy type strength training. These results are in agreement with findings that resistance training in healthy older persons with greater loads is related to greater increases in strength and power parameters (Steib et al., 2010) and support a dose-response relationship.

Supplementation can enhance the effects of strength training (improved strength and power gains). Amino acid supplementation (AAS) may promote muscle growth but does not necessarily improve strength and power in healthy older adults (Finger et al., 2015).

Aerobic capacity may be a limiting factor of mobility and work capacity in frail older persons. Its loss may be due to decreased muscle mass (Fleg & Lakatta, 1988) or lower cardiac output (Ogawa et al., 1992). Ehsani et al. (2003) studied cardiovascular adaptation in older mild-to-moderate frail subjects after endurance exercise at 78 % of peak heart rate. They found 14 % increase in peak VO<sub>2</sub> after 9 months of intervention and that the main adaptation was increase in heart rate and probably stroke volume. It is not possible to conclude on the optimal regime to improve endurance and VO<sub>2</sub>max.

Falls in adults over 65 years old are frequent (Rubenstein & Josephson, 2002) and are a cause of many injuries (Stevens et al., 2006) leading to impaired mobility and physical fitness. Exercise programs are effective in reducing falls and fall-related injuries in healthy older persons (El-Khoury et al., 2013; Gillespie et al., 2012).

There is abundant evidence that exercise intervention improves balance in frail elderly persons (Freiberger et al., 2012; Giné-Garriga et al., 2010; King et al., 2002; Binder et al., 2003; Clemson et al., 2012; El-Khoury et al., 2015; Faber et al., 2006; Giné-Garriga et al., 2013; King et al., 2006; Siegrist et al., 2016; Taylor et al., 2012), even in very old persons (Cadore et al., 2014). A combination of strength and balance training improves balance outcomes (Binder et al., 2002; Fairhall et al., 2014; Freiberger et al., 2012; Giné-Garriga et al., 2010). When strength and balance were complemented with gait and functional exercises (El-Khoury et al., 2015; Freiberger et al., 2012; Siegrist et al., 2016) no additional effect on balance outcomes was observed.

### Discussion and conclusions

There is sufficient evidence that nutrition and frailty status are related. The Mini Nutritional Assessment is a screening and assessment tool developed to identify patients who are malnourished or at risk of malnutrition.

Vitamin D supplementation is important in people with 25-OH vitamin D level < 30 nmol/l. Healthy older people should consume in average 1.0 to 1.2 g/kg of body weight of protein per day. In acute or chronic disease, protein intake should be 1.2 to 1.5 g/kg/day or 2.0 g/kg/day in severe illness, injury or marked malnutrition.

Physical activity and exercise in frail elderly are effective and relatively safe and may reverse frailty. Most studies researched effects of interventions on fall prevention and functional outcomes. The review showed that different exercise interventions in frail elderly persons can increase strength and power, have potential to maintain or even slightly increase fat-free mass, and are effective in improving aerobic capacity and balance. Consequently, fall incidence is reduced and quality of life improved.

The aim of this research was present the results of a systematic literature review and data analysis focusing on nutrition in the context of managing frailty at individual level. For the purposes of this research, a systematic literature review method was used. The method proved to be appropriate and the aim was achieved.

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# Positive ageing: the problem of young generation or challenge for modern society

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## *Abstract*

*Introduction:* Retirement is an important life event, which brings new life changes. This reflects on physical, psychological and social levels. The individual is suddenly facing a fear for the future, he is trying to find new roles in society and has a lot of insecurities that ageing can bring.

*Methods:* A systematic literature search of the published literature was conducted at Slovenian libraries with Cobiss. We also used some databases (ScienceDirect, Wiley Online Library, MEDLINE, CINAHL, Cochrane, PubMed), where we were searching within ageing psychology field. We used descriptive method with literature review to make meta-analysis. The review was restricted to studies published since 2007 to 2017.

*Results:* Many studies suggest the process of preparation for ageing is very important for positive ageing. It is important to stay active on all three (physical, psychological and social) levels, because this is the only way to maintain a positive self-image in society. There are equally important factors of positive ageing: the ability of individual's time perspective and maintaining a sense of cohesion with society.

*Discussion and conclusions:* Positive ageing depends on the environment in which the person lives and works. Different mechanisms, such as the ability of the thought and behavioural adjustment, maintaining a positive sense of self and positive view on ageing are very helpful.

*Key words:* positive ageing, older adults, retirement, views on aging, psychological adjustment

**A**geing is a process we all share. But not all of us age the same. However, it depends on the opportunities and constraints that are presented to us as we age, and that is greatly influenced by the community in which we live (Shenfil, 2009). After retirement, ageing process is felt even more and indi-

vidual is suddenly facing a fear for the future, he is trying to find new roles in society and has a lot of insecurities ageing can bring. That is why it is important to find a sense of transcendence, being a part of something beyond the self and trying to find meaning in life (Stevens, 2016). You try to live life to the fullest and age gracefully, which is a good catalyst for positive ageing. A term, used to describe the process of maintaining a positive attitude, feeling good about yourself, keeping fit and healthy, and engaging fully in life as you age (Denmark and Zarbiv, 2016).

### Methods

We used a descriptive research method with a critical review of Slovenian and English professional and scientific literature. It was carried out using the Slovenian online library COBISS. We also used some databases such as MEDLINE (Pubmed), CINAHL, Cochrane, ScienceDirect and Wiley Online Library. We were searching within ageing psychology field, coping with retirement and positive ageing. We conducted a meta-synthesis. Literature inclusion criteria were articles published between 2007 and 2017, English language and appropriate content. The applied keywords in English were: (positive) ageing, older adults, elderly, retirement, psychological adjustment, psychology of ageing and positive view on ageing. The literature search took place from March to April 2018.

### Results

Ten studies were obtained that show tangible evidence on connection between preparation for old age, retirement and succesful (positive) ageing.

*Table 1: Overview of studies*

<i>Author and year</i>	<i>Purpose of research</i>	<i>Methodology</i>	<i>Results</i>
Craciun and Flick, 2015	Exploring positive aging goals in different social circumstances.	Qualitative study – episodic interview	Preparation for old age implies several decisions that one needs to take such as making lifestyle changes (e.g., maintain physical activity level, decide where to live in old age and organize care facilities, changing eating or physical activity patterns, etc.).
Craciun et al., 2015	To provide a better understanding of positive views on aging in an emerging precarious context.	Qualitative study – episodic interviews	Individuals place emphasis on adaptability and flexibility more than on stability and long term planning, proving they have adjusted to their precarious living conditions.

<i>Author and year</i>	<i>Purpose of research</i>	<i>Methodology</i>	<i>Results</i>
Craciun et al., 2017	To investigate whether positive views on aging can compensate the detrimental association of a lack of resources with health and well-being in midlife.	Explanatory sequential mixed methods	Data reflects the importance of positive views on aging as a resource for a healthy old age despite aging in precarious circumstances.
Fernandez-Ballesteros et al., 2011	To examine the prevalence of successful aging and to identify the predictors of aging criteria.	Longitudinal study	Variables and factors that are the most consistent predictors of successful aging: men, higher income, better education, physical activity, positive emotional balance, extraversion, self-efficacy for aging and family network.
Hessel, 2016	To analyse if retirement has effects on individuals' health.	Longitudinal study	Retirement led to significant improvements in self-reported health in men and women as well as lowered risk of reporting limitations in activities of daily living for women.
Hicks and Siedlecki, 2017	To examine potential mediators of the relationship between perceptions of aging and health outcomes (i.e. subjective health and physical limitations).	Longitudinal cohort study	Positive views on aging are significantly related to both subjective health and physical limitations. More positive views on aging were associated with better reported health, as well as lower degree of self-reported physical limitations.
Houliort et al., 2015	To predict that harmonious passion will lead to positive psychological adjustment to retirement.	Retrospective cross-sectional longitudinal study	Passion for work matters in psychological adjustment to retirement – especially harmonious passion, because with such a passion individuals can invest and engage in activities that satisfy their basic psychological needs.
Paul et al., 2015	To obtain evidence-based knowledge on how people age.	Cross-sectional study	Young males, married individuals and those having higher educational levels are aging more positively.
Phillips and Ferguson, 2013	To investigate whether self-compassion may be associated with subjective and psychological well-being.	Quantitative study	Older adults are likely to experience positive affects if they treat themselves with care and understanding to adverse events and hold painful thoughts and feelings in balanced awareness.

<i>Author and year</i>	<i>Purpose of research</i>	<i>Methodology</i>	<i>Results</i>
Ryser and Wernli, 2017	To find the impact and timing of the transition to retirement on individuals' emotions – positive and negative affects.	Quantitative study	The effect of retirement is impacted by working conditions before retirement, timing of retirement and social participation at the time of retirement.

Self-compassion has been identified as a strong predictor of psychological health among younger people, and some evidence suggest that it may represent a particularly important psychological resource for older adults as they strive to achieve positive ageing (Phillips and Ferguson, 2013). The most important and common factors for positive ageing are high education, being married, physical activity, positive emotional balance and strong social (or family) network. Previous findings show the impact of a positive view of ageing on health by showing that this optimistic view positively affects subjective health and life satisfaction even in the face of a serious health event (Wurm et al., 2008). Beliefs about ageing as expecting negative life changes like loneliness or disability, may be an important influence on older adults' motivation to pursue new social ties (Menkin et al., 2017).

There are also significant improvements in health after retirement, if there is proper social participation at the time of retirement and sufficient psychological adjustment to it. Retirement improves subjective health status and mental health, while also reducing outpatient care utilization (Eibich, 2015). But it is not negligibly, retirement can also lead to a break with support networks and friends, and may be accompanied by emotional or mental impacts of, "loneliness", "obsolesce", or, "feeling old" (Coe and Zamarro, 2011).

### Discussion

Positive ageing can be placed in the nomological network of ageing well: optimal, successful, active, productive, and healthy ageing are relatively new concepts emerging during the last decades of the twentieth century (Fernandez-Ballesteros, 2011). Therefore, researchers have turned their attention from younger individuals who hold age stereotypes to those who are targeted by these stereotypes. Stereotype embodiment theory posits that when people internalize prevalent negative age stereotypes, this influences how they actually age (Levy, 2009). So positive self-perception of ageing moderates the effects of stereotype threat, and that positive information promotes better memory performance for those older adults with a poorer self-perception of ageing (Fernandez-Ballesteros, 2015).

Psychological ageing experience includes four dimensions: physical loss, social loss, personal growth, and gaining self-knowledge (Fasbender et al, 2014). Social loss presents loss of social contacts and a feeling of being less needed and less respected, while physical loss describes a decline of physical abilities

and the loss of energy. Nevertheless, regular physical activity is a key component of healthy ageing, but few older adults meet physical activity guidelines (Andrews et al., 2017). Physical and social loss are two dimensions that capture negative ageing experience, while on the other side, personal growth and gaining self-knowledge are two dimensions that capture positive ageing experience. Continuous personal development, such as learning new skills and improving one's capabilities are important part of personal growth. The dimension of gaining self-knowledge describes the ageing process as self-acceptance and compensation (i.e. understanding one's capabilities and developing methods to work around one's limitations) (Fasbender et al., 2014).

Life expectancy has increased consistently for more than one century and continues to increase further, so we have to better understand ageing process and post-retirement feelings and emotions. The environment that will receive ageing population needs to be prepared so that there is a humanised caring environment and also this place should have a proposal to offer opportunities to health promotion of the elderly (Pilao et al., 2016). There are also various ageing theories and its theoretical perspectives that will promote a better understanding among nurses about the attitudes and behaviors of older adults in different contexts (Lalani, 2017).

### Conclusions

Older adults regard retirement as a positive thing and tend to reduce their social contacts and activities. That is why the importance of physical activity and social networking cannot be overestimated. There are different pathways to reach positive views on ageing. Those who find a sense of meaning in life tend to enjoy better physical health, experience fewer symptoms of depression, are more happier and age more gracefully. We think nurses need to have an in-depth understanding of the theoretical concepts and its meaning underlying different theories of successful ageing. This will assist nurses to provide enhanced quality care in their practice settings.

Positive ageing nowadays is not that much of a problem of young generation, then it is a challenge for modern society. We have to find new ways and programmes to encourage individuals to prepare themselves on new life roles while leaving midlife period and entering pre-retirement period. It is important to build a strong psychological support and evolve positive ageing experience on all four dimensions.

And our young generation? We have to start breaking negative ageing stereotypes and aim to coexistence and open-mind about going in to the same direction.

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# Adaptability in living space for elderly people

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## *Abstract*

*Introduction:* Living environment is one of the factors that can contribute to healthy and safe ageing at home, providing that it is well adapted to the needs of older adults. On the contrary, it can cause stress, discomfort and lead to injuries, resulting in the loss of independence and autonomy.

*Methods:* The aim of research was to determine; whether people are generally content with the functionalities that their homes, and if the degree of negative feedback increases with the ages of the users. We tended to pinpoint any major problems facing elderly people whilst living in their homes, and to establish a criteria for interior design that could be tailored with senior users in mind, particularly within the ambit of safety. A survey questionnaire was used as a research instrument among people older than 55 years. 210 people participated.

*Results:* Common shortcomings include insufficient lighting (32 %), inappropriate sequential composition of work surfaces (56 %), ease of hygiene maintenance (68 %), inappropriately shaped furniture (72 %), and tasks that become troublesome because of declining memory (75 %).

*Discussion and conclusion:* The results show that most users do not realize that they could, with more appropriate interior design, perform daily tasks faster, safer, and with less effort.

*Keywords:* furniture, ergonomics, interior design, elderly, environment

owing to an increasingly higher standard of living as well as improvements in health care, the proportion of senior citizens in the general population is rapidly increasing. Statistical prognosis indicates that, by 2030, 36 % of people will be over the age of 60 (Hilderbrand, 2002). Information from the Statistical Office of the Republic of Slovenia states that, in 2018, the percentage of Slovenian citizens aged over 65 years of age was 19,4 % (Statistic

Office RS, 2018). With the aging there had also been an increase in the number of people with health problems, mainly with sensory changes, cognitive changes, and weakness (Jaul and Barron, 2017).

The quality of life is also dependent on the architecture. Architecture and urban planning affect us and our efforts to achieve a good life and dignified existence (SA, 2009). There are both positive and negative aspects implicit in the design of the buildings, which is important because senior citizens spend a great amount of time indoors. While elderly perform their daily indoor activities, they are subjected to several risks. At the same time hygienic standards are crucial due to the increased susceptibility of the elderly to diseases and infections. Consequently, necessary steps need to be taken in the design of spaces where food is prepared and/or consumed (Torrington et al., 2004). In the matter of flats (when elderly live in their own homes) Colombo and his colleagues (1998) identified the most commonly occurring problems facing the elderly, where 1/3 of the flats were identified as having kitchen-security issues, while Boyo (2001) claims that 1/10 of elderly users suffer from difficulties regarding kitchen mobility. A good solution is to design modern residential units with architectural and furniture elements that are ergonomically adjusted for end-users, from both the standpoint of safety and of functionality (Margolin, 1997).

Most flats are designed with young, fit, and active people in mind. Furthermore, inappropriately designed housing space can lead to health problems and injuries. Changes of the living space with the needs of the elderly can reduce the risk of injury by 30 % - 50 %. The age of the furniture and equipment in their homes also plays an important part in determining functionality. Almost 2/3 of the senior population who live in their homes have not been renovated or refurnished for over the 20 years, contributing to lower safety and comfort levels (Anon, 2006). Over 14 % of English elder citizens live in unfit conditions, in homes that are in dire need of renovation and adaptation (Boyo, 2001). Only 1/10 of them decide to modify their existing furniture and equipment to reflect their special needs (Gilderbloom et al., 1996). They often refrain from renovating due to financial concerns, lessening mobility and fear of the upheaval of renovation work. Furthermore, the elderly also suffers from inappropriate room dimensions including rooms which are too big for their (West and Emmitt, 2004). We have homeless young adults and we have elderly couples living on in large detached houses and unwilling to move because of the exceptional financial disadvantage this would entail (SA, 2009).

## Methods

The main aim of the current research was to discover whether people are satisfied with the functionalities of their kitchens and if they feel safe during using them. The research was carried out via individual surveys. The survey only includes people over the age of 55. 210 questionnaires were fulfilled, of which 204 were valid.

The respondents were aged between 55 and 91 (Table 1). Most respondents, 76 %, were aged between 55 and 74. The survey consists of 75 % women and 25 % men. The questionnaire consists of 54 questions and was divided to 4 parts. Only a few data are present in this article. Full data were published in *Drvna Industrija* journal (Hrovatin et al., 2012). In the first part questions focus on general data of respondents' flats and number of people who live there. The second part of questionnaire examines tasks in the kitchen. The third part is collects functionality data concerning the kitchen and the final part examines consumer behavior. In this paper we have been focused on questions concerning security and functionality matters.

*Table 1: Respondent age*

	55-64 years	65-74 years	75-84 years	85-90+ years	Total
Women	69	50	27	7	153
Men	21	16	12	2	51
Women and Men together	90	66	39	9	204

The majority (57 %) of respondents live in a single apartment home, whilst the remainder lives in houses with multiple apartments. When compared to the overall data for Slovenia, 64 % of households live in a single-apartment house. This represents a satisfactory sample (Statistical Office of the Republic of Slovenia, 2002).

The survey was carried out in the respondents' homes. Most questions were closed-ended, using a yes/no dichotomy, but some were multiple choice questions. Very few questions were open-ended. Regarding to information about the proper arrangements of work surfaces, the interviewer carrying out the survey answered the questions after receiving detailed instructions on how to assess the arrangement.

## Results

We were interested in the age of the respondents' kitchen equipment. Table 2 shows that 35 % of respondents have a kitchen older than 20 years, whilst 52 % have a kitchen older than 15 years.

*Table 2: Ages of respondents' kitchens*

	KITCHEN AGE					More than 30 years
	Less than 5 years	5-9 years	10-14 years	15-19 years	20-29 years	
Number of respondents	38	27	33	34	59	13
Percentage (%)	19	13	16	17	29	6

The results about satisfaction with their kitchen is shown in Table 3. It is noteworthy that 72 % of them were satisfied with their kitchen arrangements,

despite most of the kitchens were identify as inadequate in their functional or ergonomic way.

Table 3: Satisfaction with the degree of kitchen functionality

	YES	NO
Number of answers	147	57
Percentage (%)	72	28

Figure 1 includes results about what bothers the respondents the most in their kitchen. Only those who expressed dissatisfaction with their kitchens answered this question. Those who were dissatisfied with the functionality of their furniture and lighting identified elements as: inadequate lighting over the kitchen work surfaces and inside the cupboards, inappropriate height of shelves, oven, refrigerator, troublesome cleaning set-up (e.g. contact between wall and work surface, contact between work surface and kitchen appliances), inadequate handle design (e.g. too small, slippery, fall off, in the way), hard-to-reach places in the corners or shelves under the cupboards.

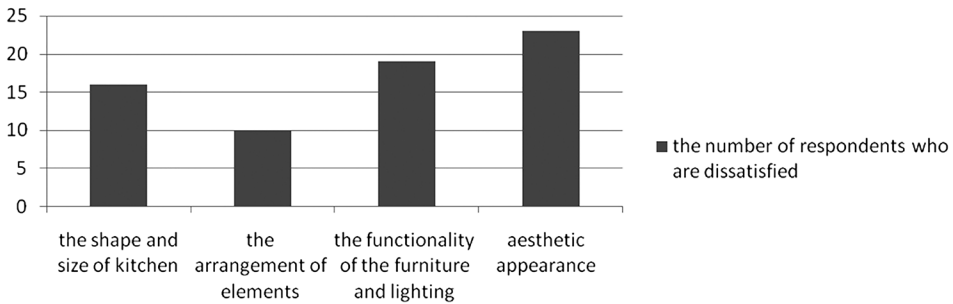


Figure 1: Graphical representation of respondents' dissatisfaction with kitchen elements (N=57)

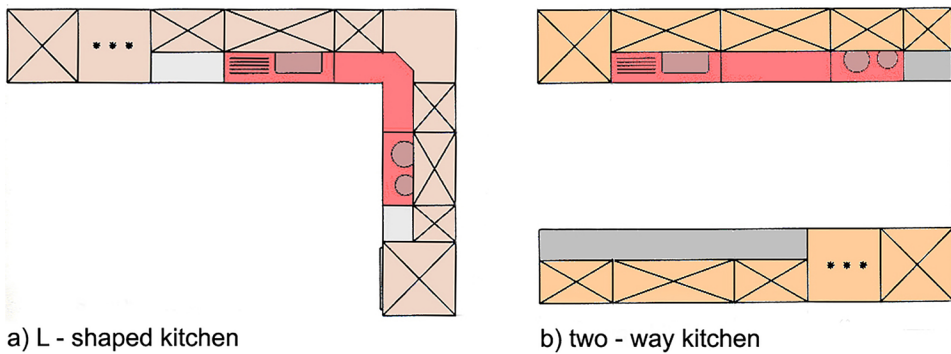


Figure 2: Adequate arrangement of three main work areas

Figure 2 shows a succession of elements that we deem appropriate. We took into consideration the darkly coloured parts. An appropriate width for a work surface was deemed to be between 60 and 150 cm. Over half (56 %) of the subjects had an inappropriate arrangement of the three main work areas (Table 4).

*Table 4: Respondents' satisfaction with arrangement of the three main work areas and an adequate width of the main work surface*

	YES	NO
Adequate arrangement of main areas and adequate width of main work surface	89	115
Percentage (%)	44	56

We were interested in the degree to which senior users were prepared to use modern technology and computers. Of the 15 who stated they use a computer, 14 were younger than 65. A somewhat higher percentage (21 %) would be comfortable with using kitchen robots (Table 5).

*Table 5: Percentage of respondents who use a computer and those who would be willing to use a kitchen robot*

		YES	NO
Do you use a computer at home?	Number of answers	27	177
	Percentage (%)	13	87
Would you be prepared to use kitchen robots?	Number of answers	43	161
	Percentage (%)	21	79

Senior citizens are less agile, having more difficulty moving around a room, which means they suffer from a greater risk of injury. We asked the respondents whether they bump into open cabinet cupboard or sharp surface and table edges whilst performing kitchen tasks. The results show that 72 % have had problems with bumping into doors or corners.

## Discussion

It had originally been surmised that most senior users would be dissatisfied with the functionality of their kitchens. However, the majority (72 %) of respondents were indeed satisfied with their kitchen, even though 56% of them were found to have unsuitably arranged work surfaces, trouble with maintaining a hygienic environment, that over a third have unsuitable lighting arrangements, and that over half (52 %) of respondents have kitchens older than 15 years. The results show that users are typically unaware that they could perform their daily tasks faster, with less effort, and more safely (Hrovatin et al., 2012).

Those that were not satisfied with their kitchens gave surprising results, since most were uncomfortable with aesthetics rather than functionality. It

had been anticipated that senior users would be more dissatisfied by the functionality of their kitchen, as they tend to suffer from restricted agility, sight and/or memory issues... They become used to their kitchens and have limited desire for change. They typically attribute the problems they face when using their kitchen to their advancing age but are unaware that their problems could be decreased if the space were adapted to their needs. Therefore, householders over the age of 55 should already be looking into kitchens that are adapted for use by senior citizens to become accustomed to it whilst they are still active and will get used to new environments with greater ease (Hrovatin et al., 2012).

Our research shows that 56 % of respondents have an inappropriate work surface arrangement. A more functional and safer kitchen working environment is gained by appropriately arranging its elements. Particularly important is the arrangement of the kitchen sink, the main work surfaces and stove (Hrovatin et al., 2015). An appropriate arrangement is one which allows the user to remain in one spot whilst preparing food (slicing, cutting, peeling, washing), whilst and at the same time monitoring the food that is already being cooked (stirring, adding). Additionally, the adjacent position of the sink and stove would mean that the user needs to travel a shorter distance if he or she needs to pour away boiling water. Elderly tend to have sight and agility problems, which compounds the problem of slippery floors in a kitchen. Every year, 30 % of users over the age of 65 experience a fall in their kitchen, a danger that can lead to serious injury or even death (Stevens, 2005). Our research shows that as many as 72 % of users bump into open doors and various sharp edges during kitchen work. That's why design and ergonomics of the furniture is important.

It is assumed that in the future, so-called „intelligent“ technology will make an important contribution to kitchen usage and will ease the workloads of users. Very few of the respondents use a computer and was expected that (79 %) would not want a robot in their kitchen. Many senior users have trouble adapting to new technology, and most of them have no wish for it at all. Now younger and middle aged are more familiar with computers so a robotically-aided kitchen will be much more attractive to elderly users in the future. „Smart“ kitchen appliances are step in this direction. Elderly with memory issues tend to leave stoves on, which can easily create a fire hazard. From the point of view of safety, this means intelligent stoves with the option of setting cooking times and automatic shut-off systems when operating with an empty container or without one at all. Intelligent refrigerators are also a welcome addition, for example ones capable of ordering groceries on the internet via a display on the refrigerator door. The refrigerator monitors one's food inside via labels and barcodes, whilst also noting the purchase dates of products, and then warning about the expiry date. Use is not complicated, and as senior users tend to have problems with mobility, this addition could be of invaluable help to them. Due to the senior users' difficulties in keeping up with new technologies it would be necessary to carefully select those appliances that are easy to use and have clear, intuitive interfaces (Hrovatin et al., 2012). It will be nec-



essary however, as Casals et al. (2000) determined, to make the commands and controls simple, easy-to-use and user-friendly.

### Conclusions

Most users who renovate their kitchen at an older age count on it being used for the rest of their lives. The results of this research show that most people are unaware of the importance of ergonomic adaptations to the specific needs that old age brings. Manufacturers should design kitchen furniture systems that would allow for implementation adapted for special needs and should inform buyers more about the significance of an adequately furnished kitchen, heeding the needs of advanced age.

Considering that designers during planning space and furniture have in mind the 19 to 65 age-group, the modern kitchen furniture neglects the needs of the elderly. Therefore, our findings correlate to the Dorst and Cross (2001), who recommend for successful design the interaction between goals and ideas. In the future, we would broaden the research to include other parts of residential unit, thus providing criteria for the design of homes for the elderly.

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# Effects of enough omega-3 fatty acids on cardiovascular system in the elderly

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## *Abstract*

*Introduction:* Cardiovascular diseases represent a significant risk factor. In the EU alone, they result in over 1.8 million deaths annually (37%). In 2014, 6.1 million new cases were discovered and their total number rose to almost 50 million. Diet plays an important role, because when it is unhealthy, it can make the disease worse. But when it is healthy, diet can act as a protective factor against cardiovascular diseases. The elderly pose a special challenge, because they represent an increasingly big part of our population. They also have lower caloric intake needs, which puts them at a higher risk of malnutrition.

*Methods:* The descriptive research method with a critical review of Slovene and English professional and scientific literature was used. We conducted a meta-synthesis, using studies published between 2007 and 2017.

*Results:* In the elderly, higher consumption of functional foods, such as omega-3 fatty acids, seems necessary. The amount of omega-3 fatty acids required to lower the risk of cardiovascular complications is expected to be at least 0.5 g higher than the daily recommended amount. Lower food consumption and consequential need to find the right meal composition therefore represent the biggest challenges.

*Discussion and conclusions:* Based on previous research and findings, guidelines for further research and sufficient omega-3 consumption among the elderly will be presented.

*Key words:* health of the elderly, elderly diet, nutraceuticals, cardiovascular disease, omega-3.

**C**ardiovascular diseases are illnesses which affect the vessels and are the leading cause of premature death among the adult population in the EU (Fan and Kenny, 2018). In 2014, they resulted in 1.8 million deaths (37.1

%), 6.1 million new cases were discovered and their total number rose to almost 50 million. They do not only represent a vast healthcare challenge but a considerable financial and economic problem as well, since they cost the EU approximately 169 billion EUR annually (Eurostat, 2017). Mechanisms which lead to cardiovascular diseases are different, but they are all connected by the fact that in over 90 % of cases they can be prevented. The elderly represent an increasingly big part of the population. It is estimated, that by 2050, 35 % of the population will be older than 65. Ensuring a healthy and quality ageing therefore presents the greatest challenge (Ubeda et al., 2012). Healthy and balanced diet, adjusted to the needs of an elderly person, plays an important role (IVZ, 2010; Eilat-Adar et al., 2013).

Olfactory, gustatory and gastrointestinal changes are typical in elderly and they can result in appetite reduction, thirst and manifest in a slower peristalsis, lower amounts of gastric acid secretion together with lower absorption and metabolic ability (IVZ, 2010; Molfino et al., 2014). On the account of reduced bodily functions, lowered muscular mass and lesser physical activity, energy needs are reduced as well, which can result in malnutrition. Malnutrition can be prevented by consuming functional foods, such as omega-3 fatty acids, that are classified as essential double bond fatty acids, which are indispensable in a healthy diet, the ageing process and cardiovascular diseases prevention (Tur et al., 2012; Ubeda et al., 2012).

### Methods

We used a descriptive research method with a critical review of Slovenian and English professional and scientific literature. It was carried out using the Slovenian bibliographic catalog database COBIB.si, Medline (Pubmed), Cochrane and Google Scholar. We conducted a meta-synthesis. Literature inclusion criteria were articles published between 2007 and 2017, Slovene or English language and appropriate content. The applied keywords in English were: elderly health, elderly diet, omega-3 fatty acids, elderly diet AND omega-3, elderly AND nutritional status, nutraceuticals, elderly AND cardiovascular disease, omega-3 AND cardiovascular disease, functional food AND cardiovascular disease. Slovene literature search was performed using the following keywords: zdravje starostnikov, prehrana starostnikov, srčno-žilna obolenja. Statistic data on cardiovascular diseases was acquired on website of Eurostat, European Commission. The literature search took place from February to April 2018.

### Results

Sixteen studies were obtained that show tangible evidence on the connection between omega-3 fatty acids and reduced risk of cardiovascular disease, along with the additional amount needed to achieve the cardioprotective effect (Table 1).

Table 1: Overview of studies

Author/year	Purpose of research	Methodology	Results
Alissa and Ferns, 2012	To compare individual dietary compounds in terms of their cardiovascular protection.	Literature review	The risk of cardiovascular disease is reduced by a diet rich in functional foods, such as polyunsaturated fats, nuts and fish.
Cao et al., 2014	To summarize the effects of omega-3 fatty acids in prevention of cardiovascular diseases and determine the required amount.	A literature review	Additional 500 mg of omega-3 fatty acids per day in patients without chronic heart disease and 1 g in patients with chronic heart disease is recommended to achieve the cardioprotective effect.
Casula et al., 2013	To investigate the preventive effect of 1 g/day of omega-3 fatty acid supplements to patients with existing cardiovascular disease.	A meta-analysis.	Long-term effect of high dose omega-3 fatty acid supplementation can be beneficial against the onset of cardiac death and myocardial infarction.
Dawczynski et al., 2010	To determine the effects of omega-3 long chain polyunsaturated fatty acid supplemented products on cardiovascular risk factors.	A cross-sectional study.	The consumption of omega-3 supplemented products decreases cardiovascular risk factors.
Delgado-Lista et al., 2012	To update the current evidence on the influence of omega-3 on the rate of cardiovascular events.	A systematic review.	Marine omega-3 fatty acids are effective in preventing cardiovascular events in persons with high cardiovascular risk
de Oliveira Otto et al., 2013	To evaluate associations between circulating biomarker, dietary omega-3 and cardiovascular disease events.	A prospective cohort study.	Increased consumption of omega-3 from seafood may prevent cardiovascular disease development.
Eilat-Adar et al., 2013	To summarize the literature on the association of nutrition and CVD.	A literature review	The mediterranean diet has been shown to reduce cardiovascular morbidity in primary and secondary prevention.
Filion et al., 2010	Analysis of cardiovascular efficacy of omega-3 fatty acids.	A meta-analysis.	The evidence suggests that omega-3 fatty acids may result in a modest reduction in mortality and stenosis.
Flock et al., 2013	To establish a dietary reference intake of long-chain omega-3 fatty acids for cardiovascular protection.	A literature review	A minimum additional intake of 500 mg omega-3 daily is recommended for adults without chronic heart disease.

<i>Author/year</i>	<i>Purpose of research</i>	<i>Methodology</i>	<i>Results</i>
Lavie et al., 2009	To assess the evidence showing the benefits of omega-3 polyunsaturated fatty acids.	Literature review.	The target consumption should be at least 500 mg/day for individuals without underlying cardiovascular diseases and at least 800 to 1,000 mg/day for those with well known coronary heart disease.
Levitan et al., 2009	To examine the associations of fatty fish and omega-3 intake with heart failure.	A prospective cohort study.	Intake of marine omega-3 fatty acids was associated with lower rates of heart failure.
Levitan et al., 2010	To examine the association of marine omega-3 with heart failure.	A meta-analysis.	Moderate consumption of fatty fish and marine omega-3 were associated with a lower rate of first heart failure hospitalization or death.
Merino et al., 2014	To investigate the effect of increased omega-3 consumption on peripheral artery function.	A prospective cohort study.	Increased dietary consumption of omega-3 improves peripheral vasoactivity.
Mozaffarian et al., 2008	To assess if habitual consumption of omega-3 acids is associated with more favorable heart rate variability.	A prospective cohort study.	Vascular endothelial cell function is improved and arrhythmic risk reduced by omega-3 fatty acid intake.
Shen et al., 2017	To study the effects of marine omega-3 fatty acid supplementation in older adults with hypertension and/or hypercholesterolemia.	Experimental study.	Dietary fish oil-based supplementations were safe and effective in reducing blood pressure and blood cholesterol.
Wang et al., 2012	To assess the effect of omega-3 fatty acid supplementation on endothelial function.	A meta-analysis.	Supplementation of omega-3 fatty acids significantly improves the endothelial function.

Scientific findings show that omega-3 polyunsaturated fatty acids can help reduce the effect of cardiovascular risk factors. These include hypertension, hyperlipidaemia, elevated amounts of low-density lipoprotein (LDL) and elevated inflammatory marker levels (Alissa, Ferns, 2012; Shen et al., 2017). Furthermore, increased consumption of omega-3 can help prevent cardiovascular events in those with high cardiovascular risks and reduce cardiovascular morbidity in both primary and secondary prevention (de Oliveira Otto et al., 2013; Eilat-Adar et al., 2013). It can also reduce the rate of first heart failure (Levitan et al., 2009; Levitan et al., 2010), improve peripheral vasoactivity (Merino et al., 2014), delay the onset of cardiovascular disease, cardiac death, myocardial infarction (Casula et al., 2013), reduce stenosis as well as consequential mortality (Filion et al., 2010).

With the recommended daily intake of omega-3 fatty acids, the risk of death as a result of cardiovascular causes can be reduced by up to 16 % and myocardial infarction by up to 24 % (Tur et al., 2012). However, the exact amount of omega-3 fatty acids needed to achieve better cardioprotective effect is a subject of an ongoing debate among scientists. Studies agree that along with the recommended daily consumption of 1.1 g per day for women and 1.6 g for men, an additional 0.5-0.8 g should be consumed by individuals without chronic heart disease and 1-1.3 g by those with chronic heart disease (Lavie et al., 2009; Flock et al., 2013; Cao et al., 2014).

Sufficient amounts can be achieved by means of consuming functional foods, such as nuts and fish or through supplementation of fish oil or other products (Dawczynski et al., 2010; Delgado-Lista et al., 2012; Wang et al., 2012). Lower food consumption in the elderly, mainly due to lower caloric intake and the subsequential need to restructure meal composition, presents the main challenge in achieving the sufficient consumption of omega-3 (Mudge et al., 2010).

### Discussion

Correct meal planning is essential when it comes to achieving enough omega-3 consumption and cardiovascular protection among the elderly. Beside lower food consumption, they can also lack in knowledge and economic means (Iizaka et al., 2008; Vanderwee et al., 2010).

Since there is no single correct way to achieve the correct meal composition, modelling based on guidelines and diets seems sensible. One such diet is the Mediterranean diet, which is characterized by a high omega-3 fatty acid intake, from fish (such as mackerel, sardines or salmon) and plant (such as broccoli or spinach) sources. The diet also includes seasonal vegetables and fruits, whole grains and wholegrain bread, olive oil and nuts. If adequate fish consumption cannot be achieved because of the economic factors, substitution with nuts, such as walnuts, cashews or Brazil nuts is justified (Eilat-Adar et al., 2013; Estruch et al., 2013).

As an alternative or complementary to Mediterranean diet, DASH (Dietary Approaches to Stop Hypertension) guidelines could be used. Primary goal of DASH is to lower the hypertension, but since it promotes consumption of similar food types to Mediterranean diet (with emphasis on lower salt and higher low-fat dairy product intake), its use in general cardiovascular disease prevention is possible (Folsom et al., 2007).

### Conclusion

With the available statistical data, it is clear that cardiovascular diseases represent a problem that will become even more important with growing share of the elderly in our population. Recommended daily intake of omega-3 can reduce the risk of cardiovascular risk factors, but increased consumption can

help achieve a better cardioprotective effect. Two diets that recommend high omega-3 consumption are the Mediterranean diet and DASH. This information could be used to raise awareness of cardiovascular diseases on the primary level, to encourage lifestyle changes on secondary level and prevent complications on tertiary level of healthcare.

Based on the studies we obtained and their results, further research of this topic is warranted. The additional amount of omega-3 needed to achieve the cardioprotective effect should be worked out more precisely. The second research focus could be on how to achieve enough omega-3 consumption among different cultures with different dietary habits. Future research should also focus on how to get the information to the elderly and their health education – to encourage them to follow the proposed dietary patterns.

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# Nutritional Treatment of the Elderly in Nursing Homes

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## *Abstract*

*Introduction:* The number of elderly individuals is increasing, due to longer life expectancy. Malnutrition is widespread among the elderly living at home, hospitalized or in nursing homes. Nutritional status affects the quality of life, increases morbidity and mortality. With nutrition treatment, we would like to improve our residents' quality of life and improve the role of dietitian in nursing homes.

*Methods:* The literature search was carried out in Pubmed, ScienceDirect, Google Scholar and Medline. A filter was applied in order to select papers published in the last 10 years. All types of studies were included. Our research was conducted from April 2017 to March 2018 in seven nursing homes. 1310 residents were included, aged over 65 years. On the basis of MNA-SF<sup>®</sup> (Mini Nutritional Assessment – Short Form<sup>®</sup>), we identified undernourished residents. Depending on the degree of malnutrition, we have established appropriate nutritional support.

*Results:* Initial screening showed that in our nursing homes, 50.6 % had good nutritional status, 29.2 % were at risk of malnutrition and 20.2 % malnourished. In March 2018 46.6 % had good nutritional status, 39.9 % were at risk of malnutrition, and 13.5 % malnourished.

*Discussion:* We begin nutritional treatment for every new resident, since early recognition of malnutrition and appropriate measures significantly affect quality of life. We are learning new approaches to nutritional treatment and are expanding the range of measures that will provide healthy life for residents. At the same time, we want to improve the role of dietitian in all nursing homes.

*Key words:* nutrition screening, malnutrition, elderly, nursing home

In recent years we have witnessed a dramatic increase in the global elderly population (Boateng and Jeptanui, 2016). In Slovenia, 19.4 % of population is aged 65 or more (Statistical Office of the Republic of Slovenia, 2018). With advances in medicine helping more people to live longer lives, it has been estimated that between 2015 and 2050, the number of the elderly will double globally (Boateng and Jeptanui, 2016).

Chronic diseases are the main reason for most health problems in older age. It is possible to prevent or delay the onset of many of them by engaging in healthy behaviors, earlier in life. Many studies suggest that even in very advanced years, physical activity and good nutrition can have powerful benefits for health and wellbeing (WHO, 2015). Ageing causes numerous changes in health and the performance of the body. Nutrition plays important role in health maintenance. Changes like decreased salivation, difficulty in swallowing, and delay in the emptying of the stomach and esophagus, as well as lower gastrointestinal movement, affect the ability to maintain good nutritional status. As a result, the elderly are a potentially vulnerable group for the risk of malnutrition (Abolghasem Gorji et al., 2017). One of the changes notable in the elderly is a decrease in appetite, which can be caused by changes to the physiology, in psychological functioning, in social circumstances, acute illness, chronic diseases and the use of medication. Higher rates of appetite decline occur in women, nursing home residents, hospitalized people, and with age (Pilgrim et al., 2015).

Current public health approaches to population ageing have not been effective. The health of older people is not keeping up with increasing longevity (Chatterji et al., 2015). Current health systems are poorly aligned with the needs of older populations (Smith et al. 2012 and Oliver et al., 2014). Long-term care models are both inadequate and unsustainable (Beard and Petitot, 2011).

Malnutrition is a common healthcare problem that predominantly affects the elderly population. It has an effect on increasing morbidity and mortality, lowers the quality of life, extends hospital stays and raises the costs of care. Malnutrition is common at all levels of healthcare, from primary to specialized and also in nursing homes. Malnutrition is known to be the most frequent cause of disability in the elderly that are living at home, hospitalized or in a nursing home (Cuerda et al., 2016).

In Slovenia, a dietitian is usually not part of the personnel structure of nursing homes. The employment of dietitians in nursing homes is not yet established although the importance of good nutritional status is well known. That is why we decided to employ a dietitian and implement a series of actions in order to improve the nutrition status of our residents with the bigger goal of improved quality of life. Hopefully those actions will become widespread on a national level and nutritional treatment will be implemented in all nursing homes.

## Methods

The literature search was carried out in four databases, Pubmed, ScienceDirect, Google Scholar and Medline, and was completed with a manual search on the basis of the references given in the selected papers. Filter was applied in order to select papers published in the last 10 years. In order to be included, papers had to examine nutritional status of elderly, 65 years old or more. All types of studies were included.

Research was conducted to determine the prevalence of malnutrition in our nursing homes and compare the prevalence before nutritional treatment with prevalence after establishment of nutritional treatment and to compare our results with the literature. The eligibility criteria were the following: age 65 years and older, residents of DEOS nursing homes and willingness to participate in nutritional treatment. 1310 residents were included. The MNA-SF<sup>®</sup> (Mini Nutritional Assessment – Short Form<sup>®</sup>) was used as the nutritional screening instrument in accordance with ESPEN recommendations (Cederholm et al., 2017). All the data and measurements were collected by health care professionals in cooperation with a clinical dietitian to assure unified measurements and evaluation of MNA- SF<sup>®</sup>.

## Results

### *Literature review*

Many studies have been conducted to evaluate the prevalence of malnutrition across a population that embraces different levels of healthcare. The DREAM+65 Study used MNA screening-assessment instrument and showed the prevalence of malnutrition in hospitals to be 21.7 % and the risk of malnutrition 46.6 %. In nursing homes, the prevalence of malnutrition and the risk of malnutrition is slightly lower than in hospitals; 30.9 % of elderly are at risk of malnutrition and 15.6 % are malnourished (Cuerda et al., 2016). Results of a study carried out in 11 nursing homes in Sweden evaluated 318 subjects. The prevalence, according to MNA assessment of malnutrition was 17.7 % and for the risk of malnutrition, 40.3 %. After 24 months, the nutritional status of 38.7 % subjects worsened (Bolmsjö et al., 2014). A Turkish study was conducted on 402 nursing home residents. The aim of this study was to determine the prevalence of malnutrition risk and sarcopenia in elderly nursing home residents. According to MNA, 56.5 % of subjects had normal nutritional status, 24.8 % were at risk of malnutrition and 18.7 % were malnourished (Sakaa et al., 2015). Aukner et al. conducted research across Oslo's 21 nursing homes. 358 residents with dementia or cognitive impairment, of whom 46 % lived in special care units, were included. Nutritional status was assessed using the Malnutrition Universal Screening Tool (MUST) and anthropometry. 67 % were classified as being at low risk, 20 % at medium risk, and 13 % at high risk of malnutrition. There was no significant difference between residents in open and special care units, assessed by MUST (Aukner et al., 2013). A study conducted in Leb-

anese long-term care nursing homes described the differences between elderly men and women on socio-economic, health and nutritional status. Data was obtained from 221 residents; 148 (67 %) women and 73 (33 %) men, living in 36 nursing homes. The prevalence of malnutrition was 3.2 % and of risk of malnutrition 27.6 %. There was no statistically significant difference between women and men on MNA (Doumit et al., 2014).

Guidelines for nutritional treatment vary across countries. Slovenia has some guidelines for nutritional treatment in nursing homes, that are derived from ESPEN guidelines. There are few main points of the guidelines. Nutrition should be part of general care for elderly people in nursing homes (Volkert et al., 2006). Nutrition screenings should be frequent. We must act as soon as we notice a deviation from the normal (Volkert et al., 2006 and Kondrup et al., 2003). Nutritional screening is performed in the elderly once a week. To screen the nutritional status of the elderly, we use the MNA to identify malnutrition and the risk of malnutrition (Kondrup et al., 2003).

*Implementing nutritional support in nursing homes*

At the beginning of our research in April 2017, we included 105 residents and one nursing home. Initial screening showed 50.6 % of residents had normal nutritional status, 29.2 % were at risk of malnutrition and 20.2 % were malnourished. With the aim of improving the nutritional status of our residents, we implemented some actions, presented in the second column of Table 1.

*Table 1: Measures to improve nutritional status*

FIELD OF ACTION	ACTIONS	FUTURE PLAN
ORGANIZATION OF NUTRITIONAL SUPPORT	<p>In 2017, we employed a dietitian.</p> <p>In 2017, we gradually implemented nutritional screening.</p> <p>In 2017, we set up an interdisciplinary nutrition support team at each nursing home, consisting mostly of nursing staff, and working closely with a dietitian and a doctor.</p> <p>In the last year, we have devoted a lot of attention to interdisciplinary nutritional treatment and screening for malnutrition across all our residents.</p>	<p>In addition to nutritional screening, more attention will be paid to individual nutritional treatments.</p> <p>We will transform the nutrition support team, so that it will include multiple new profiles (more active involvement of the doctor, involvement of physiotherapists, occupational therapists etc.).</p>
RECOGNITION AND MANAGEMENT OF MALNUTRITION	<p>In April 2017, we implemented routine nutritional screening at admission and periodic screenings for all residents.</p>	<p>Residents with identified malnutrition at admission will receive individual nutritional treatment.</p> <p>We will more often include a clinical dietitian in the departmental expert meetings.</p>

<i>FIELD OF ACTION</i>	<i>ACTIONS</i>	<i>FUTURE PLAN</i>
DOCUMENTATION	<p>We have created a data reporting system.</p> <p>We have created internal forms that make ordering an appropriate individual diet easier.</p> <p>We have created a unified work process for the implementation of nutritional screening and determining appropriate measures.</p>	<p>We will update the computer nursing program so that it will include nutritional screening, individual nutritional needs, the prescribed dietary therapy and other measures, the diagnosis with the established degree of malnutrition and the monitored and valued intake of food and liquid.</p>
TRAINING / EDUCATION	<p>Training of nursing staff for the use of the MNA-SF® questionnaire was carried out.</p> <p>Nursing staff was educated for performing nutritional screening.</p>	<p>Education will include new knowledge about the process of nutritional treatment with the roles of individual members in it, decision making algorithms about nutritional measures for individual conditions and diseases.</p> <p>Our work will be presented at scientific conferences.</p> <p>Participation in training and workshops in the field of clinical nutrition and food security.</p>
PURCHASE OF EQUIPMENT	<p>We purchased scales for all nursing homes.</p> <p>We purchased a body composition analyser.</p>	
EVALUATION OF NUTRITION SUPPORT PRACTICES	<p>We performed nutrition screening and reported on the nutrition treatment to doctors and professional director.</p>	<p>We will participate in the nutritionDay worldwide project.</p>
FOOD SUPPLY	<p>We regularly evaluate the energy and nutritional composition of menus.</p> <p>In the menus, corrective measures were taken to align them with valid recommendations.</p> <p>We provided personalized and individual nutrition, and adapted food consistency for different levels of dysphagia.</p> <p>Residents at risk for malnutrition and malnourished residents are provided with food for special medical purposes.</p>	<p>Due to the growing need for individualized diets, we will increase the diversity of dishes offered, to enrich nutrition and to improve the process and organization of work in our own kitchens.</p> <p>Critically, we will redefine professional requirements for ordering enteral nutrition and associated feeding systems.</p>

We included one nursing home a month. In 11 months and across 7 nursing homes, 1310 residents were included. The strengths of our research lie in the fact that it was carried out on a broad sample of subjects aged over 65 and living in nursing homes, and that we used MNA as a nutritional screening assessment instrument. This makes it easier to perform comparisons with other similar studies, considering the use of MNA in nursing homes is advised by ESPEN. However, we are also aware of some limitations. We started out with a small sample and added more nursing homes with time. Also, many subjects changed during our study due to changes in nursing home, hospitalization, new admissions and high mortality. In March 2018, nutritional screening was

performed on 1107 residents. 46.6 % residents had normal nutritional status, 39.9 % were at risk of malnutrition, and 13.5 % were malnourished. Nutritional treatment can help individuals but the overall result is not likely to change by much due to new admissions, hospitalizations, diseases etc. We evaluate that nutritional support has influence on quality of life, muscle mass if combined with strength training, better wound healing, but new studies are needed to assess these correlations. The multidisciplinary team, consisting of nursing staff, physiotherapists, doctors and clinical dietitians, report the positive influence of nutritional treatment on muscle mass, physical ability and overall health. In future we expect some changes in prevalence of malnutrition, but due to the high morbidity of this age group, we plan to evaluate individual changes more closely than the prevalence. Our future plans are presented in the third column of Table 1.

The results of our study are comparable with other studies, especially those using MNA. Most of our residents come from hospitals, are critically ill and are 85 years old or more, and are already malnourished at admission. Residents previously living at home usually have better nutritional status than those who were hospitalized or lived in other nursing homes.

### Conclusions

The use of nutritional screening is rising but predominantly in the hospital environment, where malnutrition is most common. Nursing homes also have high prevalence of malnutrition, the treatment of which is often neglected due to current health policies that do not include dietitians and other nutrition specialists in the nursing home employment scheme. More studies on the subject might provide statistical elements that will help develop new guidelines and protocols on a national level.

We implement nutritional treatment for every new resident, as early recognition of malnutrition and appropriate measures significantly affect quality of life. We are learning new approaches to nutritional treatment and are expanding the range of measures that will provide healthy life for residents. Nutritional support seems to have a good influence on quality of life and should be performed in all nursing homes.

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# Effects of regular exercise on elderly people

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## *Abstract*

In 2006/07 exercising for women, aged over 65, started in Kamnik and lasted five years. At the beginning, 32 women of the exercising group were included into active exercising and 32 women of the control group were not included into active exercising. The exercising took place intensively twice a week for 60 minutes from October 2006 to June 2007 and once a week for 60 minutes from October 2007 to June 2011. We performed the measurements of basic physical parameters and the tests of functional physical fitness by checking flexibility, strength and balance. The first measurements for the members of the exercising group were carried out in October 2006, the second after half a year in July 2007 and the third in July 2011, when 20 women of the same exercising group still actively participated after four years. The measurements for the members of the control group were carried out in October 2006 and July 2011, when 17 women of the same control group attended the measurement again. The purpose of the research was to highlight the importance of regular physical activity for the women over 65 years old, to improve their motor skills related to power, flexibility and balance and also endurance, speed and coordination. Statistical analyses were done by using SPSS 16.0 program (SPSS Inc., IBM Corporation, Chicago Illinois, USA, 2008) and were checked at the level of 5-percent risk ( $p = 0,05$ ). The test results of functional physical fitness of older people showed the considerable improvement in all tests after half a year of adapted exercising; additionally, we noticed progress in most tests, also during the second measurement after the finished exercising in 2007 and 2011. Moreover, the exercising group compared to the control group also achieved substantially better results of motor abilities. Exercising can have a significant impact on the improvement of motor skills of the elderly, which may result in the independent performance of all basic hygiene tasks, dressing, household and domestic work, shopping and

other tasks related to freedom of movement, expansion of living space and an independent and autonomous life without the assistance of others.

*Key words:* elderly, women, regular exercise, motor skills, health.

In Slovenia, higher number of older people began to emerge when the generations born before and during the World War II started to retire. These generations compared to today's births are highly numerous and represent a significant group of population due to social, societal, biological and economic factors. It is assumed that in Slovenia in 2020, there would be, according to the data from 2009 around 19 % of people over 65 years old (Sedej, 2009), while by the year 2050 39 % older than 60, among them 13,9 % over 80 (Vertot, 2008). The main challenge of modern times has become the aging of the population. It has become very important how the elderly spend their life after age of 65. Movement and regular exercises are of great importance. It has been proven that the impact of physical activity in old age (Oražem Grm, 2008) is reflected by positive effects in cardio-vascular, muscular-skeletal as well as psycho-social components of health. Since aging changes physical appearance and physical abilities, the appropriate physical activity, such as for example walking, is important to establish and enhance physical performance in old age.

Regular exercising (Mišigoj-Duraković et al., 2003) is important for maintaining and improving the level of health, preventing the development of non-infectious diseases at adults and the elderly, treating and rehabilitating numerous acute and chronic diseases, maintaining the ability for independent life in old age and increasing the functional abilities or physical fitness. It is an effective method for overcoming stress, since it brings an enjoyable entertainment and relaxation (Tušak, 2002). Daily activities, such as dressing, bathing, walking, eating and maintenance of personal hygiene and instrumental activities such as cooking, shopping, washing, handling money, using the phone, house tasks, cleaning, using means of transport, taking medication and other activities related to independent life at home, are very important for functional qualifications (Finkel, 2003).

Although aging (Berčič, 2002) is an inevitable bio-physiological process, the decline of physiological functions can be slowed down. Each individual should, if it is in his power, take care of as slower aging as possible by daily physical and sports-recreational engagement. Consideration should be given to a type of activity, intensity, frequency, duration as well as gradual approach and regularity of exercise. When choosing exercises, it is important that we find joy, pleasure and stimulus in them, because only then we can persevere.

## Methods

In the research, we were assessing the impact of regular exercising on better and greater physical abilities in old age period; therefore, in 2006/07 we includ-

ed 32 women of the exercising group and 32 women of the control group, aged 65 and over, from Kamnik and Domžale and surroundings, into our research. In 2006, the average age of the participants of the exercising group was  $69.68 \pm 3.83$  and of the participants of the control group  $70.75 \pm 3.67$ . In 2011, only 20 (62.5 %) participants of the same exercising group were still included in the exercising group,  $74.75 \pm 4.17$  years old on average; and only 17 (53.1 %) women of the control group, on average  $75.12 \pm 2.97$  years old, attended the measurements again. The reasons for lower participation in the measurements were the termination of participation in the research due to poor state of health or even deaths of participants.

The information about physical and functional abilities of participants were collected by using the Fullerton test battery (Rikli & Jones, 1999). We were assessing the functional physical condition of the elderly, since the Fullerton test battery includes the tests which determine the abilities that are necessary for independent life: getting up from the chair for 30 seconds, weightlifting sitting for 30 seconds, torso bending forward on the bench, touching hands on the back, stand-up and go, walking for 9 minutes, balance on one leg with eyes open and grip strength - power measured by a dynamometer (Jamar Hydraulic Hand Dynamometer - 5030J1, Sammons Preston, Providence, ZDA). To perform the measurements, we used the devices intended to test pupils; the measurement of power was done by a dynamometer lent to us by the Department for Physiotherapy from the Health Centre in Kamnik; for weightlifting sitting we used an appropriate 2, 27 kg heavy handle. The participants of the exercising group were tested for the first time in October 2006, for the second time after half a year exercising in July 2007 and for the third time in July 2011; the participants of the control group were tested twice, in October 2006 and July 2011.

For statistical analysis the SPSS 16.0 program was used (SPSS Inc., IBM Corporation, Chicago Illinois, USA, 2008). The results are presented in the text and in tabular forms. All statistical differences were verified at the level of 5-percent risk ( $p = 0.05$ ). The results are presented in the text and in tabular forms. All statistical differences were verified at the level of 5-percent risk ( $p = 0.05$ ). T-test was used to assess the differences between the physical parameters and motor-functional abilities for the members of the exercising group, at the beginning and at the end of exercising in 2006/07 as well as the comparisons for the period from 2006, before and after the exercising, and after five years in 2011, separately for the exercising group and control group; also the analysis of variance (F-test) was used to assess the differences of physical parameters and motor-functional abilities between the members of the exercising group and the control group to compare the periods 2006 and 2011 as well as the analysis of covariance to determine the differences in the change between the initial and final state of motor-functional abilities between the members of the exercising group and the control group.

## Results

The comparison of members of the exercising group and control group before the start of exercising in 2006/07 showed no statistically significant differences; statistically significant differences between the two groups occurred during the final testing in 2011, in favor of the members of the exercising group (Figure 1, 2, 3, 5 and 8). The comparison of the two groups showed no statistically significant differences before the start of exercising in 2006/07 and after the exercising in 2011 (Figure 4 and 7). At the first measurement, before the start of exercising in 2006/07 the comparison of results of the exercising group and control group showed a statistically significant difference in favor of the exercising group; the statistically significant difference was also observed between the two groups at the final testing in 2011 and again in favor of the exercising group members (Figure 6). Statistically significant difference appeared for the members of the control group, between the first and the final measurement, namely the average results of all tests after four years were lower than the results of the initial measurements.

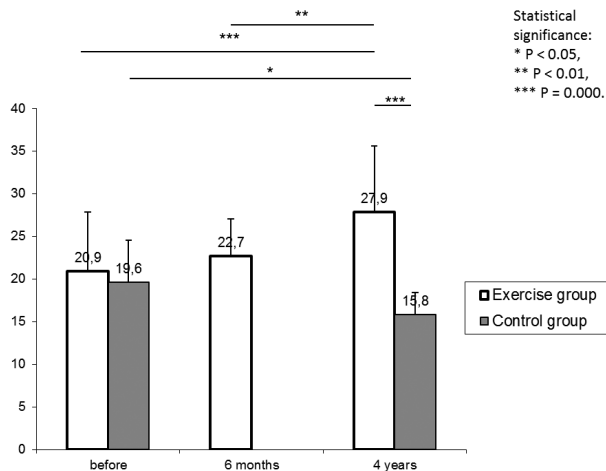


Figure 1: Getting up from the chair for 30 seconds (number of repetitions)

At the members of the exercising group (Figure 1) before and after the finished exercising in 2006/07 the test results of getting up from the chair for 30 seconds were not statistically significant, but they were statistically significant when we compared the results of the test before the start of exercising in 2006/07 and after a four-year period in 2011 and after the finished exercising in 2006/07 and after four years. The difference of results (Figure 2) of the members of the exercising group in the test *weightlifting sitting for 30 seconds* before and after the exercising in 2006 /07 showed a statistically significant difference, in favor of the test after six-month exercising; a statistically significant difference

was also observed when we compared the results of the tests before the start of exercising in 2006 /07 and after a four-year period in 2011.

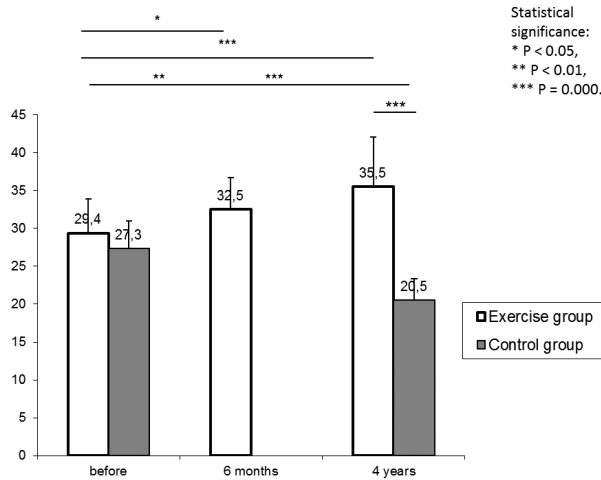


Figure 2: Weightlifting sitting for 30 seconds (number of repetitions)

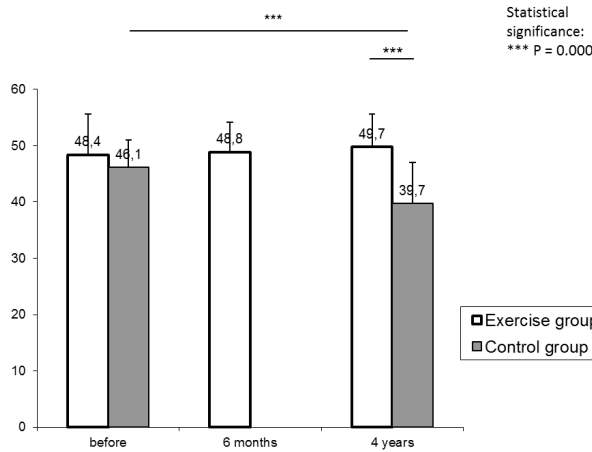


Figure 3: Bending forward on the bench (cm)

The test results of bending forward on the bench (Figure 3) were not statistically significant for the members of the exercising group, neither in the period before and after exercising in 2006 /07 or after four years in 2011. The results of touching hands on the back test (Figure 4) were statistically significant at the members of the exercising group only after six months of exercising in 2006/07.

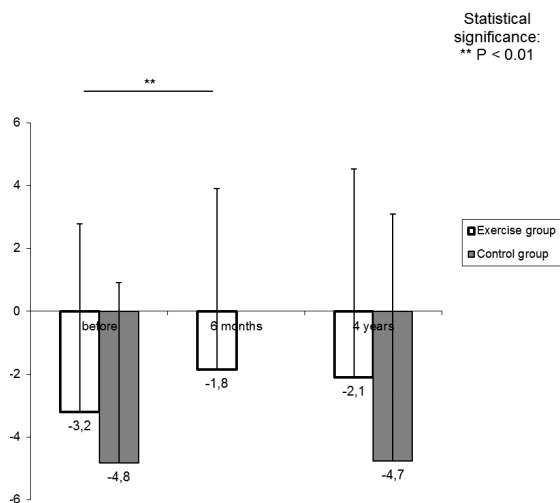


Figure 4: Touching hands on the back (cm)

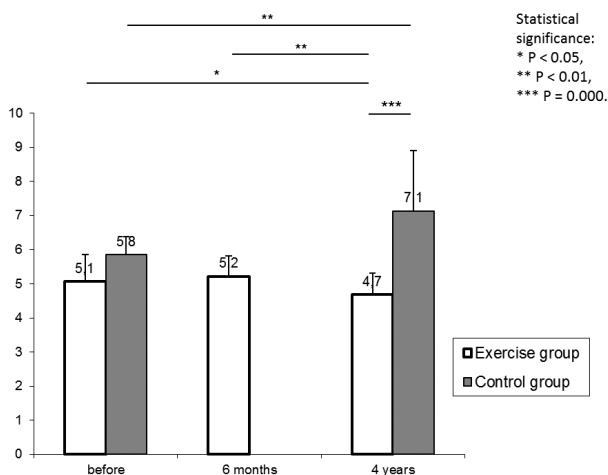


Figure 5: Stand-up and go (in seconds)

The test results of *stand-up and go* test (Figure 5) were not statistically significant at the members of the exercising group before and after exercising in 2006/07, but they were statistically significant when compared to the results before the beginning of exercising in 2006/07 and after a four-year period in 2011 and after the end of exercising in 2006/07 and after four years. The comparison of results of the exercising group of *9-minute walking* test (Figure 6) before and after the exercising in 2006 /07 showed a statistically significant difference in favor of the test after six months of exercising; statistically significant difference was also present when we compared the test results of before the start of exercising in 2006/07 and after a four-year period in 2011.



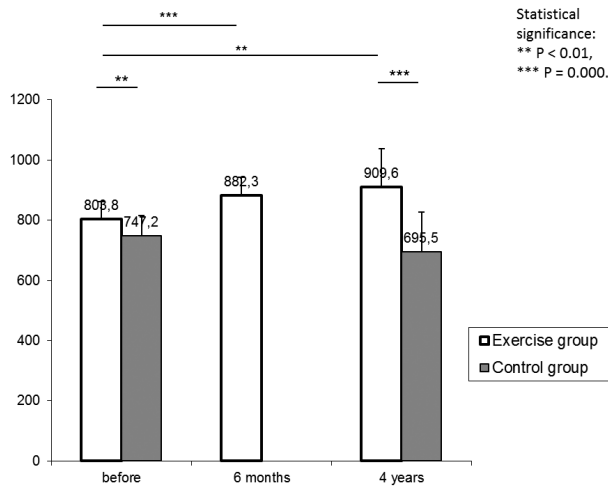


Figure 6: 9-minute walking (number of meters)

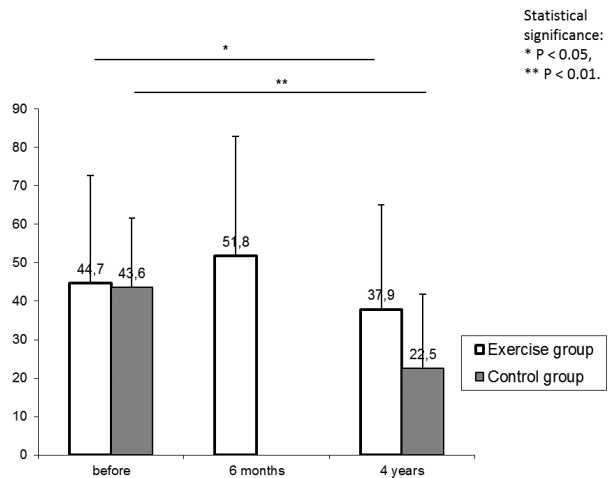


Figure 7: Balance on one leg with eyes open (in seconds)

The test result of *balance on one leg with eyes open* test (Figure 7) were for the members of the exercising group statistically significant compared to the beginning of exercising in 2006 /07 and after four years in 2011. The statistically significant difference occurred at the members of the exercising group at *grip strength by a dynamometer* test (Figure 8) during the measurement before and after the exercising in 2006 /07, as the average power of the grip strength measured by the dynamometer increased.

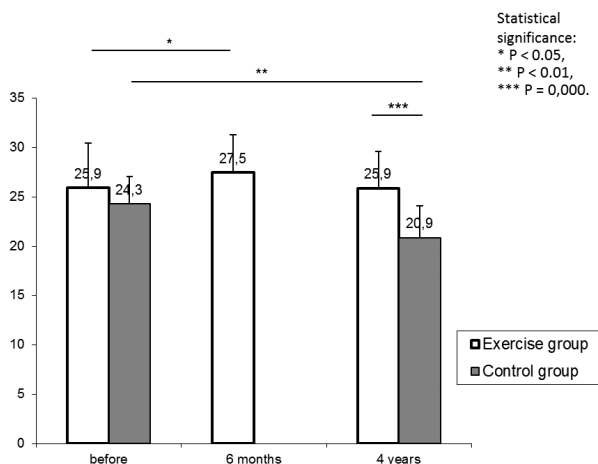


Figure 8: Grip strength by a dynamometer (in kilograms)

## Discussion

Independent living plays an important role for the elderly, therefore the subjective factors such as age itself, accessibility and proximity of home, physical exercising and physical fitness, desire for dealing with certain sport, family situation and financial situation, have greater influence on sports activities than objective ones. Fox (1992) states that for people, being active in sport means an active spending of free time and socializing, where the criterion is primarily the well-being. In California, a research about the effects on strength and flexibility of 6-week fitness training was made on a small sample of 8 men and 14 women aged from 60 to 79. For each exercise, the participants performed 12 to 15 repetitions using the fitness equipment, before that they did the 20-minute warm up and the stretching exercises. 15 elderly people of the same age participated in the control group. Both groups were tested before and after the exercising by using Fullerton test battery for measuring functional physical fitness: 6-minute walk, getting up from a chair for 30 seconds, touching of hands on the back, stand-up and go and grip strength. The control group showed a substantially lower physical fitness; the testing group showed better results in grip strength, shoulder flexibility, the number of repetitions of getting up from a chair, walking speed and stand-up and go (Cavani et al., 2002). Very similar results were found when we tested our group, as the members of the exercising group achieved better results in the flexibility of the shoulder girdle, which was shown in touching hands on the back test; in the strength of the upper extremities, which was shown in weightlifting sitting for 30 seconds test and grip strength by the dynamometer test; in the power of the lower extremities, which was shown in the getting up from a chair for 30 seconds test and in general endurance, shown in 9 -minute walking test. We have also noticed that during the second testing after the end of exercising in 2006/07 and 2011 the mo-

tor abilities at the members of the exercising group were still improving which show the tests of getting up from a chair for 30 seconds, weightlifting sitting for 30 seconds, torso bending forward on the bench, stand-up and go and 9-minute walking. The decline of motor abilities after four years was observed only in *balance on one leg with eyes open* test due to the links between the sensory-neuronal system and  $\alpha$ -motor neurons, which die with age and weaken the stabilizing of the knee joint (Madhavan et al., 2005 & 2009); it was demonstrated by the comparative research between the young and the elderly over 65. They found out significant differences between the young and the elderly by *standing on one leg with squatting* exercise, at first with eyes open and then eyes closed. Comparing the sample results of the members of the control group for the period from 2006/07 to 2011, after four years, we noticed the reduction of all motor abilities, because the measured results were lower in all tests, except at touching hands on the back.

### Conclusion

The results of this research are part of recognition that with adapted physical exercising, with an emphasis on strength, flexibility and balance, we can significantly influence the improvement of functioning of the locomotors system, balance and strength at the elderly. Regular exercises improve physical abilities and thus the functional competence of the individuals, which is reflected in better health and well-being, better independent performance of all basic tasks which in the process enable free physical movement, enlargement of living space and autonomous living without the help of others. We wish that the results of adapted physical exercising contributed to the decision making of the wider female and male population, aged 65 and over, to make physical activity the way of their life. Since 2009, the exercises are going in the Slovene area by the method of 1000 movements (Grishin, 2012) within the Society of School of health, where elderly have the exercises every day at 7:30 in the morning in nature. Further researches of physical activity at the elderly over 65 would be definitely interesting for the follow-up on the national level in order to determine the functional capacity of older people and that would allow us to plan the development of programs for active spending of life in the third period.

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# Physical activity of the elderly with a diabetic foot

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## *Abstract*

Physical activity is an important factor for health itself and for elderly people. Healthy aging means maintaining the health at all levels. Diabetes is a chronic, progressive deterioration of beta cells in the pancreas. Therefore, the adaptation of the treatment is necessary, first with a healthy lifestyle. Chronic elevated blood glucose levels can lead to the failure of organs or organ systems over the years. One of the consequences may be the formation of a diabetic foot. A diabetic foot is the result of chronic complications of diabetes. As the feeling of pain, heat, cold and vibration are reduced or absent, the patient does not pay attention to injuries or does not take appropriate action when injured. The mechanics of walking also change because of the sensitivity impairment. The importance of physical activity is also becoming aware amongst diabetics. Regular diet, regular therapy (antidiabetics, insulin injections, and regular blood sugar monitoring) in addition to regular physical activity can have diabetes well-controlled.

*Key words:* diabetes 2, diabetic foot, physical activity of the elderly

**D**iabetes is one of the most prevalent chronic diseases. Type 2 diabetes is considered a global epidemic and is strongly linked to the style of life and economic change (Anjana and Pradeep, 2017). Treatment is complex and includes dieting, exercise, taking tablets or insulin injections. The patient must have a clear idea of his own illness so that he can learn to live with it. The treatment of diabetes in the elderly is a major challenge, involving both healthcare professionals and the patient's family. (Mlakar, 2014). One of the consequences may be diabetic neuropathy. A diabetic foot is thus a set of disease disorders on the foot that lead to ulcers in the skin. Treatment of foot ulcers requires various measures, including prevention of wounds, conserva-

tive and surgical interventions, and rehabilitation after amputation. The goal of treating femoral ulcers is to prevent amputation. Exercise is important when the patient has diabetes, exercise can have effects on the body, reduces blood sugar and maintains the physical activity of the patients. Moreover, improper shoes and absence of later examination of the feet can cause additional problems to the patients with diabetes (Marolt, 2009).

Excessive physical activity can lead to undesirable fluctuations in blood sugar. In any case, a consultation with a doctor is necessary, to what extent physical activity is recommended (Ruhland, 1998). Only physical activity does not sufficiently influence the metabolic regulation of diabetes. The basis for treating diabetes is still proper nutrition and insulin doses, while incentives for regular physical activity are a welcome and important addition. Sport therefore influences our attitude towards health, nutrition and lifestyle, and consequently also on the regulation of diabetes (Battelino and Janež, 2007). Patients with a physical activity program improve the quality of life - physically, emotionally and socially. If there is a tendency to hypoglycaemia or even a poor recognition of hypoglycaemia, the patient must take care of his own safety while engaging in physical activity. Types of exercise where hypoglycaemia may be dangerous (swimming, walking along an exposed mountain path, etc.) should be avoided. It is advisable to consult your doctor, what kind of exercise is appropriate for the individual (Lipnik, 2014).

In type 2 diabetes, progression of the ability of beta cells to eliminate insulin results in insulin resistance. Most patients may have large abdominal, overweight, elevated triglycerides, and high blood pressure. As a rule, there are no visible signs of disease for several years. It usually lasts between 5 and 12 years before the disease is detected without the patient having any problems.

Diabetic foot is one of the most common complications of diabetes. The term diabetic foot describes the changes that occur on the legs of patients with diabetes (Hohnjec, 2011). It is a wound that does not start healing without adequate professional care. Nerve damage causes a gradual loss of touch, hot and cold, and pain. The foot becomes insensitive primarily on the fingers. Where the pressure on the underlying soft tissue is formed, the cavity is formed. Through cracks, infectious cusps enter the affected tissue and thus form purulent infections and inflammation (Medvešček and Pavčič, 2009).

In association with the onset of type 2 diabetes, movement is a very important protective factor. A diabetic patient is recommended at least 150 minutes of aerobic exercise per week. Physical activity must be spread evenly throughout the week. Promoting gradual escalation of physical activity according to individual's wishes and moderation is very important (NIJZ, 2018). Regular physical exercise is one of the important strategies for treating a patient with diabetes and results in an increased cardiorespiratory function, reduced insulin resistance, and a better blood lipid state (Anjana and Pradeep, 2017).

## Methods

A descriptive method of work was used with a critical review of both scientific and professional literature in the Slovenian and English languages. The literature was searched using the CINAHL, Medline and COBIB.SI databases. The search for literature and resources included literature published between 2007 and 2017. The inclusion criteria for the selection of literature were; free access to full-text articles and articles related to diabetes and diabetes related to physical activity. However, the exclusion criteria concerned mainly older articles that did not fall below a certain limit of literature search. The search was carried out using keywords: Type 2 diabetes, diabetic foot, physical activity of the elderly. Data collection took place in March until May 2018 (Table 1 and Table 2).

Table 1: Keywords

Keywords	CINAHL	Medline	COBIB.SI
»Type 2 diabetes«	129	144	136
»diabetic foot«	39	52	53
»physical activity of the elderly«	28	31	30
Skupaj	196	227	219

Table 2: Exclusion criteria

Exclusion criteria	Number of units removed
1) duplication of articles	43
2) focus on other disorders	104
3) focusing only on another population	178
4) older article research	41
5) Focus on diabetes 1	206
6) the contents of the article do not match the author's keywords	56
Together	628

## Results

It has long been known that physical activity affects the reduction of blood sugar. With physical work, glucose is consumed. The sensitivity of tissue to insulin is also increased. Physical activity is recommended for every person, including diabetes (after prior consultation with a doctor), because with regular physical activity, the body is kept in good condition, so that it is easier to carry out everyday efforts and daily stress (Battelino and Janež, 2007).

A systematic review of literature suggests the importance of physical activity and exercise as a key intervention in the prevention of diabetic foot, although there are several different exercises and methods that have similar benefits to the already given goal. The literature review also proves that exercise is a useful non-pharmacological method for the prevention of diabetic peripheral neuropathy and slows down the appearance of ulceration and skin lesions in the aforementioned patients. Most specialists recommend aerobic ex-

ercise, which causes deep breathing and increases heart rate and stroke volume (Lipnik, 2014). Aerobic exercise has a beneficial effect on metabolism. It uses fatty acids for energy, and the reduction in the level of free fatty acids in the blood is probably the reason for this. A high level of fatty acids found in obesity, especially in the case of type 2 diabetes, has adverse effects on metabolism. Insulin resistance is increased, insulin secretion from beta cells in the pancreas is weakened, blood fats are unfavourably altered, the state develops as well as in inflammatory inflammation, and in the long run this leads to cardiovascular disease (Medvešček and Pavčič, 2009). If aerobic activity is carried out regularly, the effects are long lasting. Body weight also decreases, in particular by reducing the amount of fat in the abdomen. The effects are particularly favourable in the elderly, because the muscle mass decreases with aging, while the fat content of the body increases (Medvešček and Pavčič, 2009).

Authors LeMaster et al., (2008) argue that a good program of training for a patient with diabetes, does not necessarily mean the emergence or worsening of diabetic foot. Study by Hung and colleagues. (2009) refers to the theory of tai chi practice where in patients, blood glucose can be improved after 12 weeks of practice and at the same time reduces the possibility of diabetic foot formation (Table 3).

Table 3: Overview of studies

Author/year	Purpose of research	Methodology	Results
Balducci et al., 2007	The effect of long-term exercise training in patients with type 1 and type 2 diabetes.	Quantitative method of work	Long-term aerobic exercise can prevent the onset of diabetic peripheral neuropathy.
LeMaster et al., 2008	To determine the effect of the training program in diabetic foot patients	Quantitative method of work	Promoting physical activity does not mean deterioration of the diabetic foot.
Hung et al., 2009	Study the effect of tai chi chuan exercise on peripheral nerve modulation in patients with type 2 diabetes	Quantitative method of work	In patients, blood glucose can be improved for 12 weeks with tai chi chuan exercise. A further larger randomized controlled clinical trial with longer time monitoring is required.
Ahn S, Song R.2012	Find out the effects of Tai Chi practice on glucose control, neuropathy results and quality of life in patients with type 2 diabetes and neuropathy.	Quantitative method of work	In patients, blood glucose can be improved for 12 weeks with tai chi chuan exercise. A further larger randomized controlled clinical trial with longer time monitoring is required.
Dixit et al., 2014	Assess the effect of moderate aerobic exercise on diabetic peripheral neuropathy.	Quantitative method of work	Moderate intensities of aerobic exercises play an important role in disorders of the progression of diabetic peripheral neuropathy in type 2 diabetes.



The study (Balducci, 2014) mentions for the first time that the long-term prescribed in controlled aerobic exercise, such as fast walking, can alter the natural history of diabetic neuropathy or even delay its onset.

The purpose of the study by Dixit and colleagues (2014) is to evaluate the effect of moderate aerobic exercise (40 % - 60 % heart rate) on diabetic peripheral neuropathy. It has been found that moderate intensity of aerobic exercise can play an important role in diabetes type 2 disorders. LeMaster (2008) points out in his research that the promotion of physical activity does not cause a significant increase in ulcers on the feet.

A single recreational exercise usually involves warm up for 5-10 minutes, followed by 20-30 minutes of main activity and for completion of 5-10 minutes of cooling by low activity exercise, such as walking, ease of movement and relaxation exercises. The intensity of the exercise can be determined and assessed according to the feeling without any special devices and heart rate measurements. The simple criterion for even moderate aerobic exercise is that we can talk normally during exercise (Medvešček and Pavčič, 2009).

Appropriate forms of physical exercise are a combination of several activities over a long period of time. Appropriate training is; walking or walking uphill, cycling, mountaineering, skiing, rowing, dancing, some fitness activities (bicycle, conveyor belt, repeating various lighter exercises) and more intensive work in the garden or field (mowing, grabbing). A systematic review of literature suggests the importance of exercise in the treatment of diabetic feet, as it contributes to a better revitalization of the lower limbs. Gymnastics in patients with diabetes have additional benefits, which in turn slows down peripheral diabetic neuropathy, skin damage, and ulceration (Matos et al., 2018).

### Discussion and Conclusion

Despite the existence of various clinical guidelines and recommendations for the patient's health and educational work, it is a great challenge for health professionals to motivate individuals with diabetes to preserve newly acquired habits and lifestyle. Physical exercise is vital here. Before starting physical activity, diabetes should be discussed with your doctor and diabetologist. A suitable type of exercise depends to a large extent on other health problems that an individual has. Often, there is fear in elderly patients, whether they should start physical exercises and how intense it should be. It is important to closely monitor blood sugar before, during and after exercise. They should also be alert to the condition of their feet, which they regularly inspect. For exercise, choose comfortable sports shoes and suitable socks.

A systematic review of literature suggests the importance of physical activity and exercise as a key intervention in the prevention of diabetic foot, although there are several different exercises and methods that have similar benefits to the already given goal. The literature review also proves that exercise is

a useful non-pharmacological method for the prevention of diabetic peripheral neuropathy and slows down the appearance of ulceration and skin lesions in the aforementioned patients.

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# Physical activity and its importance for the elderly's health

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## *Abstract*

*Introduction:* Achieving a high age is a reflection of the high quality of life. Regular physical activity is crucial and increases the ability to live independently. The aim of the research was to find out the frequency of physical activity of the elderly in the home environment.

*Methods:* The research sample covered the elderly from Slovenia and 18 other participating countries. More than 86,000 individuals aged over 50 were participated, of whom 2257 were from Slovenia, of whom 1275 were aged 65 and over. The data were analysed with the SPSS Statistics 20 program.

*Results:* 86 % of the elderly people from Slovenia do not have difficulties in performing day-to-day activities. 46 % of Slovenian elderly people do not engage in any sports or intensive activities. As many as 86 % of the elderly from Slovenia do not need help outside the household. The difference in assessment of health according to the elderly ( $F = 500.50$ ,  $p < 0.001$ ) was found between countries. Slovenia ranked on the 7th place. For those elderly who receive help outside the household, assess their health higher. 70 % of Slovenian elderly people have overweight.

*Discussion and conclusion:* The elderly's body activity is insufficient, the body weight is too high, which means a higher level of risk for the chronic non-communicable diseases. Only by ensuring adequate healthcare, economic prosperity, social inclusion and health education we can reduce the incidence of chronic non-communicable diseases.

*Key words:* physical activity, elderly people, quality of life, chronic non-communicable diseases

**W**ith age, there are changes in physical abilities, the flexibility and tonus of the muscles of the whole body decrease, the bones become fragile, the coordination of movements and cognitive abilities de-

creases (Akerman, 2014). Regular physical activity has many positive effects on human health: it strengthens bones and muscles, and develops, increases and maintains psychophysical and functional abilities of the body, which in turn increases the ability to live independently in old age. It also reduces the risk of developing and preventing the progression of various chronic non-communicable diseases, helps to reduce stress, anxiety and depression, helps to increase self-esteem and self-confidence, and helps to establish social interaction, social integration, promote the economic and social development of individuals, community and the whole nation (Zaletel-Kragelj et al., 2011). It has also been shown that physical activity prevents many chronic diseases in the elderly, like reduce incidence and mortality due to cardiovascular disease, insulin-dependent diabetes, colon cancer and osteoporosis (Bilban, 2005). Those who are regularly physically active are forgetting less, feel less anxious, restless, lonely, and less often feel that everything in their life is meaningless (Ramovš, 2013). Healthy lifestyle reduces the risk factors that are dangerous for our health, and slow down the aging process (Elanie, 2014). With physical activity, we have positive effects on the cardiovascular and musculo-skeletal system, and the individual's congruent performance improves, thereby reducing the risk of dementia and other neurodegenerative diseases (Emily et al., 2013). Regular physical activity reduces body fat and the risk of mortality due to chronic non-communicable diseases, and also regulates the general body mass index by supplementing the bone density and muscle mass (Kruger et al., 2004). Decreased muscle tonus related with an age, changes the level of activity and can have an effects on the quality of life of elderly (Siparsy et al., 2014). Thompson et al. (2012) note that older people with functional constraints have lower mental health. Similarly, researchers in the United States (Phillips et al., 2013), found that regular physical activity is vital to their quality of life. Halvorsrud et al. (2010) found that depression has less impact on quality of life than functional constraints.

Walking has been identified as an effective measure to promote mobility because it is a simple, inexpensive and very common form of activity. According to a study conducted in the United Kingdom (Sugiyama et al., 2009), approximately half of the interviewed elderly reported walking for 2.5 hours or more per week, while in Finland (Tsai et al., 2013) elderly are walking in the average 6.5 km four times a week. Data for Slovenia show that walking is the most popular activity among the elderly. Following the recommendations of the American Heart Association, the following types of physical activity are recommended for the elderly: aerobic exercise, exercises for muscular strength, and balance (Drev, 2010; 2011). In Slovenia, physical activity is also hampered by the stairs, because elderly must walk an average 15 stairs to their apartments (Birska, 2014). Data from 2012 show that three-quarters of elderly are moderately active for at least four days a week, and their most popular form of physical activity is walking. The World Health Organization recommends that are the

elderly older than 65 years should be active at moderate intensity for at least 150 minutes per week (Health Care Institute, Ljubljana, 2013).

To reach the aim of the study the following research questions were set: a.) What is the self-assessment of the health status of the elderly from Slovenia compared to the elderly in other participating countries and b.) What is the physical activity of the elderly?

### Methods

We used the data obtained with the study Easy SHARE (Survey of Health, Aging and Retirement in Europe). The survey covered older people over 65 in Slovenia and other participating countries: Austria, Belgium, the Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Poland, Portugal, Spain, Sweden, Israel and Switzerland. In the research participated 2577 elderly people from Slovenia, of which 1275 were aged 65 and over. All respondents were living in their home environment.

Data on the quality of life of the elderly, age, their physical activity and body weight, self-assessment of health status, the number of chronic diseases and self-care capabilities were collected from the first to the fourth wave of the Easy SHARE study (Börsch-Supan et al., 2013). The collected data were statistically analysed using the Microsoft Excel program and the statistical program IBM SPSS Statistic 20. One-way ANOVA test were used to find statistically significant differences.

### Results

The daily activity index is the sum of five tasks: dressing, bathing or showering, eating and cutting food, walking around the room and getting out of bed. The higher index indicates more problems the older people have with these daily activities.

*Table 1: Frequency of physical activity in older population*

	<i>Sports and other physically intensive activities</i>	<i>F</i>	<i>Percentage (%)</i>
Slovenia	More than once per week	359	28,4
	Once per week	176	14,0
	1-3 times per week	149	11,8
	Less than once per week	579	45,8
	Sum	1263	100
Other countries	More than once per week	13766	24,3
	Once per week	6617	11,7
	1-3 times per week	4967	8,8
	Less than once per week	31289	55,2
	Sum	56639	100

The ability of self-care was investigated on the basis of the question that asked older people whether they need help from the persons that live outside of their household. The number of participants who claimed they are self-sufficient was very high, as 1090 (86 %) of the elderly stated that they do not use help from the outside of the household, while in the remaining countries only 42186 (74 %) of the elderly do not use help from the outside of their household. Additionally, Table 1 shows that almost half of the respondents (46 %) in Slovenia reported that they perform sports or high intensity activities less than once per week, while in other countries this rate was as high as 55 %.

The lowest estimate of self-assessment of health was reported by the older people in Ireland ( $2.85 \pm 1.12$ ) and Switzerland ( $2.85 \pm 0.96$ ). The highest self-assessed health was reported in Poland with an average of  $4.13 \pm 0.89$ . We also confirmed the statistically significant difference in self-assessed health among compared countries ( $F = 500,50, p < 0,001$ ). Higher self-assessed health level was observed in older people who receive help from the outside of their household. Most participants in Slovenia rated their health on the scale from 1 to 5 with 2 (34 %), followed by 3 (33 %). In other countries the most frequent level of health was 3 (35 %), followed by 2 (32 %).

Table 2: Summary of health self-asesment

	Self-assessment of health						
	N	Mean	SD	95 % confidence interval of the mean		Min	Max
				Low	High		
Austria	4449	3.18	1.035	3.15	3.21	1	5
Germany	4487	3.48	0.937	3.45	3.51	1	5
Sweden	5113	2.93	1.122	2.89	2.96	1	5
Netherlands	4517	3.12	1.003	3.09	3.15	1	5
Spain	5577	3.70	0.971	3.67	3.72	1	5
Italy	5894	3.55	1.023	3.53	3.58	1	5
France	6539	3.51	0.981	3.48	3.53	1	5
Denmark	3698	2.88	1.153	2.84	2.92	1	5
Greece	3998	3.35	0.962	3.32	3.38	1	5
Switzerland	3440	2.85	0.959	2.82	2.88	1	5
Belgium	6825	3.20	0.980	3.17	3.22	1	5
Israel	2232	3.54	1.182	3.49	3.58	1	5
Czech Republic	4856	3.64	0.915	3.62	3.67	1	5
Poland	2687	4.13	0.891	4.09	4.16	1	5
Ireland	464	2.85	1.117	2.75	2.95	1	5
Hungary	1333	3.93	0.969	3.88	3.98	1	5
Portugal	931	3.89	0.921	3.83	3.95	1	5
Slovenia	1264	3.60	1.040	3.54	3.66	1	5
Estonia	3554	4.06	0.768	4.04	4.09	1	5
Together	71858	3.41	1.055	3.40	3.41	1	5



## Discussion

The self-assessment of the health status of the older population in Slovenia is among the higher assessed in the survey. In this part of the research, 19 countries were covered, and Slovenia ranked 7th among the countries according to the criterion of the self-assessed health status. The ability of older people in Slovenia to take care of themselves is very high, as 86 % of them stated that they do not use help from the outside of their household, while the possibility of self-care was lower in the older population from other countries (74 %). The research shows that older people from other countries are generally more satisfied with their lives than older people from Slovenia. At the same time, we compared the assessment of health, considering whether the participants are able to care for themselves, and found that self-assessed health is higher in Slovenia and in also in other countries in people who do not need assistance from outside of their household. Mitzer et al., (2013) noted that self-care is associated with positive health behaviour, which leads to improvement of health status, reduces costs of health services, hospital days, number of hospitalizations, visits to a doctor; and has positive effects on health.

Birsa (2014) notes that in Slovenia, most of the people are largely independent in carrying out daily tasks, but this independence decreases with age. Differences between women and men occur mainly in instrumental tasks. Bilban (2005) states that, with regular physical activity, we maintain the power, endurance, flexibility and good balance that is necessary for ensuring mobility and is the basis for independence. Based on the analysed variables, we found that the physical activity of the elderly is inadequate.

The results of the study show that the body mass index was not affected by the level of physical activity of an individual. For all participants, both normal and overweight, it is possible to detect the greatest proportion of those who are almost never or never engaged in sports or intense activities. According to a study carried out in Rotterdam, the improvement of the nutritional status leads to an improvement in the quality of life (Gariballa, 2011). Additionally, it is important that the older population adapts their activity to their physical abilities and health status (Drev, 2011).

Tang & Lee (2011) state that good social inclusion leads to better well-being of older people, including better self-assessed health, lower mortality risk, higher quality of life, and less depression. Wikman et al. (2011) state that poor health does not always mean poor quality of life, as some individuals are able to overcome specific disease limits and adjust their lives to achieve their goals. However, the broader aspects of the quality of life of the elderly, including emotional wellbeing, autonomy, self-realization, controlling the important aspects of life with its meaning and fulfilment need more research. Of the 1209 participants in Slovenia, there are as many as 841 (70 %) overweight, while among the 55,000 elderly people in the rest of the world, the total proportion of overweight participants is 34147 (63 %). In both studied groups, both in participants from Slovenia and those from other countries, it can be seen that most of them are

overweight, with a slightly worse situation in Slovenia, which also means higher risk of developing heart disease, diabetes, high blood pressure and all the consequences associated with it. It is known that aging reduces muscle mass and increases body fat (Gariballa, 2011). In current generations, older individuals have a higher body mass index than the younger ones, which is due to a more sedentary lifestyle (Krueger et al., 2004).

### Conclusion

It is necessary to educate and encourage older people to remain independent for as long as possible, despite their functional limitations as the physical activity of the elderly is insufficient. However, much remains to be done by designing state policies and health systems around the world to address this problem. By ensuring appropriate conditions for a high quality of life, adequate health-care, economic well-being, social inclusion and health education in the same way for all people it is possible to reduce chronic non-communicable diseases and related problems.

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# Factors influencing hospital length of stay in non-acute care setting

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## *Abstract*

*Introduction:* Aging population results in increased need for non-acute hospital care. Inaccessible treatment is aimed primarily for the elderly, who no longer need diagnostic procedures, but rather the improvement of self-care. Health care is one of the priorities of non-acute treatment. The purpose of the study was to determine factors influencing the length of stay at non-acute care hospital department.

*Methods:* Based on routinely collected data from the Care Department of University Medical Centre Ljubljana in 2016, a retrospective cross-sectional study was carried out. The aims of the study were to detect the relation of hospitalization length of stay with patients' demographic characteristics, care needs, family participation, and medical diagnosis at discharge. Data on all 431 patients were collected. The average age of the patients was 80 years; most of them were women (70.5 %). Hospitalization for 102 patients (32.6 %) completed after four weeks, and for 115 (26.6 %) after five weeks.

*Results:* Hospitalization was longer in patients below 65 years of age ( $p = 0.02$ ), in patients with greater number of discharge nursing diagnoses ( $p = 0.044$ ), in patients with low involvement of relatives ( $p = 0.024$ ), and in patients after hip fracture or stroke ( $p < 0.001$ ).

*Discussion and conclusions:* Significant association between the number of discharge nursing diagnoses and the length of hospitalization confirms that nursing care contributes to patients' progress and quality of life.

*Key words:* hospital length of stay, elderly, non-acute care

Non-acute care is aimed primarily for the elderly population, who no longer needs diagnostic procedures, but rather the improvement in self-care. The purpose of the study was to determine what influence the length of hospitalization in non-acute care.

The treatment of elderly usually takes longer than the treatment of active population, and with aging the need for hospitalization is increasing due to deterioration of chronic diseases (Peternelj, 2013). Older people often suffer from a number of diseases, including geriatric syndromes with multiple aetiologies. Signs and symptoms vary according to the individual and are often atypical, so patients visit different hospitals, and at the same time receive numerous screening and recipe tests (Arai et al., 2012).

In hospitals, 60 % of adults who are admitted are older than 65 years. Hospitalization due to disease in the age group of 85 years lasts on average 10.84 days (National Institute of Public Health [NIJZ], 2014), 8.1 days for men, and for the same age group of women on average 9.7 days (Skela Savič, Zurc and Hvalič Touzery [Skela Savič], 2010). Long hospitalization in high age has an overall impact on the quality of the elderly life and represents an increased risk of re-hospitalization and accommodation in institutional care (Nazarko, 2012).

Treatment of the elderly is prolonged; the complications of the underlying disease and invasive interventions are more frequent and slow down the recovery (Poredoš, 2004; Toth, 2009). The hospitalization frequently leads to a functional decline or to a partial or complete dependence (Boyd et al., 2008), requiring the provision of social assistance (Toth, 2009). In elderly who is not capable of self-care, several aspects must be considered before discharge from the hospital. The most important are his health status and the need for care (Lavtižar and Kramar, 2012).

An effective non-acute treatment in that age group should be ensured by appropriate programs in which the maintenance and improvement of the quality of life should be emphasized. Early focus on non-acute nursing care and rehabilitation can improve the outcome and positively affect the ability to perform daily life activities (Neyens et al., 2009). Patient classification system identifies the complexity of required health care for each patient. The core concepts are: (1) hygiene, (2) mobility, (3) food intake, (4) medicines, (5) supervision. These concepts embrace a 4-tiered scale and assign the patient to one of four categories (Klančnik-Gruden et al., 2013). Nursing diagnoses enable a reliable assessment of patient care needs (Klančnik et al., 2015) aimed at improving health and restoring autonomy. The goal of planning, in cooperation with the patient and his relatives, is to achieve higher level of life quality.

University Medical Centre Ljubljana opened non-acute care department with 33 beds in 2011 and immediately faced referral requests above its limits. This study is an attempt to examine the parameters that influence hospital length of stay at this department.

## Methods

A retrospective cross-sectional study using data from nursing documentation was carried out. The aims of the study were to examine whether the length of hospitalization in non-acute hospital care setting is associated with the patients demographic characteristics, the needs for nursing care, family support, and medical diagnosis at discharge.

### *Population, sample*

The research sample included data on all ( $n = 431$ ; 100 %) patients who were hospitalized at the Non-acute nursing department of University Medical Center Ljubljana in 2016. The majority (70.7 %,  $n = 305$ ) were women with an average age of 84.1 years (Standard deviation (Sd) = 10.6). The average age of all patients was 79.5 years (Sd = 10.7). Patients hospital length of stay lasted on average 24.3 days (Sd = 10.7). Half of patients (50.35 %) were hospitalized four ( $n = 102$ ; 23.67 %) or five ( $n = 115$ ; 26.68 %) weeks. In some cases ( $n = 41$ ; 6.26 %) hospitalization lasted longer than 35 days (Max = 150 days).

### *Instrument*

Data were obtained from acute hospital discharge, nursing care documentation, from social workers' reports and from non-acute nursing discharge documents. The collected data were: gender, age, the acute hospital referral department, the number of hospitalization days, the admission and discharge medical diagnosis, nursing diagnosis and the category of nursing care. In order to simplify the data analysis, only the first medical diagnosis of the individual patient was recorded. Data about visits of patient relatives and their involvement in care were summarized from the documentation of the social worker.

### *Data analysis*

SPSS version 23.0 was used for data analysis. Variables were described as frequencies ( $n$ ) and proportions (%), the smallest (Min.) and the highest (Max.) value, average ( $M$ ), median ( $Me$ ), and the standard deviation (Sd). When the numerical variables were not distributed normally, the nonparametric tests were used for analysis. Correlation between the variables was calculated with the Spearman coefficient ( $r$ ), the difference between two groups with the Mann-Whitney U-test, and the correlations and the difference between the three groups with Kruskal-Wallis test. The confidence level was set at 95 %.

## Results

Patients that were admitted to the non acute care department were transferred mostly from surgical hospital departments, and a fifth of them from the medical department (Table 1).

Table 1: Admitted patients by referral hospital department

Referral hospital department	Patients	
	n	%
Surgical	269	62.4
Medical	84	19.4
Neurological	35	8.1
Infectious diseases and febrile conditions	22	5.1
Orthopedic	15	3.4
Gynecological	5	1.1
Otorhinolaryngological and maxillofacial surgical	1	0.2
Total	431	100

N, number; %, percent

The mean value suggested longer hospitalization for women ( $M = 24.62 \pm 12.68$  Vs  $M = 23.68 \pm 10.79$ ), but the difference between groups regarding gender was not statistically significant ( $p = 0.38$ ).

Neither the age of patients was significantly correlated ( $p = 0.91$ ) to the length of stay at the non-acute care setting. After dividing the sample in two groups considering patients age, the length of hospitalization in patients older than 65 years deviated from normal distribution. Therefore, Mann-Whitney U-test was used to check differences between groups. In the group under the age of 65, the length of hospitalization was at least 6 and a maximum of 62 days ( $M = 28.2$ ;  $Me = 29$ ;  $Sd = 11.9$ ). In the group of patients above 65 years the hospitalization lasted from 0 to 150 days ( $M = 23.9$ ;  $Me = 25.5$ ;  $Sd = 12.1$ ). The difference between two groups was statistically significant ( $p = 0.02$ ).

Needs for nursing care were identified taking into account the categories of nursing care and the quantity of nursing diagnoses per patient. The highest (63.6 %) percentage of patients was classified into category 2, which meant that the patients were assigned by default and received supportive or partial assistance from nurses. A fifth (20.96 %) of patients was assigned to the demanding category 3. These patients may have required complete assistance with hygiene care, mobility, elimination, or feeding; the patients received tube care, or their vital signs were monitored more than 6 times every 24 hours. More than a tenth (15.4 %) of the hospitalised patients was assigned to category 1, which meant that they did not receive assistance with hygiene care, mobility, elimination, and feeding; they did not have infusion lines, and their vital signs were monitored less than 6 times every 24 hours (Table 2).

The correlation coefficient between nursing care categories and hospitalization length was not significant (Table 2). Moreover, the correlation coefficient between nursing care categories and the number of discharge nursing diagnoses was weak ( $r = 0.104$ ), but statistically significant ( $p = 0.044$ ).



Table 2: Hospitalization length related to the nursing care category

Nursing care category	n	Hospitalization length, days					p
		Min	Max	M	Me	Sd	
I.	64	2	88	24.94	24.5	12.61	0.76
II.	264	0	150	24.90	26.0	12.53	
III.	87	0	46	23.38	26.0	10.09	
Total	415	0	150	24.59	26.0	12.06	

N, number of patients; Min, minimum value; Max, maximum value  
M, average value; Me, median; Sd, standard deviation  
P, the result of the Kruskal-Wallis test

The number of nursing diagnosis at admission at the non-acute hospital department ranged from two to 25 nursing diagnosis per patient. The variable was not significantly correlated to the length of hospitalization ( $p = 0.49$ ). Total of discharge nursing diagnosis ranged from 2 to 20, and the variable was significantly correlated to the length of hospitalization ( $r = 1.04$ ;  $p = 0.04$ ).

The most common discharge medical diagnosis were different fractures (35.96 %), internal organ diseases (17.86 %) and cardio-vascular diseases (8.12 %). There was a significant correlation between the hospitalization length and the type of discharge medical diagnosis (Table 3). However, the longest hospitalization of 150 days was observed in patient with hip fracture.

Table 3: Hospital length of stay depending on medical diagnosis at discharge

Discharge diagnosis	n	Length of stay in days					p
		Min	Max	M	Me	Sd	
Hip fracture	49	0	150	30.49	30.0	19.17	<0.001
Stroke	14	3	45	27.64	29.5	11.01	
Other neurological diseases	14	10	62	25.93	24.0	12.46	
Other fractures	106	4	34	25.84	27.0	8.86	
Internal organ diseases	77	1	88	24.57	25.0	11.78	
Injury	32	0	45	24.50	28.5	11.36	
Cardio-vascular diseases	35	6	36	18.51	17.0	7.99	
Intracerebral hemorrhage	20	6	47	22.65	22.5	11.69	
Cancer	24	4	45	22.13	18.0	12.65	
Surgical procedures	20	3	37	21.50	24.5	10.07	
Other	8	2	36	20.00	20.5	12.28	
Infection	32	0	43	18.63	18.0	10.06	
Total	431	0	150	23.86	23.75	11.8	

N, number of patients; Min, minimum value; Max, maximum value; M, average value; Me, median;  
Sd, standard deviation; p, statistical significance of the Mann-Whitney U-test

The inclusion of family in caring activities was significantly correlated to the length of patients' hospitalization. Greater quantity of visits by relatives to the patient, reflected in shorter hospitalization period ( $r = -0.109$ ;  $p = 0.023$ ).

### Discussion

Non-acute care hospital department is intended for patients that primarily need nursing services. Before admission, the patient should be physically stable considering that non-acute care programs do not allow diagnostic treatment. This department prioritizes support, care and rehabilitation, adapted for geriatric patients.

In this study significant association has been found between the length of hospitalization at non-acute care hospital department and: a.) total of discharge nursing diagnosis; b.) type of medical discharge diagnosis; c.) and inclusion of family members in care activities. Length of stay was not correlated to the observed demographic characteristics (gender, age), and neither to nursing care needs defined from nursing categories.

Findings from this study are supported from authors (Murko, et al., 2016; Majcen Vivod, Vivod, 2012), as the age and the gender of patients does not affect the length of hospitalization. An increase in women's illness compared to men is visible after age of 70, due to the longer life expectancy of women.

The correlation between nursing care categories, which describe patient needs for care, and nursing diagnoses was significant, meaning that two indicators are complementary. The sum of nursing diagnoses which were set up upon admission and discharge at the hospital, decreased from an average of 10 to eight diagnosis per patient. Significant association between the two variables suggests that nursing care has an important effect on patient needs, and improved health status. Non-acute department activities are tailored to the elderly, and based on support, care and rehabilitation.

Length of stay at the hospital was correlated to the type of medical discharge diagnosis, where the longest time of hospitalization was characteristic for hip fracture. Considering the positive relation of total hospitalization days with typical and most common medical diagnosis of elderly, a special geriatric care would be beneficial. Ellis et al. (2011) researched the effectiveness of treatment in elderly who were admitted to the hospital. The study included a total of 10,315 patients from six countries. They examined hospital-rehabilitation programs for patients with heart disease, neurological patients and patients with lung and musculoskeletal disorders. Results show that patients included in special geriatric treatment had higher probability of survival and independency compared with the control group receiving standard hospital treatment. Patients with geriatric treatment also were at lower risk deterioration of health status and more likely improved cognitive abilities. Similarly Bachman et al. (2010) measured the effects of hospital rehabilitation on patients with geriatric treatment and on patients with standard health care. The study includ-

ed 17 randomized controlled trials involving 4,780 patients. Again, the results showed a positive effect of special geriatric care on improved functional status, reduced risk of admission to nursing home and lower mortality in elderly.

Involvement of relatives in the first two weeks of non-acute hospital care is negatively associated with the length of hospitalization. Thus, many elderly people are frail and with serious health problems that require physical help and support from family. Co-operation of relatives is therefore a very important part of rehabilitation (Skela Savič et al., 2010).

### Conclusions

No significant relations have been found between patient demographic characteristics, his nursing care needs and the length of stay at the non-acute hospital department. However, the length of stay is correlated to the sum of nursing diagnoses, and to the type of medical diagnosis at the discharge time.

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# Tackling frailty with the help of information-communication technology

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## *Abstract*

*Introduction:* Frailty seems to be highly prevalent among the elderly, while its prevalence is estimated to be between 5 % and more than 45 % depending on definition and age group. Beside impairment, dependence on others, and one or more chronic diseases, it appears to be almost inevitable consequence of demographic changes in the society. Solutions and services adapted to the elderly and supported by the information-communication technology (ICT) seem to significantly contribute to facing population's demographic ageing.

*Methods:* The literature review, which researches and describes management of frailty with the help of ICT, was carried out (use of PRISMA protocol) between March and June 2017.

*Results:* Number of all research results was 124,634, while 33 articles were included in the analysis.

*Discussion and conclusions:* Application and use of ICT among frail persons is multidimensional and plays an important role within management of frailty. Especially in the sense of physical activity and exercise, and motion detection or falls prevention, as well as nutrition, sleep, overall well-being, cognitive functions, social interaction, communication, psychological state, and support to other daily activities of frail elderly. However, several questions and challenges remain unanswered.

*Key words:* information-communication technology, ICT, ageing, frailty, frailty management

**W**e are facing the demographic ageing of the population, whereas by the year 2060 the percentage of EU citizens over 65 is expected to increase 10 % (18-28 %) and the percentage of EU citizens over 80 to more than double (5 – 12 %) (World Health Organization, 2015). Although life

expectancy is prolonged, many elderly people are facing dependency on others, frailty impairment and one or more chronic diseases, which seem to be an almost inevitable consequence of these demographic changes. Frailty - »a multidimensional syndrome characterized by decreased reserve and diminished resistance to stressors« (Rodríguez-Mañas et al., 2013) - seems to be highly prevalent among elderly persons, while its prevalence is estimated to be between 5 % and more than 45 % depending on the definition and age group (Veninšek and Gabrovec, 2018).

Solutions and services, adapted to elderly people and supported by the information-communication technology (hereinafter referred to as ICT), seem to significantly contribute to facing population's demographic ageing (Vollenbroek-Hutten et al., 2017), and also to potentially contribute to health care systems' transformation towards patient-centered and integrated care, which meet the needs of the elderly (World Health Organization, 2015).

So far, there have been many ICT solutions that demonstrate beneficial outcomes for the elderly. They seem to play an important role in providing more accessible, of better quality and safer health care (Beard and Bloom, 2015), overall well-being, quality of life and empowerment of the elderly (Keränen et al., 2017), as well as in their improved health and social participation (Beard and Bloom, 2015). ICT can also play an important role in supporting complex care of frail older people in terms of screening, assessment, monitoring and follow-up (Kelaiditi, 2016).

There has been an important step made towards ICT implementation into several healthcare services, as well in the field of elderly care. However, we seem to face some challenges regarding the implementation, namely potential ICT tools without proven clinical effectiveness and service adoption (Jansen - Kosterink et al., 2016), low system usability and lack of personalization and flexibility (Peruzzini and Germani, 2014), as well as greater, but still limited, technology adoption by the elderly, among which many don't believe ICT can greatly improve the quality of their lives (Heart and Kalderon, 2013).

## Methods

Between March and June 2017, literature review was conducted using PRISMA protocol (Moher et al., 2010) and search within PubMed, Cochrane, Embase, UpToDate and CINAHL databases. We used several combinations of key words in English language, chosen from the list, proposed by the ICT task leaders in the frame of Joint Action Advantage, in which National Institute of Public Health co-leads the work package that deals with managing frailty at an individual level together with Greek University of Patras. Peer-reviewed journal papers, international documents, standards, guidelines, and EU research studies published between 2002 and 2017 were included in the review. Furthermore, grey literature, namely unpublished or hard to find publications, reports, PhD theses etc. were included in the review, whereas the list of these grey documents

was also prepared by the ICT task leaders. Editorials, letters, interviews, posters and papers without an access to full text were excluded from the research.

## Results and discussion

We conducted a comprehensive literature review on the management of frailty with the help of ICT. Overall number of research results after applying all the combinations of keywords was 124,634. After taking into account the inclusion and exclusion criteria and exclusion of the duplicates, 33 papers/sources remained for the analysis.

One of the main goals of ICT usage in frail elderly is to improve the quality of their lives. ICTs can make life of the elderly and (potentially) frail elderly easier and improve their productivity. Lifestyle improvement ICTs can play an important role and have a positive impact on the quality of life of the frail elderly by promoting social interaction, communication, physical activity and exercise, nutrition, and support other day-to-day activities. Beside that, ICTs can improve their accessibility to services and consequently improve independence and self-care help, as well as lower frailty rates.

Since frailty often results from reduced physical capacity and decreased regular physical activity (Rogers et al., 2017), ICTs that promote physical activity and exercise can also play an important role in its management, which can improve body performance and consequently reduce frailty (Binder et al., 2003; Cadore et al., 2014). ICTs are used both to set up training programs as well as to implement them, and can play an important role with maintaining adherence to the program and correct execution of the training. Exercise adherence could thus be improved by introducing ICT to promote group exercise, social networking, regular contact with caregivers, involvement of relatives and caregivers, etc. And possibly as well through gaming principles (Barelle et al., 2014). Although frequency of ICT use seems to be related to clinical outcomes (Vollenbroek-Hutten et al., 2017), there is no evidence on the ICT based exercise programmes for frail elderly in the reviewed literature.

Supportive technologies usually include assistive technologies (e.g. for disabilities, home care, etc.) and monitoring of different data and activities (e.g. fall detection, kinematics, position, physiological data, etc.). The latter has proved to be effective in a positive attitude to health, health literacy, increased confidence in technology (Ogonowski et al., 2016). Supportive ICTs can reduce the burden of formal and informal caregivers taking care of an elderly person's safety living alone and can help to provide home care (Lexis et al., 2013). Complex smart home solution that includes monitoring of activities in home environment (e.g. movement detection, usage of devices, etc.) can significantly contribute to the self-management empowerment for independent living of the elderly (Tomita et al., 2010). The smart home solutions can also include ICTs for fall detection and prevention (the latter can also act as a stand-alone applications), which play an important role, especially among the frail elderly (Pie-

trzak et al., 2014), to whom falls present one of the greatest risks for independency. ICTs can thus enable home environment and falls' risk assessment, and most often fall detectors. The latter are based on sensors, usually attached to the body or wrist, which continuously monitor individual's activity to detect a fall and automatically call for help (Pietrzak et al., 2014; Ogonowski et al., 2016). This increases the confidence and sense of security of frail elderly (17). One of the electronic fall detection are smart watches (Gjoreski et al., 2016; Kostopoulos et al., 2016).

ICTs can also play an important role in the objective identification of prefrail and frail people, whereas gait parameters (stride length, double support, and walking bout duration variability) were shown to be the most sensitive to discriminate frailty levels (Ritt et al., 2017; Schwenk et al., 2015). One of the ways this data can be obtained from simple measurements in everyday life is by using a method of gait parameters assessment using two microphones, attached to the body and connected to a smartphone (Wang et al., 2016), or by using a single dimensional accelerometer, attached to the top of the foot (personal laboratory experience). For more objective frailty assessment, physical activity data obtained from the accelerometer can be later combined with clinical indicators (Fontecha et al., 2013).

Social isolation is an important challenge for the elderly (Nicholson, 2012), and is often associated with depression, re-hospitalization, falls, unhealthy behaviours (e.g. excessive, alcohol consumption, and smoking), predominantly sedentary lifestyles, lack of adherence in pharmacological treatment, increased susceptibility to infectious diseases, etc. ICTs can thus play an important role also in tackling social isolation of the elderly, however they are not suitable for everyone alike (Chen and Schulz, 2016). ICTs can ease the social isolation of the elderly by connecting them with the outside world, gaining social support, engaging in interest activities and boosting self-confidence, whereas the positive effect of ICT use on social connectedness and social support seemed to be of a short-term (did not last for more than six months after the intervention).

ICTs can play an important role at the individual level, as well as supporting the functions and administration of the health system. Among others, the support for health systems are also telecare and telehealth. The most effective telecare intervention proved to be the telephone follow-up by nurses to improve clinical indicators and to reduce health service use, and in order of the latter also automated vital signs monitoring (Barlow et al., 2007). Physicians can use clinical decision support systems to remotely evaluate patients in adapting therapy, identifying, which patients need more urgent or more detailed examination; the number of visits can be significantly reduced (Cabalero-Ruiz et al., 2017). ICT-based services for the elderly (telegeriatric services) play an important role in rural and remote communities. They are cost-effective (Versleijen et al., 2015), but their implementation is slow and fragmented (Smith and Gray, 2009).



The literature review results suggest that the adoption and the use of new technologies remain problematic, especially for the elderly. The implementation challenge is often present, as the adoption and use of new technologies reduce with age (this is indicated by the number of the elderly, who start using the Internet) (Niehaves and Plattfaut, 2014), as well as the adoption of health-related ICTs (Heart and Kalderon, 2013). Resistance to ICT adoption by the elderly is often linked to their abilities, capacity and social impacts, whereas socio-demographic factors such as gender, age, education, and income also play an important role. In order to increase the acceptance of health-related ICTs among elderly, ICTs should be simple and useful to users, and special attention should be given to personality traits of the individual as well as learning and support in the use of ICT (Heart and Kalderon, 2013). ICTs should promote successful life-long development in all age groups and should not be focused solely on the state of disability/impairment (Baltes et al., 1999). Therefore, higher rate of ICT usage among frail elderly could be achieved by introducing ICTs to them well before the onset of the state of disability/impairment (Lindenberger et al., 2008).

### Conclusions

Application and use of ICTs among frail persons are multidimensional and seem to play an important role within management of frailty, namely within the support of prevention as well as complex care of frail elderly. Especially from the perspective of physical activity and exercise, and motion detection or falls prevention, as well as nutrition, sleep, overall well-being, cognitive functions, social interaction, communication, psychological state, and support to other daily activities of frail elderly. However, several questions and challenges remain unanswered.

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# Strategies for successful life in the home environment for elderly disabled people with neuromuscular disorders

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## *Abstract*

*Introduction:* The modern world is aware of the trend of an aging population; it is also aware of the needs of elderly people with special needs, in our case elderly disabled people with neuromuscular disorders, to live a quality life in their home environment. The latter is possible, but we need the appropriate support systems and a clearly defined strategy.

*Methods:* The empirical study was carried out according to a qualitative work method, with the help of a semi-structured interviews with seven elderly severely disabled people with neuromuscular disorders. The interviews were carried out in 2017. The collected data were analysed with a qualitative content analysis. Based on these data, a SWOT analysis was made, through which the strategy was elaborated.

*Results:* It was clear from the interviews how elderly disabled people with neuromuscular disorders live, what they need, what they miss, what they are afraid of, what they are looking forward to and other information needed for the SWOT analysis, and for the four components of the strategy derived from the analysis.

*Discussion and conclusion:* The study showed where to direct actions to enable elderly disabled people with neuromuscular disorders living in their home environment. Based on the analysis a Model for the perception of elderly disabled people with neuromuscular disorders in relation to the environment was developed. With wise decisions and good strategies unavoidable changes in the future will be manageable.

*Key words:* elderly people, people with disabilities, neuromuscular diseases, home environment, strategy.

**E**lderly people prefer to live in their own homes rather than moving into assisted living and care institutions (Yusif et al., 2016). Ageing at home is possible with sufficient professional care, which in today's ageing society

provides a strategy for sustaining independence and autonomy (van Hoof et al., 2010). There are many smart technologies available, which the elderly people have already accepted, and which can enable them to live in a home environment (Morris et al., 2013). With ageing deterioration of physical abilities is inevitable, but the effects of ageing are very individual and sole chronological age is a bad indicator of physical ability of the elderly (Manini, 2011). Disability is one of the main disadvantageous health issues connected with ageing, of which the main causes are bodily impairment caused by a chronic illness, acute events such as hip fracture or brain stroke, as well as progressive illnesses (Fried and Guralnik, 1997). The basic characteristic of neuromuscular disorders is muscular weakness. Resulting from this weakness are secondary effects such as scoliosis, contractures, respiratory insufficiency, etc. Rehabilitation of patients with neuromuscular disorders is based on strengthening of the muscles including strengthening of the respiratory muscles and procedures of cleaning airways, maintenance of the range of motion in joints, stretching of the contractures, equipment with orthoses, etc. Psychosocial rehabilitation programs are also very important (Zupan, 2010). The progressive nature of neuromuscular disorders causes a decrease in mobility, and the mobility impaired persons use wheelchairs as a technological aid for greater independence (Pousada et al., 2017). There are numerous technical aids for mobility, daily activities, controlling living environment, communication, leisure activities (Zupan, 2015). With modern technical aids, patients with neuromuscular disorders are less dependent on foreign aid, more independent and safe in their home environment, more involved in the social environment, education and work (Fowler, 1998).

UMAR (2017) in the Strategy of the long living society, explains the conditions for an independent quality life of the elderly. It notes that living conditions are not sufficiently adapted to the needs of the elderly, while adjustments are made to a modest extent. It also notes the low mobility of the elderly, which is not typical of older people in other countries, that are developing options to have ownership apartments exchanged for ensuring social security and long-term care. It finds conditions in Slovenia cause overly high costs of apartment upkeep, which further worsen the possibilities of the elderly to meet their other needs.

The aim of this study was to identify the strategy for the possibilities of elderly disabled people with neuromuscular disorders to live independently outside institutions. We pursued this goal through SWOT analysis and based on it we developed key strategies.

## Methods

We designed an empirical qualitative study, using the case study method. The sample included seven severely disabled persons with neuromuscular disorders, who live independently and organise their own lives. Their mobility is dependent on the use of an electrical wheelchair. They were chosen random-

ly from the wheelchair bound patients older than 65 years who entered the program of renewal rehabilitation for neuromuscular patients in year 2017 in Rehabilitation centre Dom dva topola Izola. They live in urban and suburban environments all over the country. Four persons were female and three were male. The average age was 70.2 years. All seven persons participated voluntarily, anonymity was guaranteed.

Original purpose of the interviews was to determine the factors, which influence the possibility of the elderly disabled people with neuromuscular disorders to live an independent life outside institution. The open questions of the interview were: How does your typical day look like? In what way do you integrate yourself into your social environment, what is your greatest obstacle connected with it and what do you miss in that area? How do you evaluate the attitude of the community and other public institutions, including religious ones, toward elderly disabled people? What is your greatest obstacle with everyday tasks? What, in your opinion, would improve your independence, quality of life in the home environment and inclusion into the social environment? How do you see your future? What is your attitude toward the idea of living in an institution (Home for the Elderly)?

## Results

### *SWOT analysis*

On the basis of the interviews we have created a SWOT analysis (the Analysis for Strengths, Weaknesses, Opportunities and Threats), through which we have created SO strategy (in which we take advantage of advantages to take advantage of opportunities), WO strategy (in which we overcome weaknesses to take advantage of opportunities), ST strategy (in which we identify the benefits that can help us overcome the threats), WT strategy (a plan by which we prevent the danger from our weaknesses) for living independently in a home environment for the elderly disabled people with neuromuscular disorders.

With the SWOT analysis we delineated advantages and disadvantages as well as opportunities and dangers derived from pursuing the goal of living in a home environment for the elderly disabled people with neuromuscular disorders.

### *Disadvantages (D)*

- D1: Integrating into social networks is limited especially if the elderly people with neuromuscular disorders don't drive a car (anymore). These people have few contacts with the environment also due to architectural barriers, and many of them are practically isolated from the outside world in the winter due to cold and snow;
- D2: Inappropriate attitude of the society toward elderly people with neuromuscular disorders in the environment where they live;

D3: Due to the nature of the disorder (progressive disease) elderly people with neuromuscular disorders are often forced to leave their home environment and move into an institution.

#### *Advantages (A)*

- A1: Elderly people with neuromuscular disorders remain in a home (closer or wider family circle) environment (family house/flat, home neighbourhood, home village/settlement/city) and don't move to a removed location, where everything is new;
- A2: Joy at accomplishing small successes and simple achievements;
- A3: The activities of Muscular Dystrophy Association, as the national representative organisation of disabled people with neuromuscular disorders.

#### *Challenges (C)*

- C1: To live for as long as possible outside institutions and to independently and autonomously organise all they need for their life;
- C2: More understanding, support and cooperation of the wider society;
- C3: Technical aids could improve quality of life in a home environment.

#### *Dangers (D)*

- D1: The greatest fear of elderly disabled people with neuromuscular disorders is the need to live in an institution;
- D2: The society is »afraid« of elderly people with neuromuscular disorders, mainly due to stereotypical conceptions;
- D3: Elderly people with neuromuscular disorders are afraid of the future, when they will be even more dependant.

Based on the interviews we have also created the Model for the perception of elderly disabled people with neuromuscular disorders in relation to the environment that is shown in Figure 1.



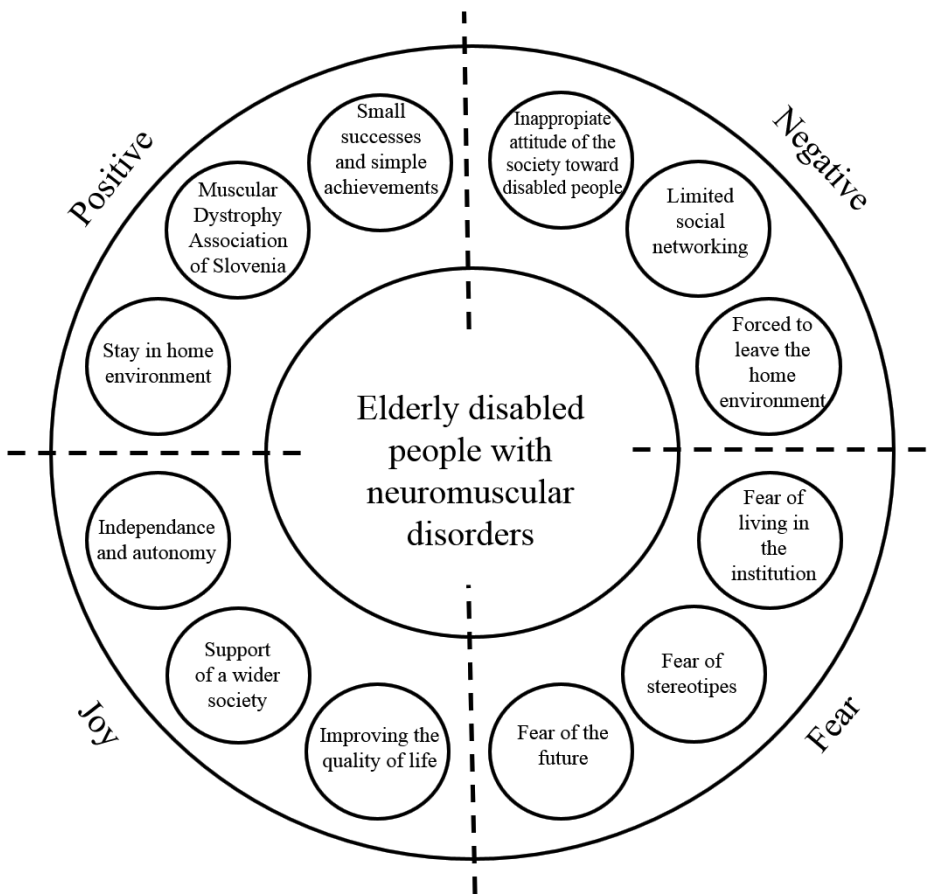


Figure 1: Model for the perception of elderly disabled people with neuromuscular disorders in relation to the environment (Source: own).

### Discussion

SWOT analysis is a widely and commonly used tool for performing general strategies. Associated advantages and disadvantages are related with internal factors, over which we can influence control and act accordingly, while opportunities and dangers are related with external factors, over which we don't have direct influence and to which we can only adapt.

In this study performed SWOT analysis with four derivative strategies has indicated key guidelines, where action should be directed for enabling life at home for elderly disabled people with neuromuscular disorders. Delineated advantages and disadvantages as well as opportunities and dangers, which originate from the qualitative research, were the basis for the creation of the Model of the perception of elderly disabled people with neuromuscular disorders in relation to the environment as shown in figure 1. The model presents elderly disabled people with neuromuscular disorders (central inner circle), sur-

rounded with smaller circles, which represent positive and negative influences, as well as the influences of joy and fear. The results of the qualitative research were the basis for the SWOT analysis that showed different strategies for living independently in a home environment for the elderly disabled people with neuromuscular disorders:

SO strategy (in which we take advantage of advantages to take advantage of opportunities)

- Older people with neuromuscular disorders can stay longer in a home environment, closer and wider family environment, with the help of technical aids, which can significantly improve the quality of life in a home environment;
- With the help of Muscular Dystrophy Association of Slovenia (different ways of assistance) elderly people with neuromuscular disorders have some basic corner blocks for a dignified life outside institution and for an independent organisation of all the necessities for their life;
- With the happiness of small accomplishments and simple achievements elderly disabled people with neuromuscular disorders can help us achieve more understanding, support and cooperation of a wider society.

WO strategy (in which we overcome weaknesses to take advantage of opportunities)

- The fact that elderly people with neuromuscular disorders due to the nature of the disease are often forced to leave their home environment and move into institutions could be prevented with enabling a dignified and independent life outside institutions for as long as possible;
- Appropriate behaviour of the society toward elderly people with neuromuscular disorders in an environment where they choose to live could be achieved with more understanding, support and cooperation of the wider society;
- Limited integration into social networks and few contacts with the surroundings due to architectural barriers, isolation in winter due to the cold and snow could be overcome with technical aids, which could improve the quality of life in a home environment.

ST strategy (in which we identify the benefits that can help us overcome the threats)

- With efforts to enable elderly disabled people with neuromuscular disorders to stay in a closer or wider family home environment (family house/apartment, home neighbourhood, home village/

housing estate/settlement/city), we could manage their greatest fear: living in institutions;

- Joy at accomplishing small successes and simple achievements could help us deal with the fear of the society, that is afraid of elderly disabled people with neuromuscular disorders due to stereotypical conceptions;
- The activities of Muscular Dystrophy Association (different ways of assistance), as the national representative organisation of disabled people with neuromuscular disorders could crucially influence the reduction of fear in elderly disabled people with neuromuscular disorders of their future, when they will be even more dependent.

WT strategy (a plan by which we prevent the danger from our weaknesses)

- We need to avoid pressure on elderly disabled people with neuromuscular disorders to live in institutions because the life at their home environment and their independence are their highest values.
- We need to avoid stereotypical conceptions about elderly disabled people with neuromuscular disorders because that would cause an inappropriate attitude from the society toward elderly disabled people with neuromuscular disorders in the environment where they live;
- We need to avoid an uncertain future for the elderly disabled people with neuromuscular disorders. We need to prepare for their future and ensure it, where key meaning will be their active integration into social networks, which shrink to a minimum with the loss of a driver's licence, architectural barriers, cold and snow in the winter.

### Conclusions

The study has indicated key elements, which are necessary for understanding the needs of elderly disabled people with neuromuscular disorders to live in a home environment. The strategies derived from the study indicate guidelines, where we should focus our activity, as well as, which areas need additional strengthening. In the future, strategies derived from this research, should be compared with strategies prepared by the political bodies in the framework for the preparation of the law on long term care and protection for the long-term care. The topic of this study is very current, especially since demographic research predicts big changes, for which we should prepare in time, if we want to successfully manage them.

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# Nutritional status of older adults admitted to the Surgical Ward

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## *Abstract*

*Introduction:* A substantial number of older adults are malnourished at the time of hospital admission, which negatively influences their recovery time, quality of life, possible complications, length of hospital stay and costs of treatment.

*Methods:* The study was conducted at the Surgical Ward of the Izola General Hospital between January and May 2016. All patients aged 65 years or older were invited to the study within 48 hours after being admitted to the ward. Nutritional examinations were carried out with anthropometric, bioimpedance and functional measures and with NRS-2002, based on which patients' nutritional status was defined, patients were nutritionally assessed and classified into two groups; one with increased nutritional risk, the other without it.

*Results:* Out of 67 acute patients (64 % male),  $77.0 \pm 7.9$  years, BMI  $28.4 \pm 4.4$  kg/m<sup>2</sup> (BMI  $\geq 25$  kg/m<sup>2</sup>: 54 (81 %)) in the study, 39 (58 %) had increased nutritional risk, 11 (28 %) had normal body mass, 16 (41 %) were overweight and 12 (31 %) obese. The group with increased nutritional risk had lower fat free mass index, phase angle and hand grip strength.

*Discussion and conclusion:* Despite the fact that 81 % of patients' BMI  $\geq 25$  kg/m<sup>2</sup>, 58 % of them were grouped as patients with increased nutritional risk. If the nutritional status of patients were determined using only the BMI cut-points for malnutrition ( $< 20$  or  $\leq 22$  kg/m<sup>2</sup>) only 8 % of patients would be classified as malnourished.

*Keywords:* older adults, nutritional screening, nutritional assessment, nutritional status, malnutrition

**U**ntentional weight loss and malnutrition are typical for older adults. Aging is often accompanied by physical inactivity, chronic or/and acute disease, reduced dietary intake and hormonal changes which reflects in

reduced body mass, change in body composition and sarcopenia (Cruz-Jentoft et al., 2010; Cereda et al., 2017). Despite the fact that the health profession and science are constantly developing, nutrition and nutritional status in older adults often still remain disregarded.

Malnutrition is often found associated with an increase in severity and number of complications, longer recovery time, prolonged hospitalization and cost of treatment. A substantial number of older adults are in poor nutritional status or malnourished at the time of hospital admission (Kjerstin et al., 2015; Gärtner et al., 2017). With nutritional assessment which consist of nutritional screening and assessment of nutritional status it is possible to recognize patients with nutritional risk (Kondrup et al., 2003; Van Bokhorst-de van Schueren et al., 2014). Anthropometric measures, hand grip dynamometer and bioelectrical impedance analysis (BIA) enable the determination of body composition and reliable nutritional status (Scalfi and Troiano, 2013).

The purpose of the study was to investigate the nutritional status of older adults at the admission to the surgical ward as well as to determine the association between age, body mass index (BMI), fat free mass index (FFMI), phase angle (PA) and hand grip strength (HGS).

## Methods

### *Data collection*

The study was conducted at the Surgical Ward of the Izola General Hospital between January and May 2016. All patients aged 65 years or older were invited to the study within 48 hours after being admitted to the ward (abdominal, urological and vascular surgery) in the preoperative period. Data on demographic characteristics, clinical history, medical diagnoses and associated diseases were obtained from patients' medical records. Body weight and standing height were measured with calibrated portable scale and stadiometer (KERN MPS 220K100PM). BMI was calculated as  $[(\text{kg}) / \text{height}^2 (\text{m})]$ . The patients' nutritional status was determined based on BMI cut-off points for malnutrition ( $< 20 \text{ kg/m}^2$  ( $65 \text{ y} \leq$  and  $< 70 \text{ y}$ ) or  $< 22 \text{ kg/m}^2$  ( $\geq 70 \text{ y}$ ) (Cederholm et al., 2015).

Information about the participants' nutrition risk was collected using the NRS-2002 in accordance with the recommendations Kondrup et al. (2013). Patients who had a total final score  $\geq 3$  were classified nutritionally-at-risk. With multi-frequency BIA (Bodystat 6000, Bodystat) FFM and PA were measured. FFMI was calculated as  $[\text{FFM} (\text{kg}) / \text{height}^2 (\text{m})]$ . For the interpretation of the FFMI and PA the cut-off points were used. Patients were grouped as malnourished if  $\text{FFMI} < 15$  and  $17 \text{ kg/m}^2$  for women and men, respectively (Cederholm et al., 2015) and if  $\text{PA} < 4,6^\circ$  and  $< 5^\circ$  for women and men, respectively (Guerra et al., 2015). HGS measurement was carried out by hand held dynamometer (Jamar Hydraulic hand dynamometer). For the interpretation of HGS cut-off points for sarcopenia were used. Patients were grouped as malnourished if  $\text{HGS} < 20$  and  $< 30 \text{ kg}$  for women and men, respectively (Cruz-Jentoft et

al., 2010). The nutritional screening and measurements were conducted in the same day. The research was approved by the Commission for Medical Ethics and the Quality and Education Service of the Izola General Hospital.

### *Statistical analyses*

Statistical analyses were conducted using Microsoft Excel and IBM SPSS Statistics 22. The characteristics of the total study sample were presented as frequencies (%) and mean  $\pm$  standard deviation (SD). Student t-test was used to analyze the differences between the means of the variables of the two independent groups within the sample. In order to analyze the relationship between two variables, we used the Pearson correlation coefficient. Linear regression analysis was used to analyze the influence of age on the measured parameters.

### **Results**

A total of 67 patients were assessed at the admission at the surgical ward with mean age  $77.0 \pm 7.9$ , range 65 and 96 years. Mean BMI was  $28.4 \pm 4.4$  kg/m<sup>2</sup>, range 18.8 and 41.8 kg/m<sup>2</sup>. Regarding the classification of BMI by the World health organization (WHO), 12 patients (18 %) had normal body mass (18.5–24.9 kg/m<sup>2</sup>), 26 (39 %) were overweight (25.0–29.9 kg/m<sup>2</sup>) and 29 (43 %) were obese ( $\geq 30$  kg/m<sup>2</sup>). The results of measurements were FFMI  $18.4 \pm 3.1$  kg/m<sup>2</sup>, HGS  $26.0 \pm 10.7$  kg and PA  $4.4 \pm 1.1$ . There was a negative correlation between age and FFMI, HGS and PA of whole sample (Table 1).

According to the NRS-2002, patients were categorized in groups with increased nutritional risk (INR) and low nutritional risk (LNR). 39 (58 %) patients were in INR and the majority of patients (52 %) achieved a total of 3 points (Figure 1). The mean age and BMI of patients with INR was  $79.5 \pm 7.8$  years and  $27.4 \pm 4.7$  kg/m<sup>2</sup>, respectively. Regarding the classification of BMI, 11 patients (28 %) had normal body mass, 16 (41 %) were overweight and 12 (31 %) were obese. There were significant differences in age, BMI, FFMI, HGS and PA according to the patients' nutritional status determined by the NRS-2002 ( $P < 0.05$ ) (Table 1). There was no correlation between age and BMI in the group of patients with INR and in the whole sample of patients ( $P = 0.742$ ) and ( $P = 0.103$ ), respectively.

Table 1: General characteristics and body measures of the study participants.

	All participants	NRS-2002		P
		increased nutritional risk	low nutritional risk	
	N = 67	N = 39	N = 28	
	Mean (SD)	Mean (SD)	Mean (SD)	
Age (years)	77.4 (7.9)	79.5 (7.8)	74.4 (7.3)	0.009a
	n (%)	n (%)	n (%)	
≥ 65 and < 70	14 (21)	5 (13)	9 (64)	
≥ 70	53 (79)	34 (87)	19 (36)	
Gender	n (%)	n (%)	n (%)	
female	24 (36 %)	17 (71)	7 (29)	
male	43 (64 %)	22 (51)	21 (49)	
	Mean (SD)	Mean (SD)	Mean (SD)	
BMI (kg/m <sup>2</sup> )	28.4 (4.4)	27.4 (4.7)	29.9 (3.5)	.024a .103b .742c
WHO classification	n (%)	n (%)	n (%)	
< 18.50	0	/	/	
18.50–24.99	12 (18)	11 (28)	1 (4)	
25.00–29.99	26 (39)	16 (41)	13 (46)	
≥ 30.00	29 (43)	12 (31)	14 (50)	
	Mean (SD)	Mean (SD)	Mean (SD)	
FFMI (kg/m <sup>2</sup> )	18.4 (3.1)	17.4 (3)	19.8 (2.8)	.001a .004b .457c
Hand-grip (kg)	26.0 (10.7)	22.7 (8.8)	30.7 (11.6)	.002a .000b .052c
Phase angle (°)	4.4 (1.1)	4.0 (1.0)	4.9 (1.0)	.001a .000b .158c

SD, standard deviation; BMI, body mass index; FFMI, free fat mass index; HGS, Hand-grip strength; PA, Phase angle. a) T-test; b) Pearson correlation test between age and other parameters (N = 67); c) Pearson correlation test between age and other parameters (N = 39).

Patients that screened positive with NRS-2002 (39) were classified as malnourished according to cut-off points of measured parameters FFMI, HGS and PA (Table 2). The majority of malnourished patients were determined by PA (29), little less with HGS (23) and the least with FFMI (13). Only 5 patients were identified within the cut-off points of BMI ( $\leq 20 \text{ kg/m}^2$  or  $\leq 22 \text{ kg/m}^2$ ).



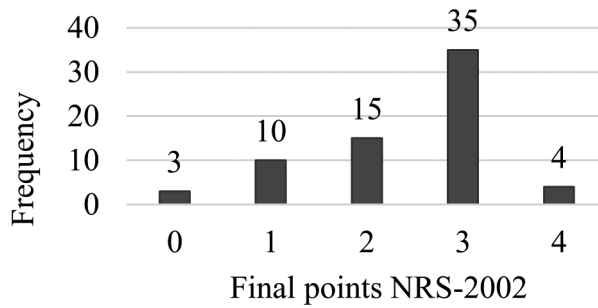


Figure 1: Results of nutritional screening with NRS-2002.

Table 2: Number of patients within BMI, FFMI, HGS and PA cut-off points for malnutrition.

	Inside cut-off points				P
	increased nutritional risk (N = 39)		low nutritional risk (N = 28)		
	malnourished				
	n (%)	Mean (SD)	n (%)	Mean (SD)	
BMI (kg/m <sup>2</sup> )	5 (100)	20.1 (1.2)		/	
FFMI (kg/m <sup>2</sup> )	13 (81)	14.4 (1.6)	3 (19)	14.9 (0.2)	0.667
HGS (kg)	23 (70)	17.4 (5.2)	10 (30)	21.4 (6.7)	0.075
PA (°)	29 (67)	3.7 (0.8)	14 (33)	4.2 (0.7)	0.040

SD, standard deviation; BMI, body mass index; FFMI, free fat mass index; HGS, hand-grip strength; PA, phase angle.

## Discussion

In our sample, 39 (58 %) patients were screened positive by NRS-2002 of which 34 (87 %) patients with the age  $\geq 70$  years. The majority of patients achieved a total of 3 points (Figure 1) of which 30 (86 %) with the age  $\geq 70$  years. There were significant differences in age according to the patients' nutritional status determined by the NRS-2002 ( $P = 0.009$ ) (Table 1). Because NRS-2002 contains an additional point for the adults with the age  $\geq 70$  years this directly impacts on the final sum of points and on the determination of patients' nutritional status ( $\leq 2$  or  $\geq 3$  points).

The mean BMI in the group with INR was  $27.4 \pm 4.7$  kg/m<sup>2</sup> with significant statistical difference with BMI in LNR ( $P = 0.024$ ). 34 (87 %) patients with INR had BMI  $> 22$  kg/m<sup>2</sup> of which 28 had BMI  $\geq 25$  kg/m<sup>2</sup> at their admission to the hospital which causes concerns. If we had used only the cut-off points of BMI ( $\leq 20$  kg/m<sup>2</sup> or  $\leq 22$  kg/m<sup>2</sup>) for screening of malnutrition at the admission, only 5 (8 %) patients would be classified as malnourished, which is less than one quarter comparing to the results of NRS-2002. This indicates the need for screening patients at the hospital admission with screening tools, since the dis-

tion based on BMI, although adapted to the elderly, shows poor sensitivity. Therefore, the use of BMI would be more appropriate for monitoring the changes of nutritional status during the hospitalization. Although WHO classifies the risk of malnutrition based on low BMI for all age groups in the same way, Beck and Ovesen (1998) argued in the previous researches that the cut-off point for determination of malnourished older adults should be  $24 \text{ kg/m}^2$  and healthy BMI should be raised on  $24\text{--}29 \text{ kg/m}^2$ . Similarly, Rojer et al., 2016 in study came to the conclusion, that overweight patients with unintentional weight loss had still high BMI which is typical also for geriatric patients. In our sample, as well as in the group with INR, there was no statistical correlation between age and BMI (Table 1) which means that in our sample age did not impact on lower BMI.

BIA and dynamometer were used for the measurements of body composition while cut-off points for a clinical diagnosis of malnutrition and sarcopenia (Cruz-Jentoft et al., 2010; Cederholm et al., 2015; Guerra et al., 2015) were used for determining nutritional status. Patients that screened positive with NRS-2002 (39) were classified as malnourished according to cut-off points of measured parameters FFMI, HGS and PA (Table 2). The majority of malnourished patients were determined by PA (29). In the recent study, Ringaitiene et al., 2016 showed that a preoperative PA value derived from BIA distinguishes malnourished from well-nourished patients. It is possible to conclude that the use of PA is a good indicator of malnutrition. However, further research is needed to evaluate the clinical application of PA.

The measured parameters FFMI, HGS and PA inside the groups with LNR and INR showed significant statistical difference ( $P < 0.05$ ). In the whole sample, age showed statistical correlation with FFMI, HGS, PA ( $P < 0.05$ ), which means that age impacts nutritional status (Elia in Stratton, 2012). It is interesting that in the group with INR there was no statistically significant correlation between age and FFMI, HGS, PA ( $P > 0.05$ ) (Table 1). Besides age, the disease, infection, physical inactivity, etc., which affect the change in body composition, reduction of muscle mass and muscle strength (Cruz-Jentoft et al., 2010) may have greater influence on patients' nutritional status in the group with INR.

### *Limitations*

The information on unintentional weight loss at the admission in older adults is unreliable and can affect the misinterpretation of the results in determining the nutritional status because most of the patients do not remember or monitor their weight. Therefore, we have used the information about unintentional weight loss only in the NRS-2002. Information on unintentional weight loss is reliable only when the body weight during hospitalization or at the readmission is compared to the body weight from patient' medical record at the last admission.

## Conclusions

The majority of patients had increased nutritional risk. Age influences poor nutritional status, but in patients with INR it is not directly associated with lower levels of FFMI, PA and HGS. It is also not associated with lower BMI.

The use of BMI for nutritional screening of older adults at the admission is not sensitive enough. Therefore, the use of BMI resulted to be more appropriate for monitoring the changes of nutritional status during the hospitalization. Different parameters determined different numbers of malnourished. We conclude that set cut-off points of measured parameters have a significant influence on the assessment of the nutritional status. For a more precise definition of nutritional status and severity of the disease we suggest laboratory tests.

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# Intergenerational programs as a solution to the social isolation of the elderly

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## *Abstract*

*Introduction:* Loneliness and social isolation are becoming a serious problem within the institutionalized care of elderly people in nursing homes and they are major obstacle to the mental and physical health of the elderly. On the market we can find robot animals for solving this problem, but we believe that there is a more empathic solution at the level of intergenerational program. This solution is practice in foreign countries.

*Methods:* We will undertake a systematic overview of Slovenian and foreign scientific and professional literature with a descriptive method of work in the field of the distribution of intergenerational programs for children and the elderly, as well as the positive and negative properties of these. We used descriptive method with literature review to make meta-analysis. The review was restricted to studies published since 2007 to 2017 and included 10 articles.

*Results:* As with other people, the need for active life, socialization and social inclusion is also evident in the life of elderly. By reviewing the literature we justified the benefit of intergenerational cooperation, highlighted the problems of the elderly, presented examples of well-organized intergenerational associations around the world and justified the importance of socializing older people.

*Discussion and conclusions:* The solution of mentioned problem within institutionalized care is necessary since the population of the elderly around the world is growing and is facing us with a wide array of challenges.

*Key words:* intergenerational program, active aging, pre-school children, nursing homes, social isolation of older people

Aging is a social phenomenon concerning nearly all the high-income countries (Kinsella and He, 2008; Gualano et al., 2017). In particular, the Eurostat estimations suggest that in 2030 over a fourth of the European population will be over 65 years old. All of the developed countries have problems related to a declining birth rate and increasing aging population (Yasunaga et al., 2016).

Older adults are at risk of being socially isolated due to poor health, low morale, and communication difficulties (Findlay, 2003; Morita and Kobayashi, 2013). This condition affects individual health, and it appears to be associated with a higher risk of hypertension, depression, cognitive decline, and even suicide (Fratiglioni *et al.*, 2000; Findlay, 2003; Iliffe *et al.*, 2007; Gualano et al., 2017). Conversely, social involvement for elders can be extremely advantageous (Fratiglioni et al., 2000; Findlay, 2003; Varma *et al.*, 2015; Gualano et al., 2017). One of the urgent challenges is providing services where older adults can maintain their health along with their engagement in meaningful activities. Intervention programs need to focus on acquiring social capital (SC) and generally target “groups” and not “individuals” (Yasunaga et al., 2016).

Since the beginning of the 1990s, the productive aspects of aging have been considered as an essential aspect of the successful aging concept. Volunteering is considered as activity that represent productive aging (Fujiwara et al., 2006; Yasunaga et al., 2016) and is found to have a high correlation with the physical and psychological health of older participants (Fujiwara, 2005; Yasunaga et al., 2016). Keeping older people healthy and active is an emerging challenge as presence of the physical activity in life is associated with decreased risk for numerous chronic diseases (Schroeder et al., 2017).

An intergenerational program (IGP) it is a form of human service that involves on going and organized interaction between members of younger and older age groups for the benefit of all participants (Erikson, 1950; Yasunaga et al., 2016). Intergenerational (IG) learning is actually the oldest method of learning and is the process whereby knowledge, skills, values and norms are transmitted between generations (Hoff, 2007; Fitzpatrick, 2013). The aim of IGP is to improve interactions and communication between different ages throughout shared experiences (Epstein and Boisvert, 2006; Gualano et al., 2017) and as a provider of generative roles for older adults, allowing children to grow up and be meaningful for older adults’ functional capacity (Fujiwara et al., 2003; Sakurai et al., 2016).

IGP was proposed as a bonds developer, between two generations (Newman, 1989; Morita and Kobayashi, 2013). As defined by the International Consortium for IGP, “IGP” are “social vehicles that create purposeful and ongoing exchanges of resources and learning among older and younger generations” (Kaplan, 2002; Morita and Kobayashi, 2013).

## Methods

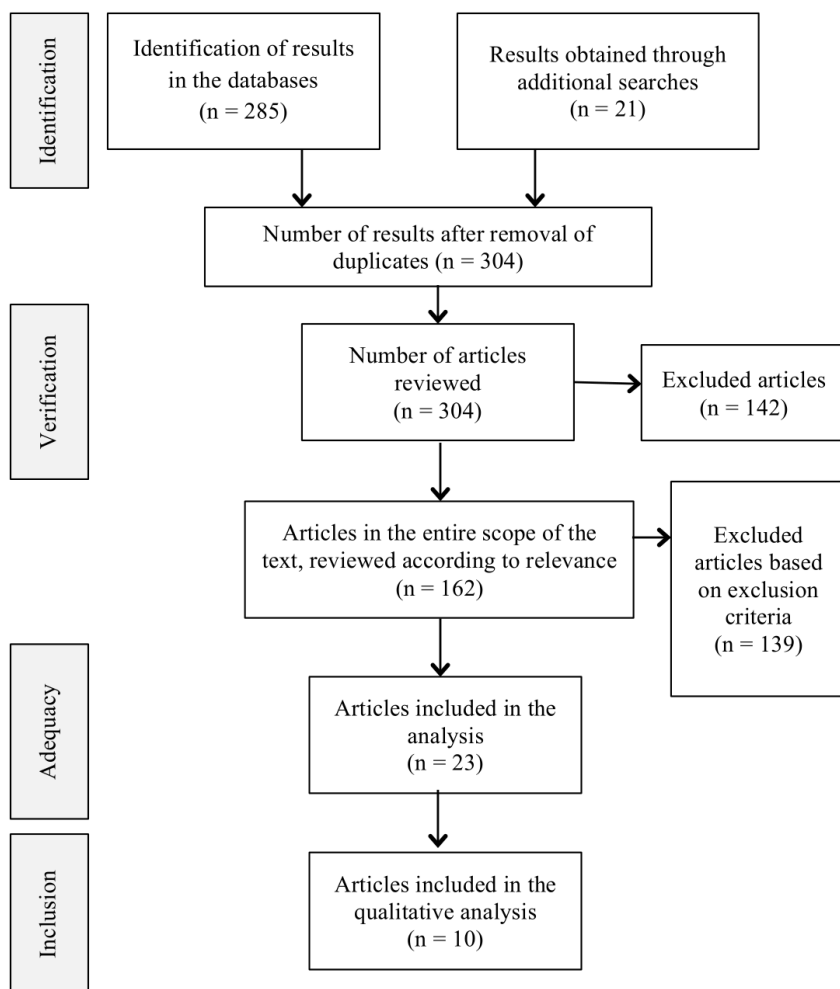


Figure 1: Results of literature review according to PRISMA methodology (Moher et al., 2009)

We used a descriptive method of work with a critical overview of Slovene and English professional and scientific literature. The literature review was from March to May 2018. The literature search was carried out using the Slovenian bibliographic-catalog database COBIB.SI, University database Di-Kul and foreign CINAHL and Medline databases (PubMed) and Google Scholar. The search criteria used the basic inclusive factors as required keyword combined with Boolean operator AND and OR, published between 2013 and 2018 and language criterion (Slovenian or English). The applied keywords associated with the Boolean operator AND in English were: »(kindergarten

OR preschool) AND (elderly OR aged OR older OR geriatric OR senior) AND intergenerational program AND social isolation AND (retirement home OR nursing home)« in different variants. Slovene literature was searched with the following keyword: »medgeneracij\* program\*«.

Table 1: List of inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
IG program	Dementia
IG activity	Adults, young people (everyone up to 7 years)
Social isolation	Book
Elderly (everyone up to 65 years)	Architecture of IG buildings or places
Children (7 years or younger)	Thesis
Articles with appropriate methodology	
Kindergarten or preschool	
Retirement home	

## Results

Table 2: Overview of studies

Author(s) and year	Aim of research	Methodology	Results
Cook and Bailey, 2013	Exploring care home residents' views of connections they have and would like to have with younger generations.	Qualitative study with interviews	A lot of participants spoke of importance of keeping in touch with family for their quality of life. They also valued contact with people that are not relatives. The authors represented the challenges of implementing IG initiatives with pros and cons.
Fitzpatrick, 2013	Exploring why IGP learning involving young children and older people is important in contemporary Europe; explain key definitions, concepts and terminology; synthesize key European research which identifies the goals and benefits of IG learning; exploring if regional trends exist in relation to IG learning; identifying emerging issues and concerns, which will be further explored.	Literature review for Europe IG project (TOY)	It was obtained that there is the lack of research and evaluation data on extra-familial IG learning in the academic literature. However, a wide range of more informal documentation and evidence illustrating a limited number of examples of IGP. Contribution of young children to IG learning is an issue that merits more attention. Building critical capacity over time will require key sectors such as schools, care settings and civil society groups to recognize the potential of IG learning. At local government level planning for communities and public spaces requires awareness of the benefits of all generations meeting and interacting.



<i>Author(s) and year</i>	<i>Aim of research</i>	<i>Methodology</i>	<i>Results</i>
Fried et al., 2013	Trial evaluates re-sults from IGP Ex-perience Corps. Whether senior vol-unteer roles within this program bene-ficially impact chil-dren's academ-ic achievement and classroom behavior in public elementa-ry schools and im-pact on the health of volunteers.	Dual evaluations	For older adults, IGP shows the primary outcome as decreased disability in mobility and Instru-mental Activities of Daily Living (IADL). Secondary outcomes are decreased frailty, falls, and mem-ory loss; slowed loss of strength, balance, walking speed, cortical plasticity, and executive function; objective performance of IADLs; and increased social and psycho-logical engagement. For children, primary outcomes are improved reading achieve-ment and classroom behavio-ur in Kindergarten through the 3rd grade; secondary outcomes are improvements in school climate, teacher morale and retention, and teacher perceptions of old-er adults.
Gualano et al., 2017	To summarize the effects of IG activi-ties on both, elderly and children. Identifying the key elements of the IG activities and deter-mining the success of these programs.	Literature review - followed the PRISMA statements	Ten studies evaluated children's outcomes outlining the positive impact of IGP upon children's perception of elderly. The effects on older participants were varie-gated. The retrieved studies out-lined the importance of a care-ful organization and of a specific training for all staff members.
Hozjan, 2010	To review and sum-marize recent ac-tivities in the field of IG cooperation in Slovenia in or-der to highlight cer-tain difficulties, to stimulate new re-search and to estab-lish more system-atic connections between partici-pants.	Perspective, opin-ion and commentary article	Slovenia is facing the challenge of maintaining and improving the systems of IG solidarity in the current demographic conditions. Another challenge the country is facing is establishing an appropri-ate link between various govern-ment departments, non-govern-mental organizations and active individuals. This is not a sim-ple task, since the planning of IGP touches the family, educa-tion, employment, health system, pension insurance, housing pol-icy, health system, spatial plan-ning, etc.
Kang, et al., 2016	To synthesize cur-rent findings on the relationship be-tween social en-gagement and cog-nition during two particularly critical periods of life, early childhood and older adulthood.	Integrative review	The findings of this review may inform future directions for addi-tional research and for develop-ing and testing the efficacy of po-tential interventions to facilitate cognitive development and/or preservation via increased social engagement.

<i>Author(s) and year</i>	<i>Aim of research</i>	<i>Methodology</i>	<i>Results</i>
Morita and Kobayashi, 2013	Compartment of the changes in visual attention, facial expression, engagement/behaviour, and IGP conversation in older participants in performance-based and social-oriented IG programs to determine a desirable interaction style for older adults.	Time sampling - structured observation study	IGP with preschool children brought smiles and conversation to older adults. The social-oriented IG program allowed older adults to play more roles than the performance-based IG program. The IG programs provide opportunities to fulfill basic human needs and reintegrate older adults into society. Further development of such beneficial programs is warranted.
Murayama et al., 2015	Clarify the effect of an IGP on elderly persons' symptoms of depressive mood and in improving their sense of coherence, which is an element for successful coping with stressors.	Evaluating	IGP could serve as key health promoters among elderly people by decreasing the risk of social isolation and loneliness due to the greater sense of meaningfulness. However, given our limited sample size, generalizability was restricted and studies with larger cohorts are required to further validate our findings.
Sakurai et al., 2016	This study examined the long-term effects of the IGP picture-book reading program "REPRINTS"	A follow-up assessment	The present study indicates that the REPRINTS IGP has long-term, positive effects that help maintain and promote intellectual activity, physical functioning, and IGP exchange, although the effect of the increasing amount of physical activity is unclear.
Yasunaga et al., 2016	A targeted review of IGP by focusing on novel interventional program Research on Productivity through IGP Sympathy (REPRINT) - picture-book reading program.	A non-randomized trial design	REPRINT as a school volunteer program is a "win-win" project with various reciprocal merits for multi-generations based on two theories: social capital and generativity.

Positive outcomes of IGP have the great potential to promote health and well being of older adults and children as the literature suggests that IGP benefit both (Morita and Kobayashi, 2013). For children there are specified positive aspects in the improvement of children perceptions of elder people (Gualano et al., 2017), improving the academic success of young children from IGP in reading activity (Sakurai et al., 2016) and understanding of the aging process (Jarrott et al., 2006; Newman and Hatton-Yeo, 2008; Morita and Kobayashi, 2013). On the other hand, elderly that were included in IGP maintained greater functional abilities and intellectual activities (Sakurai et al., 2016), they also increased self-esteem, improved well-being (Hernandez and Gonzalez, 2008; Morita and Kobayashi, 2013), increased social contact (Newman and Riess, 1992; Morita and Kobayashi, 2013), decrease distress (George and Singer, 2011; Morita

and Kobayashi, 2013), fight social isolation (Gualano et al., 2017) and gratification for their contribution to the community (Newman and Hatton-Yeo, 2008; Morita and Kobayashi, 2013). IGP also completes the need of elderly people to be purposeful and meaningful, it gives them the opportunity to share lived experiences and to exchange generational differences and skills, sharing news and views on common interests (Cook and Bailey, 2013). Researchers (Fried et al., 2013) defined three reasons for dropping out; medical problems lack of time, loss of interest and mortality. Gualano et al. (2017) mention the importance of the settings where the IGP is implemented. In particular, the careful organization of evidence-based IG activities appeared to be extremely important (Jarrott and Smith, 2011; Jarrott *et al.*, 2011; Gualano et al., 2017). It is the role of facilitators to offer a program, which draws out the strengths of both generations, and to promote sustained attention and self-motivated involvement, while ensuring that older adults and children are always the main focus of the IGP (Morita and Kobayashi, 2013). No projects or programs can be easily initiated without support from public policies (Yasunaga et al., 2016). This includes realistic recognition of political and community realities (Fried, et al., 2013). As well as the variety of settings, a wide heterogeneity of IG activities emerged, such as reading, mentoring, dancing, or playing. (Gualano et al., 2017). In literature we found two examples of the evidence-based IG practice; “REPRINTS” (Research of Productivity by Intergenerational Sympathy) in Japan (Yasunaga et al. 2016) and The Experience Corps (EC) in USA (Fried, 2013). In EU are Kindergarten project (Spain), Generation Gardens (Netherlands) (Fitzpatrick, 2013), Hand in Hand (Slovenia) (Narat et al., 2012; Fitzpatrick, 2013) and many others (Fitzpatrick, 2013).

We cannot forget that social engagement can take many forms, ranging from close friendships to participation in novel activities and all of them result in acquisition of new behavioural repertoires and ideas (Sakurai, 2016).

### Discussion

Clearly, fun and enjoyment is a key motivator for young children’s learning whether in the company of their peers, or older people. It is important that we pay attention to categorising IG practice according to their forms, functions and learning areas (Fitzpatrick, 2013). The main expressed needs to reach an improvement of IGP are: increase of the number of participants or staff, the necessity of higher resources and the expansion of the projects (Morita and Kobayashi, 2013). The implementation of strictly evidence-based IG activities appears to be remarkably fascinating (Gualano et al., 2017).

IGP with preschool children bring smiles and conversation to older adults. Smiles and conversation correspond to interpersonal acceptance, which is a basic human need. When older adults are given meaningful roles as mentors or role models, they are reminded of their ability to contribute to society. So there is a need for developing new programs which would fulfil the space with natural smiling and laughter. (Morita and Kobayashi, 2013).

Having roles attractive to older adults that also bring new social capital to societal needs could provide a positive framing of society's aging. Finding effective approaches to accomplish these multiple goals as a win-win is of critical importance to our future societal wellbeing (Fried, et al., 2013). Eventually, beyond the individual effects, IGP seemed to increase the sense of community for all the involved participants (Wilson *et al.*, 1997; Teater, 2016; Gualano et al., 2017). In Slovenia IG cooperation does not yet have wide dimensions as the countries, where the IG cooperation programs have been implemented since the 1970s. Nevertheless, in the recent time, more organizations are working to strengthen the participation of generations. In Slovenia more and more kindergartens, homes for the elderly, elementary and secondary schools, and pensioners' societies are becoming involved in IG cooperation (Hozjan, 2010).

### Conclusions

IGP need more research and more implementations of evidence-based IGP in local environments (more information on benefits, better promotion and precise planning). An important consideration in the introduction of IGP into the work environment is the well-defined task and input-output definition of each participating group: children, elderly and operators, where each are very important.

Let us be examples of good practices in encourage of implying IGP in our local environment because we have to start fighting against the social isolation of the elderly, to take advantage of the benefits of IGP for the brighter future of children and to make every effort to change the world for the better.

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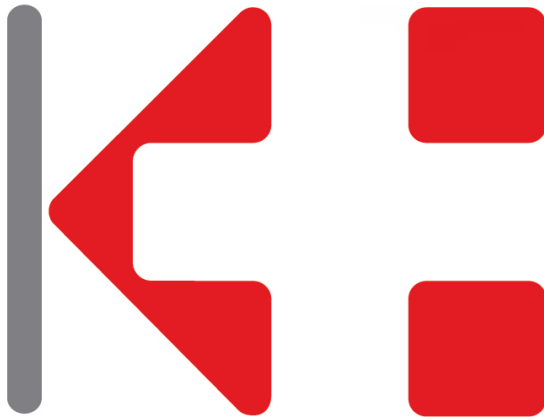
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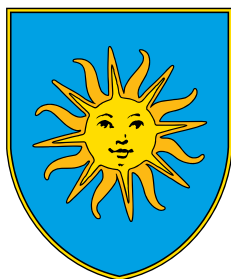


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