

Assessment of the effects of a multi-component individualized physiotherapy program in patients in a home hospice

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Abstract

Background: Hospice care is aimed at chronically and terminally ill patients. It includes symptomatic treatment as standard, but the interest in physiotherapy programs for hospice patients is increasing in order to improve their functioning and quality of life.

Aim: The aim of the study is to assess the impact of a multi-component individualized physiotherapy program on the functional and mental condition and quality of life of patients in a home hospice.

Material and method: The study included 60 patients (mean 66.3 years) in a home hospice living in southern Poland. Functional status was assessed twice: before and after intervention. The program was performed for 6 weeks (12 trainings) and was managed on the basis of WHO Rehab-Cycle ICF. The program was individually tailored to the patient, but structured according to the same scheme, i.e. breathing, strengthening, transfer, balance and functional exercises as well as functional ergonomics. Patients participated in setting particular objectives of the program. The study used: Katz (ADL) and Lawton (IADL) scales, Tinetti test, Visual Analogue Scale (VAS) pain scale, WHOQOL – BREF, Yesavage Geriatric Depression Scale (GDS). A set of ICF categories in terms of function, activity and participation was selected for the studied areas.

Results: The average functional level of ADL (mean 2.87) and IADL (mean 11.92) as well as quality of life (WHOQL mean 46.43) of researched patients before the intervention were low, whereas the intensity of pain (VAS mean 5.82), the risk of falling (Tinetti mean 8.20) and depression (GDS mean 16.65) were recorded high. After the completion of the intervention program, a significant improvement was found in all assessed areas, in particular in the scope of performing basic everyday activities (ADL mean 3.95), risk of falling (Tinetti mean 12.25) and QOL (mean 52.58).

Conclusions: The physiotherapeutic intervention presented here has a significant impact on improving the performance of basic and complex activities of everyday life as well as the emotional state and quality of life of patients in a home hospice. The results of our research confirm the great need for physiotherapy in hospice patients and for comprehensive assessment by means of ICF. Registration number: researchregistry5264

Background

Hospice care works in Poland as part of the healthcare system and is governed by the Regulation of the Minister of Health of October 29, 2013 in the field of guaranteed services in the field of palliative and hospice care [1]. A hospice can be carried out in the form of a stationary hospice or a home hospice. Hospice care is aimed at chronically and terminally ill patients. As a standard, medical aid provided by the hospice is focused on symptomatic treatment. The treatment used as part of palliative care includes the relief of chronic pain and the removal of ailments associated with long-term illnesses such as pressure sores, weakness, or general loss of fitness. Home hospice benefits (home visits) are mainly provided by a primary care physician, a nurse and a physiotherapist. They include pharmacological

treatment, treatment of somatic symptoms and pain treatment, as well as psychological care, rehabilitation, free rental of medical and auxiliary equipment [1]. An important goal of hospice care is to improve the quality of life of patients and their families [2, 3]. A decrease in functional efficiency is considered to be an important indicator of quality of life [4]. Problems related to the loss of functional efficiency cause a significant increase in stress levels and psychological problems [5]. Functional efficiency is an important measure of intervention effects and an important prognostic factor in seriously ill patients [6]. Despite this, not much attention has been paid to research related to physiotherapy aimed at improving functional efficiency and extending the life span of hospice patients.

The Central Statistical Office and the National Health Fund in Poland estimate that the number of hospice patients in 2015–2018 of the Podkarpackie Voivodeship was 2.58 thousand. The average age of hospice patients in Poland is 71 years [7]. The main beneficiaries of long-term care are the elderly people with cancer and other severe, chronic diseases [8].

In recent years, interest in the use of physiotherapy in patients under palliative care has increased [9]. The goal of physiotherapy in this group of patients is to minimize the negative effects of the disease or interference treatment. Rehabilitation in palliative care must be individualized and most often include a training of mobility, transfer, and balance, a program improving respiratory functions, a lymphoedema therapy, strengthening exercises, pain relief programs, education and psychological support [10]. Initially, rehabilitation (including physiotherapy) was aimed at providing general support to hospice patients, however there is evidence emerging nowadays for positive and relatively persistent effects of physiotherapy in the discussed group of patients. Physical exercises reduce pain and shortness of breath in palliative patients [11]. Moreover, these exercises can improve strength, endurance and function, or slow down decline in hospice patients [12]. They can improve respiratory functions and functional efficiency while performing daily activities [13]. They also improve patients' quality of life (QOL) [14].

Quality of life is associated with both the state of health and mental state of a hospice patient [15]. Assessment of patients' quality of life is considered to be the main measure of effectiveness of palliative care [16]. It is worth mentioning that many patients in the hospice are diagnosed with depression [17]. Disability is also a common problem among hospice patients [18]. Few studies indicate that in this group of patients physiotherapeutic interventions improve the functional state, quality of life and appearing symptoms such as pain and anxiety in this population [19, 20].

The goal of rehabilitation is to optimise functioning and minimise disability. Therefore, the management based on a biopsychosocial model allows for individualization of rehabilitation to maximise the functioning of seriously ill patients. The application of the International Classification of Functioning, Disability and Health (ICF) gives the opportunity to assess comprehensively patients' problems and needs, as well as to present research results in an accessible and comparable manner by various researchers [21, 22].

To the best of our knowledge, very little research has been carried out so far to assess the impact of physiotherapy on the condition of patients in home hospice care and the effectiveness and usefulness of

physiotherapy programs in hospice care. There are also no reports on the assessment of patients in a home hospice according to the biopsychosocial ICF model of the World Health Organization (WHO) [23].

Therefore, the aim of our work is to assess the impact of a multi-component individualized physiotherapy program on functional and mental state as well as quality of life of patients in a home hospice. An additional goal is also to present the results of research using ICF.

The practical goal, if the intervention results are positive, is to implement a protocol as a model of good practice in rehabilitation centres participating in the research.

Methods

Study design and participants

The study included 60 patients aged 55 to 89 in a home hospice living in southern Poland (Małopolskie and Podkarpackie Voivodships). Recruitment to the study was carried out in two rehabilitation centres participating in the study. Every patient or his family reporting to the centre to receive a rehabilitation benefit at a home hospice was informed about the possibility of participating in the project [Fig. 1]. All patients meeting the inclusion criteria were included in the study, with a referral letter from the physician to the rehabilitation centre for home physiotherapy as part of the home hospice in the period from March to June 2019. The inclusion criteria were: normal cognitive state (Abbreviated Mental Test Score (AMTS) > 6 points) [24] and a patient's informed consent to participate in the study. The exclusion criteria were: cognitive state \leq 6 points on the AMTS scale or unconsciousness, lack of an informed consent of the subjects to participate in the program. The examination and physiotherapy program were performed at the place of residence of participants by specialized physiotherapists included in the research team. All physiotherapists worked according to the designed intervention scheme in accordance with WHO Rehab-Cycle. The short duration of the project and its pilot nature influenced the decision supported by ethical considerations to create one study group and provide support to all patients reported to the project.

Figure 1

The assessment of the functional state of patients was carried out twice: before the beginning of the physiotherapy program (Study 1) and after the end of the program (Study 2).

The program was conducted for 6 weeks, twice a week (12 meetings in total). Each physiotherapy unit lasted on average 45 minutes and was performed by a physiotherapist. In order to manage the physiotherapy process Rehab-Cycle within the International Classification of Functioning, Disability and Health was used [25]. Based on a review of the scientific literature and clinical experience of the interdisciplinary team, the general goal of physiotherapy was determined for patients in a home hospice and crucial areas requiring intervention and support were chosen by the researchers. The selected areas focused on the assessment of basic and complex everyday activities, transfer, gait and balance as the most important for everyday activities. In addition, the level of pain, depression and quality of life of

patients were assessed. It is worth noting that the comprehensive assessment of the patient while minimising research tools was important for the research team, which results from poor health and high fatigue of hospice patients.

Despite the common scheme, the physiotherapy program was individually adapted to the patient's health, age and preferences. However, each program was structured according to the same scheme, i.e. breathing exercises, exercises strengthening main muscle groups, transfer / mobility exercises, balance exercises, functional exercises and learning to use mobility aids and using elements of the environment in the place of residence for better movement. (ergonomics of everyday activities).

According to the Rehab-Cycle WHO, patients were motivated by physiotherapists by setting together the most important goals of the physiotherapy program at the beginning (e.g. the possibility of using the toilet on their own, the possibility of preparing a meal by themselves, etc.) and during each training they were encouraged to participate consciously in the rehabilitation program, e.g. by analyzing which functions or activities improved even slightly.

A set of ICF categories was chosen for selected areas within a range of function, activity and participation. Moreover, research tools were linked to the codes. The first qualifier related to the extent of disability (for function) or restriction (for activity and participation) was assessed.

The study was registered in Research Registry under the number [researchregistry5264](#).

Data collection

The following research tools were used for the study, which were linked to ICF codes:

1) Basic activities of daily living (ADL) - Katz Index[26] containing 6 items, which were used to assess independence in the following activities: Bathing and showering (d510 Washing oneself), Dressing (d540 Dressing), Toilet hygiene (getting to the toilet, cleaning oneself, and getting back up) (d520 Caring for body parts and d530 Toileting), Transferring - functional mobility (d420 Transferring oneself), Self-feeding (not including cooking or chewing and swallowing) (d550 Eating), controlled excretion of urine and stool (b525 Defecation functions and b620 Urination functions). The ADL scale was calculated in two variants – a standard scale and a modified scale – a 5-grade scale consistent with the scale of ICF problem assessment in order to assign easily qualifiers [22].

2) Instrumental Activities of Daily Living (IADL) – the Lawton scale[27], containing 8 questions assessing independence in Using the telephone or other form of communication (d360 Using communication devices and techniques), moving further that a walking distance (d470 Using transportation), shopping for groceries and necessities (d620 Acquisition of goods and services), preparing meals (d630 Preparing meals), cleaning and maintaining the house (d640 Doing housework), DIY / laundry (d650 Caring for household objects), taking prescribed medications (d598 Self-care, other specified, preparing and taking medication), managing money (d860 Basic economic transactions).

The IADL scale was calculated in two variants – a standard and modified scale. As a standard, a 3-grade response scale was used for each item: 1 = unable, 2 = needs assistance, 3 = independent) and sum the eight responses[28]. The modified scale included a 5-gradescale consistent with the scale of ICF problem assessment in order to assign easily qualifiers[22].

3) WHOQOL – BREF questionnaire for assessing the quality of life. This instrument contains 26 questions assigned to four domains assessing the quality of life related to health in the following area: physical and psychological health, social relations and the environment. Each question is rated on a 5-point scale. According to WHO guidelines, the results for each domain are calculated by adding values of individual items, and then converted into a result in the range of 0 to 100, where 0 means the worst quality of life and 100 the highest quality of life [29]. ICF codes (b140 Attention functions, b130 Energy and drive functions, d920 Recreation and leisure, b134 Sleep functions, d720 Complex interpersonal interactions) are linked to selected WHOQOL items.

4) Geriatric Depression Scale (GDS). The tool allows the researcher to assess the patient's emotional state and the occurrence of depressive moods. A 30-point scale was used. The participants received 0 or 1 point for each answer. The final result was the sum of points. Interpretation of results: from 0 to 10 points - no depression, 11–20 points - mild depression, 21–30 points - deep depression [30]. The final result was transformed into the ICF scale according to the ICF Linking Rules WHO [31].

5) Tinetti test, by which the function of dynamic balance and gait was assessed. Score scale: 26–28 points - no risk of falling, 19–25 points - moderate risk of falling, ≤ 18 points – 5 times higher risk of falling compared to people with a proper result [32, 33]. The overall score of the scale was transformed into codes for balance (d4106 Shifting body'scentre of gravity) and gait (d450 Walking)[31].

6) Visual Analogue Scale (VAS) assessing a pain level - a simple and useful method of assessing the intensity of pain by marking a point on the line, e.g. 10 cm long, where 0 is attributed to the total absence of pain, and 10 the most severe pain imaginable. The test result was transformed into the ICF code (b280 Sensation of pain)[31].

Statistical methods

The obtained data was analyzed using the Statistica TIBCO Software Inc. program. (2017). Statistica (data analysis software system), version 13. <http://statistica.io>. For initial data analysis, descriptive statistics measures were used. The distribution for normality of features was tested by the Shapiro-Wilk test. The Wilcoxon test (measurable variables) and the McNemar test (non-measurable variables) were used to investigate the effect of therapy on changing the values of individual variables. The statistical significance was determined on the level $p < 0.05$.

Results

The average age of participants was 66.3 years. Most of the study group were men (53.33%) and persons in relationship (60.00%) The majority of respondents lived with their family (95.0%). The main group of

patients were cancer patients (60.00%) (Table 1).

Table 1
Characteristics of the study population (n = 60)

Variables		Total number (%) Mean (SD)
Age		67.02 (10.9)
Gender	Females	28 (46.67)
	Males	32 (53.33)
Marital status	In a relationship	36 (60.00)
	Single	24 (40.00)
Habitation	With family	57 (95.00)
	Alone	3 (5.00)
Primary disease	Cancer	36 (60.00)
	Neurological disease	14 (23.33)
	Cardiovascular or metabolic disease	10 (16.67)

Table 1

The average functional level of ADL patients in the home hospice was quite low 2.87 points out of 6 possible. It is necessary to pay attention to a large diversity of patients in terms of disability in performing basic everyday activities (SD = 2.21). After completion of physiotherapeutic intervention, which also included training in performing basic everyday activities, a significant improvement in average ADL was observed (3.95), however a group diversity remained remarkable (SD = 2.34). Considering frequency, the most often dependence occurred in bathing and showering. Lack of independence in this area was observed in as many as 73.33% of the study population. After the intervention, the incidence of this problem decreased considerably (53.33%), but still it was the most common problem among all the basic activities of everyday life. Transferring - functional mobility was the second most common dependence in ADL. This problem was found in 61.67% of subjects. After completing the intervention, a marked improvement was found in the majority of patients who had this problem before starting rehabilitation. Other activities that more than half of the subjects did not perform alone were dressing and toilet hygiene (getting to the toilet, cleaning oneself, and getting back up) (55.00% each). In both cases, a statistically significant improvement was observed after the intervention was completed.

The average functional level in the IADL range of hospice patients was low. It was 11.92 out of 24 possible points. Using such a simplified measure as the average of the group, a remarkable improvement (13.88) was observed, with large variations expected (SD = 5.03). Shopping for groceries and

necessities was the biggest problem. This difficulty occurred in almost all patients before rehabilitation (98.33%). However, no significant improvement in this area was observed after completing the intervention and it remained the area of the most common patient dependence. The next most frequently identified problems were: moving further than a walking distance and DIY/washing. 96.67% of the study group had disability in this range. After the intervention, a considerable improvement was observed in the incidence of the moving further than a walking distance problem. However, as it was expected, this problem still occurred in the overwhelming number of patients (85.00%). Moreover, a great improvement in independence after rehabilitation was observed in preparing meals, taking prescribed medications and managing money (Table 2).

Table 2

Assessment of the incidence of disability in individual items of ADLs and IADLs before and after the intervention (n = 60)

Variables		Total number (%)		p-value
		Mean (SD)		
		Study 1	Study 2	
ADL	Total (points)	2.87 (2.21)	3.95 (2.34)	< 0.001 ¹
	Bathing and showering	44 (73.33)	32 (53.33)	0.002 ²
	Dressing	33 (55.00)	18 (30.00)	0.001 ²
	Toilet hygiene (getting to the toilet, cleaning oneself, and getting back up)	33 (55.00)	22 (36.67)	0.003 ²
	Transferring - functional mobility	37 (61.67)	18 (30.00)	< 0.001 ²
	Self-feeding (not including cooking or chewing and swallowing)	21 (35.00)	15 (25.00)	0.077 ²
	Controlled excretion of urine and stool	20 (33.00)	18 (30.00)	0.480 ²
IADL ^a	Total (points)	11.92 (4.42)	13.88 (5.03)	< 0.001 ¹
	Using the telephone or other form of communication	38 (63.33)	33 (55.00)	0.074 ²
	Moving further than a walking distance	58 (96.67)	51 (85.00)	0.023 ²
	Shopping for groceries and necessities	59 (98.33)	56 (93.33)	0.248 ²
	Preparing meals	55 (91.67)	48 (80.00)	0.023 ²
	Cleaning and maintaining the house	55 (91.67)	50 (83.33)	0.074 ²

^a as a disability in individual IADL items; the necessity to obtain assistance in performing or lack of possibility to perform an activity was considered

¹ test Wilcoxon

² test McNemara

Variables	Total number (%)		p-value
	Mean	(SD)	
DIY/washing	58 (96.67)	54 (90.00)	0.134 ²
Taking prescribed medications	48 (80.00)	42 (70.00)	0.041 ²
Managing money	40 (66.67)	34 (56.67)	0.041 ²
^a as a disability in individual IADL items; the necessity to obtain assistance in performing or lack of possibility to perform an activity was considered			
¹ test Wilcoxon			
² test McNemara			

Table 2

Considering the study group, a high average pain intensity was found (5.82), with its relatively low diversity in the group (SD = 1.77). After the intervention, a significant reduction in pain intensity was observed (5.07), although it remained mainly at a moderate level.

The low average score for the entire Tinetti scale indicated a high risk of falling in the hospice patients researched before the intervention. It was on average 8.20 points out of 28 possible ones providing SD = 9.05 points. There was a notable improvement and an average reduction in the risk of falling in patients after the intervention, taking into account the quantitative variable. Analyzing the categorized and qualitative scale, it could be seen that the number of patients at high risk of falls decreased significantly.

In addition, a very high incidence of depression was found in hospice patients. Before starting the physiotherapy program, the vast majority of the study group developed mild depression (76.67%), and nearly every fourth person experienced deep depression. After the rehabilitation, a great improvement in the patients' mental state was found based on the quantitative analysis of the GDS scale. From the point of view of the categorized scale, the number of people with deep depression decreased in favour of people with mild depression.

As it might be expected, the quality of life of patients before the rehabilitation was low. The average number of points was below half the scale in the range of 0-100 (46.43). The lowest quality of life occurred in the psychological field (29.25), and the highest in the field assessing social relations (59.18). After completing the intervention, a considerable improvement in the overall quality of life and quality of life in each of the areas was found (Table 3).

Table 3

Assessment of parameters related to balance and gait, emotional state, quality of life and pain before and after intervention (n = 60)

Variables		Total number (%)		p-value
		Mean (SD)		
		Study 1	Study 2	
Pain (VAS)	Pain level on a scale of 0 to 10 point	5.82 (1.77)	5.07 (1.82)	< 0.001 ¹
Tinetti POMA Scale	Total (points)	8.20 (9.05)	12.25 (10.01)	< 0.001 ¹
	Tinetti gait (points)	3.80 (4.42)	5.43 (4.86)	< 0.001 ¹
	Tinetti balance (points)	4.40 (4.79)	6.82 (5.33)	< 0.001 ¹
	No risk of falling	4 (6.67)	9 (15.00)	
	Moderate risk of falling	4 (6.67)	12 (20.00)	
	High risk of falling	52 (91.67)	39 (86.66)	
GDS	Total (points)	16.65 (86.66)	15.72 (4.01)	0.012 ¹
	No depression	0 (0.00)	1 (1.67)	
	Mild depression	46 (76.67)	48 (80.00)	
	Deep depression	14 (23.33)	11 (1.33)	
WHOQOL	Total (points)	46.43 (18.22)	52.58 (18.90)	< 0.001 ¹
	Psychological domain	29.25 (16.92)	37.65 (19.15)	< 0.001 ¹
	Physical domain	46.70 (21.59)	53.23 (21.91)	< 0.001 ¹
	Social relations	59.18 (22.68)	63.88 (22.72)	0.001 ¹
	Functioning in the environment	50.60 (23.32)	55.57 (23.35)	< 0.001 ¹
¹ Test Wilcoxon				

Table 3

In order to enable comparability of collected data, selected measurement parameters were recorded graphically and numerically in terms of function, activity and participation by the use of codes and the average score of ICF qualifiers for individual categories (Fig. 2). With regard to a description of the patient's situation, 25 ICF codes were used, including 6 ones describing body functions and 19 ones describing activity and participation. A graphic presentation of data in the form of qualifiers allows researchers to observe the condition of patients before and after the physiotherapy program.

Figure 2

Discussion

Hospice care is an extremely important element of the modern health care system. Owing to the development of science and medicine, the life expectancy of patients with severe chronic diseases is extended, and the moment of death is postponed [23]. Hospice care understood as a comprehensive set of medical and rehabilitation services is a relatively new solution, while apart from controlling pain and other symptoms related to the disease, it is also important to improve the functioning and quality of patients' lives [34]. Physiotherapy is becoming a very important component of hospice care.

Considering our study, as expected, the average functional level of ADL and IADL of the examined patients before the beginning of rehabilitation in the home hospice was low. There was a high average pain intensity and a high risk of falling. Moreover, a high incidence of depression and poor quality of life, especially in the psychological domain was recorded. After the completion of the intervention program, a very positive result was found associated with a significant improvement in hospice patients in virtually all assessed areas, in particular in the scope of performing basic everyday activities. Even though, some improvements have been assumed hypothetically, we did not expect such a large increase and a positive physical and emotional response in hospice patients.

As the disease progresses, hospice patients experience a high level of loss of activity and mobility disorders, and then dependence on others in the performance of daily activities as a result [35]. They have serious problems in carrying out everyday life activities, which greatly deteriorate their physical and mental functioning [36]. Restriction of daily activities, i.e. washing, dressing, moving, eating meals and controlling urine and stool excretion causing dependence on other people, reduces the subjective assessment of the quality of life of hospice patients [37]. Most people admitted to the hospice indicate severe and moderate dependence in terms of simple and complex activities of everyday life and limited mobility [38].

The population of palliative patients is diverse regarding functional performance. Some patients are still able to cope with daily activities, while others are weak and bedridden. As for the hospice patients, disability and dependence is associated with many factors, such as pain, neurological and

musculoskeletal problems, disorders of internal organs, fatigue and exhaustion associated with drug therapy, comorbid diseases and poor mental condition.

Considering our study, the most common identified problems of patients in the home hospice before the beginning of the physiotherapy program were lack of independence in bathing and showering and transferring – functional. Other activities that involved the greatest and even total restrictions were dressing and toilet hygiene (getting to the toilet, cleaning oneself, and getting back up). The identified areas with the highest level of restriction are characteristic for hospice and palliative patients [39]. In most cases, hospice patients frequently receive basic medical care without special rehabilitation programs [40]. As for our study, the performed intervention and observation confirmed a significant improvement in the performance of basic daily activities after the end of the program. Most patients, despite their poor mental and physical condition, noticed an improvement in the area of their functioning as the rehabilitation process progressed and they reported an increase in their motivation for further therapy. Most hospice patients expressed a desire to stay physically independent during the illness. With reference to Cole's et al. study, it was stated that rehabilitation can improve both motor and cognitive functions in patients with disabilities resulting from impaired cancer or its treatment [41]. Improving ADL is an important factor in delaying death and improving quality of life [42]. Speaking of the study of Park et al., they observed that ADL is an important predictor of mortality in elderly people with severe disease. Observation of hospice patients not subjected to rehabilitation interventions shows a more dynamic decline in function and approaching death, the faster the worse the functional state of the patient [43]. ADL assessment plays a role in decision making regarding the treatment and rehabilitation of weak, elderly patients [40, 43]. We have proved in our study that considering patients with chronic illnesses in the home hospice, a method of achieving functional improvement is the use of an individualized physiotherapeutic program including appropriately selected physical and functional exercises. There are reports confirming that properly selected physical activity improves the comfort of life and extends its duration in elderly, chronically ill people [44].

With reference to our study, we found a high incidence of depression and poor quality of life (especially in the psychological domain) of patients in the home hospice before starting the physiotherapy program. The emotional and functional state are associated with the sense and assessment of quality of life [45]. It was proved in studies that there was a significant correlation between the occurrence of depression and worse mobility, performance of daily tasks, and more frequent pain or anxiety [46]. We demonstrated in our study an improvement in the mental state and quality of life of patients in a home hospice subjected to physiotherapeutic intervention. Pop et al. confirmed in their study that the rehabilitation of patients under palliative care resulted in a significant improvement in their quality of life. Our results confirm that there is a need to provide palliative patients with optimal rehabilitation regardless of their clinical status before rehabilitation [47].

The possibility to change body position and its transfer is the starting point for performing various everyday activities. Therefore, gait and body balance assessment, followed by planning adequate physiotherapeutic intervention that is adequate to the possibilities, are extremely important. Any

improvement recorded in these activities reduces the risk of falling and the subsequent poor health consequences and prognosis resulting from it [48]. Considering our study, we noted large problems in gait and body balance in hospice patients, and thus a high risk of falling. However, the introduced intervention proved a significant improvement in gait and balance parameters as well as a reduction in the risk of falling. Other reports confirm positive results after using individually selected gait, balance and muscle strengthening exercises in older and chronically ill patients [49, 50].

As a rule, patients under hospice care reveal severe limitations in performing various activities, which means that high-sensitivity instruments are necessary to assess functional performance. A comprehensive patient's assessment is also required for both diagnostic assessment of the patient as well as the assessment of improving effects. The International Classification of Functioning, Disability and Health (ICF) of the World Health Organization provides a normalised, standard language and a comprehensive framework for describing health and health-related conditions, and therefore it was used in this study. The deployment of qualifiers consistent with ICF scale for the assessment of individual categories assigned to individual items of the ADL and IADL scales allowed the researchers to evaluate responsively the problem before rehabilitation and observed a significant improvement in case of overwhelming majority of patients from a total dependency (qualifier 4) towards significant problems (qualifier 3), which meant that a completely dependent patient was able to participate actively in the performance of these activities, which greatly facilitates the care and nursing of caregivers. What is more, in most cases, improvement was even greater (qualifier 2), which meant that the patient required assistance in carrying out the activity rather than a complete replacement. In many cases, it was possible to achieve even a return to full (qualifier 0) or almost full independence (qualifier 1). Therefore, it is worth mentioning that the use of the ICF scale to assess individual items of the ADL and IADL scales also let the researcher specify in detail which activities required care and which only assistance, as well as which of them the patient was able to perform alone without the help of another person. In addition, a very important advantage of ICF was the ability to present results in various areas of human functioning in a universal language, which gave the opportunity to compare data of researchers using different measuring tools.

Limitations

The limitation of our study is the lack of a control group and a typical random selection of the subjects for the study group (uncontrolled trials), but in the situation of working with hospice patients where time plays a very important role, we have found it ethical to provide support at the same time to all patients wishing to participate in our research program during its duration.

Conclusion

Taking everything into consideration, we have proved a very positive impact of a multi-component individualized physiotherapy program on the functional efficiency and quality of life of patients staying at a home hospice. Speaking of a modern approach to palliative and hospice care, apart from drug

treatment and nursing care, rehabilitation should also play an important role, with particular emphasis on physiotherapy. Due to modern forms of physiotherapy, it is possible to adapt therapeutic methods to the individual needs and clinical condition of the patient [46]. Owing to the dynamics of population aging and the increase in the number of severe chronic diseases, including cancer, there is an urgent need to conduct more intervention studies in the group of elderly patients aimed at improving functional fitness and comfort of life in this period of their life.

In conclusion:

1. Intervention based on the WHO Rehab-Cycle ICF, implemented by a multi-component individualized physiotherapy program including, among others breathing exercises, functional exercises, transfer / mobility exercises, balance exercises, relaxation exercises and learning to use mobility aids and using elements of the environment to move more efficiently (ergonomics of everyday activities) after 12 visits to patients under home hospice care has a significant impact on the improvement patients' functioning in carrying out basic and complex activities of everyday life.
2. The implementation of the rehabilitation program improves the emotional state and quality of life of patients in the home hospice.
3. The results of our research confirm the great need for physiotherapy in hospice patients on the same level as medical and social care, as well as the continuation of larger-scale research aimed at preparing and verifying new rehabilitation protocols

Abbreviations

WHO:World Health Organization; **ICF:** International Classification of Functioning, Disability and Health; **ADL:** Activities of Daily Living; **IADL:** Instrumental Activities of Daily Living; **VAS:** Visual Analogue Scale; **GDS:** Geriatric Depression Scale; **QOL:** quality of life; **AMTS:** abbreviated mental test score;

Declarations

Ethics approval and consent to participate

The research project was accepted by the Bioethics Committee of the University of Rzeszow (decision number of the Bioethics Committee at the University of Rzeszow 2018/06 / 22b). In accordance with Declaration of Helsinki, the participants were provided with information about the aim and the course of the study, and expressed their informed consent to participate. The persons were informed about the possibility of withdrawing from the study at any stage of study.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and analysed during the current study are available in Repository of University of Rzeszow.

Competing interests

The authors have no conflicts of interest to declare.

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ACS contributed to the designing of the study, prepared the statistical analyses and interpretation of the data, wrote the manuscript and led the writing of the paper. **AW** contributed to the designing of the study, the acquisition of data, provided substantial feedback on the manuscript. **EK** contributed to the designing of the study, the acquisition of data, provided substantial feedback on the manuscript. **AS** contributed to the designing of the study, the acquisition of data, provided substantial feedback on the manuscript. **AŻ** contributed to the designing of the study, the acquisition of data, provided substantial feedback on the manuscript.

All authors read and approved the final manuscript.

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Figures

Figure 1. Flow diagram of the study

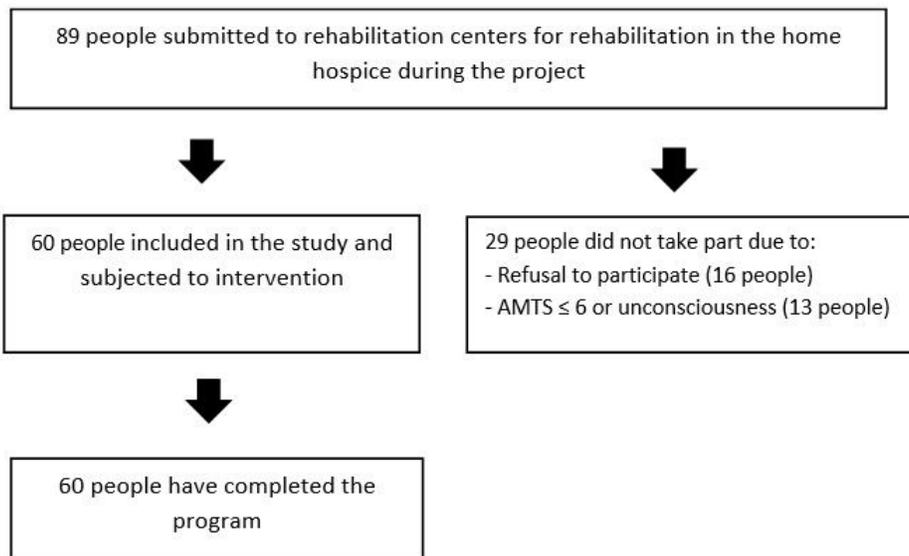


Figure 1

Flow diagram of the study

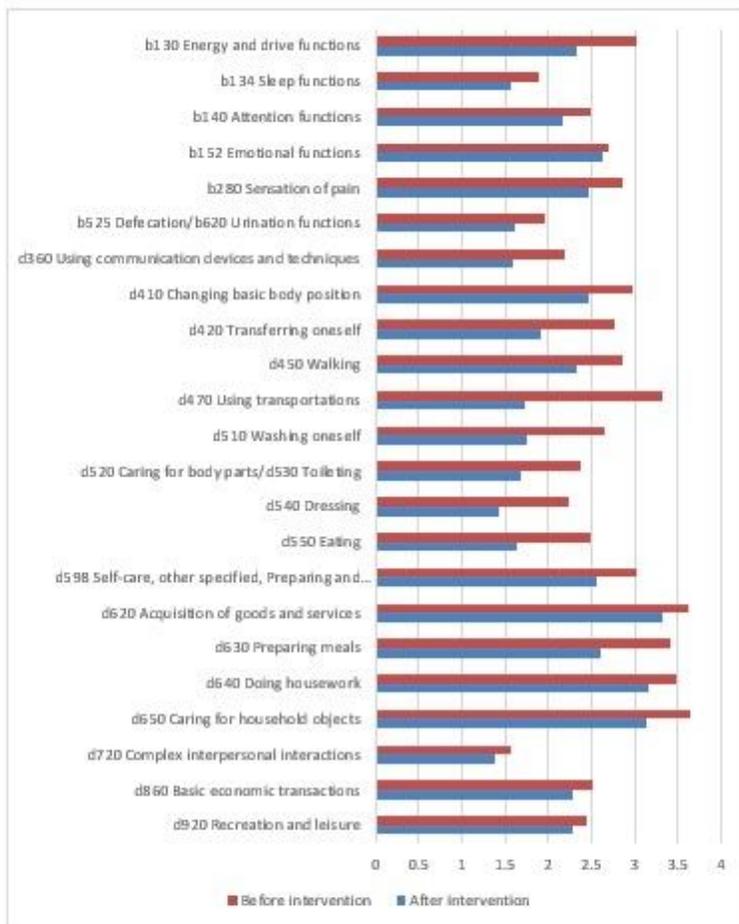


Figure 2

Health information linked to the ICF