

**Pielęgniarstwo w opiece długoterminowej**  
**Kwartalnik międzynarodowy**

LONG-TERM CARE NURSING  
INTERNATIONAL QUARTERLY

ISSN 2450-8624

tom 8, rok 2023, numer 4, s. 3-15

DOI: 10.19251/pwod/2023.4(1)

e-ISSN 2544-2538

vol. 8, year 2023, issue 4, p. 3-15

**Katarzyna Tomaszewska<sup>1,A-F</sup>, Bożena Majchrowicz<sup>2,A-F</sup>, Krystyna Kowalczuk<sup>3,A-F</sup>**

**ACCEPTANCE OF ILLNESS AND LIFE  
SATISFACTION IN MECHANICALLY VENTILATED  
PATIENTS DEPENDING ON THE TYPE OF DISEASE,  
TYPE OF VENTILATION AND DEMOGRAPHIC  
FACTORS**

**Akceptacja choroby i satysfakcja z życia pacjentów wentylowanych  
mechanicznie w zależności od rodzaju choroby, typu wentylacji oraz  
czynników demograficznych**

<sup>1</sup> Zakład Pielęgniarstwa, Wydział Ochrony Zdrowia, Państwowa Akademia Nauk Stosowanych im. ks. B. Markiewicza w Jarosławiu, Polska

<sup>2</sup> Instytut Ochrony Zdrowia, Państwowa Akademia Nauk Stosowanych w Przemyślu, Polska

<sup>3</sup> Zakład Zintegrowanej Opieki Medycznej Wydział Nauk o Zdrowiu, Uniwersytet Medyczny w Białymstoku, Polska

A - Koncepcja i projekt badania, B - Gromadzenie i/lub zestawianie danych, C - Analiza i interpretacja danych, D - Napisanie artykułu, E - Krytyczne zrecenzowanie artykułu, F - Zatwierdzenie ostatecznej wersji artykułu

Katarzyna Tomaszewska -  0000-0002-2129-9107

Bożena Majchrowicz -  0000-0003-3202-1407

Krystyna Kowalczuk -  0000-0001-5680-8859

**Abstract (in Polish):**

Cel pracy: Celem pracy była ocena poziomu akceptacji choroby przewlekłej i satysfakcji z życia pacjentów objętych długoterminową domową inwazyjną i nieinwazyjną wentylacją mechaniczną.

Materiał i metody: Grupę badaną stanowiło 73 pacjentów objętych wentylacją mechaniczną inwazyjną i nieinwazyjną w środowisku domowym. Badanie przeprowadzono w okresie od lutego do września 2022 roku. Narzędzie badawcze stanowił kwestionariusz ankiety składający się z pytań na temat danych socjodemograficznych. Kolejna część kwestionariusza zawierała 2 standaryzowane skale. Do oceny poziomu akceptacji choroby wykorzystano standaryzowany kwestionariusz: Skala Akceptacji Choroby (AIS, Acceptance of Illness Scale), oraz Skala Satysfakcji z Życia (SWLS) w polskiej adaptacji Juszczyńskiego. Podstawowym testem, który został wykorzystany w analizach statystycznych jest test Chi-kwadrat na niezależność zmiennych. Do określenia siły związku wykorzystane zostały współczynniki oparte na teście V Kramera. Korelacje między zmiennymi porządkowymi lub ilościowymi zostały wykonane za pomocą współczynnika rho Spearmana,

Wyniki: Średni poziom akceptacji choroby wśród ankietowanych osób wynosił 20,73 +/-5,36 (min. 8 a max. 40). Średni poziom satysfakcji z życia (SWLS) ankietowanych osób objętych długoterminową wentylacją mechaniczną w warunkach domowych wynosił 17,66 +/-5,37 (min. 5 a max. 35). Uzyskane wyniki pozwalają stwierdzić, że między poziomem AIS a poziomem SWLS występuje dodatnia korelacja istotna statystycznie o dość wyraźnej sile związku.

Wnioski: Zaobserwować można, że wyższy poziom akceptacji choroby powiązany jest z większą satysfakcją z życia. Analiza wykazała, że płeć nie różnicuje w sposób istotny statystycznie poziomu satysfakcji z życia SWLS oraz poziomu akceptacji choroby AIS. Poziom satysfakcji z życia oraz akceptacji choroby nie jest zróżnicowany istotnie statystycznie ze względu na rodzaj zastosowanej wentylacji.

**Abstract (in English):**

Aim: The aim of this paper was to assess the level of acceptance of chronic disease and life satisfaction of patients receiving long-term home invasive and noninvasive mechanical ventilation.

Material and methods: The study group included 73 patients receiving invasive and non-invasive mechanical ventilation at home. The study was conducted between February and September 2022. The research tool was an original survey questionnaire and two standardized scales: the Acceptance of Illness Scale (AIS) and the Satisfaction with Life Scale (SWLS) adapted by Juszczyński. The Chi-square test for independence of variables and Kramer's V test were used in the statistical analysis. Correlations were made using Spearman's rho coefficient.

Results: The average level of acceptance of the disease among the surveyed people was 20.73 +/- 5.36 (min. 8 and max. 40). The average level of satisfaction with life (SWLS) of surveyed people receiving long-term mechanical ventilation at home was 17.66 +/- 5.37 (min. 5 and max. 35). The obtained results allow us to conclude that there is a statistically significant positive correlation with a relatively strong relationship between the AIS level and the SWLS level.

Conclusions: It can be observed that a higher level of acceptance of the disease is associated with greater life satisfaction. The analysis showed that gender does not statistically significantly differentiate the level of satisfaction with SWLS life and the level of acceptance of the AIS disease. The level of satisfaction with life and acceptance of the disease does not differ statistically significantly due to the type of ventilation used.

**Keywords (in Polish):** domowa wentylacja mechaniczna, choroba przewlekła, akceptacja choroby, satysfakcja z życia.

**Keywords (in English):** home mechanical ventilation, chronic disease, disease acceptance, life satisfaction.

**Received:** 2023-11-02

**Revised:**

**Accepted:** 2023-11-15

**Final review:** 2023-11-06

### **Short title**

Domowa wentylacja mechaniczna

### **Corresponding author**

Katarzyna Tomaszewska

Zakład Pielęgniarstwa, Wydział Ochrony Zdrowia, Państwowa Akademia Nauk Stosowanych im. ks. B. Markiewicza w Jarosławiu, ul. Czarnieckiego 16, 37-500, JAROSŁAW, Polska;

email: tomka8@wp.pl

Phone: +48 795 580 108

### **Authors (short)**

K. Tomaszewska, B. Majchrowicz, K. Kowalczyk

## **Introduction**

The growing number of people developing chronic respiratory diseases and the current COVID-19 pandemic are increasing the need for home mechanical ventilation [1]. Some patients with permanent, irreversible and progressive damage to the respiratory system are treated with long-term ventilator therapy, on which the patient depends for the rest of his life [2,3]. The issue of home mechanical ventilation services in Poland is regulated by the Decree of the Minister of Health, which defines the list and conditions for the implementation of guaranteed services in the field of nursing and care services in the framework of long-term care, hereinafter referred to as “guaranteed services”.

According to it, home mechanical ventilation is provided in a home setting and implemented by a long-term home care team for mechanically ventilated adults, children and adolescents [4]. For many years, there has been an increasing number of patients receiving home mechanical ventilation (HMV) care. HMV is a comprehensive and multidisciplinary treatment for patients with symptoms of chronic respiratory failure due to lung disease, scoliosis or neuromuscular disorders [5,6]. Recent studies have shown that demographic changes and advances in medical technology have increased the use of HMV worldwide [7,8]. Mechanical ventilation of a patient can be divided by the type of pressures generated in the airway during inspiration, the extent of support for the patient's own breathing, and the route of pressure delivery from the ventilator to the patient's respiratory system (invasive or non-invasive) [9,10]. In invasive ventilation, air from the ventilator

enters the patient's lungs through a tracheostomy or intubation tube. Non-invasive ventilation, on the other hand, takes place without disrupting the patient's tissues, most often using various types of masks covering the nose and/or mouth [11,12,13]. Noninvasive ventilation is more commonly used and is the first choice for ventilatory support in HMV. The choice of ventilation and type of ventilation must be individualized, taking into account the underlying disease and condition [14,15]. With the increasing availability of advanced home care models, an increasing number of patients with prolonged mechanical ventilation (PMV) are choosing to remain at home, which is often the preferred alternative to long-term care in a specialized long-term care facility [16,17,18].

Successful coping with chronic disease depends on the type of disease, the patient's personal resources and the influence of the physical and social environment. Long-term adaptation to chronic illness involves several psychosocial aspects. It is also a cognitive process, and important areas include beliefs about the disease and its causes, assessment of the extent of control available, meanings attributed to various events, and self-perception [19]. Acceptance is the ability to come to terms with something, to accept the situation that has occurred. The literature shows that self-acceptance is closely related to minimizing negative feelings associated with illness and reducing illness-related stress [20]. Assessing life satisfaction and acceptance of the disease allows for the identification of real problems and objections on the part of patients and the recognition of their needs. This facilitates optimization, individualization of ongoing mechanical ventilation, as well as intensification of measures aimed at eliminating risk factors. Acceptance of the disease is one of the most difficult stages of the illness process. It is believed that the higher it is, the better the adaptation and less psychological discomfort. Reduced levels of acceptance can affect the overall level of satisfaction with life, which is the result of comparing one's own situation with self-established standards [21].

Initiation of long-term home non-invasive ventilation is a significant lifestyle change that inherently requires sustained effort on the part of the patient and often family or caregivers. Some people may struggle psychologically to accept the need for home non-invasive ventilation, for example, when it means progression or worsening of the disease [22]. However, in many cases, deficits in the informational, emotional, training, and assessment support of family caregivers of patients with prolonged mechanical ventilation may increase caregiver burden and contribute to poor health outcomes. Strategies for providing support and maintaining the quality of life of carers of ventilated people are needed [23].

**The aim** of this paper was to assess the level of acceptance of chronic disease and life satisfaction of patients receiving long-term home invasive and noninvasive mechanical ventilation.

### **Materials and Methods**

In the present study, a survey was conducted among patients receiving long-term home care for mechanically ventilated invasively and non-invasively ventilated patients in Poland. A diagnostic survey method was used and the surveyed patients were assisted by nurses providing services or caregivers in completing the survey questionnaire. The survey was conducted between February and September 2022. It was voluntary and anonymous.

The research tool was a survey questionnaire consisting of questions about sociodemographic data, type of chronic disease resulting in respiratory failure, mechanical ventilation used and duration of coverage of this type of treatment. The next part of the questionnaire contained two scales.

A standardized questionnaire was used to assess the level of acceptance of illness: Acceptance of Illness Scale (AIS), created by Felton et al. of the Center Community Research and Action, Department of Psychology, New York University) in a Polish adaptation by Juczynski [24]. The scale is used to survey ill people. It is also used to measure the degree of acceptance of illness. The AIS scale contains eight statements describing the consequences of illness. It comes down to the recognition of limitations imposed by the disease, lack of self-sufficiency, a sense of dependence on other people and lowered self-esteem. The AIS scale is used to measure the degree of acceptance of the disease - the greater the acceptance, the better the adjustment and the less psychological discomfort. Responses were ranked and given a point value ("strongly agree" - 1, "strongly disagree" - 5). Obtaining the least number of points (1) expresses poor adjustment to the disease, while strongly disagree (5) - acceptance of the disease. The total score of 8-40 is an overall measure of the degree of acceptance of the disease. A score of 19 points and below is considered a low score, a score range, from 20 to 29 is considered medium, and a score above 30 is considered high. A low score indicates a lack of acceptance and adaptation, as well as a strong sense of psychological discomfort, while a high score indicates better adaptation of the disease and acceptance of the condition, as well as a lack of negative emotions, reflecting less psychological discomfort. Cronbach's alpha internal consistency index was 0.85; satisfactory constancy of the score was 0.64. The relevance of the AIS was tested by comparing the results of the Scale with physicians' assessment of treatment effects in cancer patients; a significant correlation was obtained (0.42;  $p < 0.01$ ). The results of the AIS Scale were also correlated with the results of other tools that indirectly inform about the acceptance of the disease by different groups of patients (multiple sclerosis, diabetics and people after myocardial infarction). It can be applied to any disease. The greater the acceptance of the disease, the better the adaptation and less psychological discomfort.

Another tool was Satisfaction with Life Scale (SWLS) by E. Diener, R.A. Emmons, R.J. Larsen and S. Griffin, adapted by Z. Juczynski [24]. The scale contains five statements. The respondent assesses the extent to which each statement relates to one's life to date. The result of the measurement is an overall index of feeling satisfied with life. The scores are summed, and the overall score indicates the degree of satisfaction with one's life. The score ranges from 5 to 35 points. The higher the score, the greater the sense of satisfaction with life. The Cronbach's alpha reliability index of the SWLS, determined in a survey of 371 people, was found to be satisfactory (0.81). The scale's coefficient of constancy, determined in a two-study of a group of 30 people six weeks apart, was 0.86. Theoretical tractability was estimated by analyzing associations with variables that indirectly reflect or influence feelings of satisfaction with life. A positive correlation was found with the Rosenberg Self-Esteem Scale RSES (0.56). In addition, SWLS scores correlate negatively with the severity of perceived stress as measured by the Perceived Stress Scale (PSS) and control of emotions of anger, depression and anxiety as measured by the Courtauld Emotional Control Scale (CECS).

### **Participants**

The study group consisted of 73 patients receiving invasive and non-invasive mechanical ventilation in home environment. The study was carried out with the help of a questionnaire form posted on a social network of anesthesia nurses providing nursing and long-term care services to mechanically ventilated patients. Due to the specific type of treatment administered and the

communication problem concerning some of the patients, the authors initially set out to survey 100 patients. After three months, the request for questionnaires was renewed and after six months it was decided to complete the survey, obtaining a final number of 73 correctly filled out questionnaires. Patients and their families were informed that participation in the study was anonymous and voluntary, and that completing the survey was tantamount to giving informed consent. Inclusion criteria were age over 18, being cared for by a long-term home ventilation team, being able to establish verbal or non-verbal communication, and consent to participate in the study. The exclusion criteria were being a minor and lack of consent.

### Statistical Analysis

The basic test that was used in the statistical analyses is the Chi-square test for independence of variables. It was mainly used for questions built on nominal scales. Coefficients based on Cramer's V test were used to determine the strength of the relationship. Therefore, for each analysis with the Chi-square test, additional tests were performed, which are carried out especially with small samples. These are tests performed with the exact or Monte Carlo methods. The significance "p" of Phi coefficients and Cramer's V is determined by the result of the Chi-square test. Correlations between ordinal or quantitative variables (during the unfulfilled conditions of using parametric tests) were made using Spearman's rho coefficient, which indicates the intensity of the relationship and its direction - positive or negative. The resulting value ranges from -1 to 1, with (-1) indicating a perfect negative correlation and (1) a perfect positive correlation. The analysis was performed using the IBM SPSS 26.0 package (IBM, New York City, NY, United States) with the Exact Tests module. All correlations/differences are statistically significant when  $p \leq 0.05$ .

### Ethical Procedures

The participation of patients in the study was voluntary and anonymous. The study was conducted in accordance with the ethical standards set forth in the Declaration of Helsinki (64th WMA General Assembly, Fortaleza, Brazil, October 2013) and in accordance with Polish legal regulations. The application was favorably approved by the Bioethics Committee PANS in Przemyśl (KBPANS No. 07/2022).

### Results

The survey was conducted among patients receiving long-term home care for mechanically ventilated patients by invasive and non-invasive methods. The characteristics of the study group are shown in.

**Table 1. Characteristics of the study group.**

Variable		Frequency ( $n = 73$ )	
Gender	Female	33	45.2%
	Male	40	54.8%
Age (years)	18-35	4	5.5%
	36-45	7	9.6%
	46-55	14	19.2%
	56-65	26	35.6%
	>65	22	30.1%

Variable		Frequency ( <i>n</i> = 73)	
Ventilation type	Non-invasive	44	60.3%
	Invasive	29	39.7%
Period of coverage of home mechanical ventilation (years)	<1	16	21.9%
	1-5	36	49.3%
	6-10	16	21.9%
	11-15	5	6.8%
As a result of which disease mechanical ventilation was used	Neuromuscular diseases	20	27.4%
	Chronic Obstructive Pulmonary Disease (COPD)	29	39.7%
	In respiratory failure after SCA	5	6.8%
	In hypoventilation syndromes of obese people	11	15.1%
	In post-traumatic respiratory failure	4	5.5%
	Respiratory failure as a result of COVID-19 infection	4	5.5%

Source: Own

In the invasive ventilation group, neuromuscular disease, respiratory failure after SCA and post-traumatic respiratory failure were more frequently indicated, while Chronic Obstructive Pulmonary Disease (COPD) and respiratory failure due to COVID 19 were more prevalent in the non-invasive ventilation group. The correlation coefficient is statistically significant and has a strong strength of association.

**Table 2. Type of mechanical ventilation used.**

		Ventilation type		Total		
		Non-invasive	Invasive			
As a result of which disease mechanical ventilation was used	Neuromuscular diseases	Frequency ( <i>n</i> )	7	13	20	
		Percentage (%)	15.9	44.8	27.4	
	Chronic Obstructive Pulmonary Disease (COPD)	Frequency ( <i>n</i> )	26	3	29	
		Percentage (%)	59.1	10.3	39.7	
	In respiratory failure after SCA	Frequency ( <i>n</i> )	0	5	5	
		Percentage (%)	0.0	17.2	6.8	
	In hypoventilation syndromes of obese people	Frequency ( <i>n</i> )	6	5	11	
		Percentage (%)	13.6	17.2	15.1	
	In post-traumatic respiratory failure	Frequency ( <i>n</i> )	1	3	4	
		Percentage (%)	2.3	10.3	5.5	
	Respiratory failure as a result of COVID-19 infection	Frequency ( <i>n</i> )	4	0	4	
		Percentage (%)	9.1	0.0	5.5	
	<b>Total</b>		Frequency ( <i>n</i> )	44	29	73
	<b>Percentage (%)</b>		100.0	100.0	100.0	
<b>Cramer's V</b>	0.622	28.243	5	0.000	0.000	
<b>coefficient</b>	<b>value</b>	<b>Chi-square</b>	<b>df</b>	<b>p</b>	<b>Monte Carlo p</b>	

Source: Own

The longer the period of coverage of home ventilation, the more often the result of its application relates to neuromuscular diseases. On the other hand, the shorter the period of coverage of home ventilation, the more often the ventilation relates to pulmonary diseases and COVID 19. The relationship between the variables is statistically significant and has a clear strength of association.

**Table 3. Ventilation coverage period vs. type of disease.**

			Period of coverage of home mechanical ventilation (years)				Total	
			<1	1-5	6-10	11-15		
As a result of which disease mechanical ventilation was used	Neuromuscular diseases	Frequency (n)	1	6	9	4	20	
		Percentage (%)	6.3	16.7	56.3	80.0	27.4	
	Chronic Obstructive Pulmonary Disease (COPD)	Frequency (n)	10	17	2	0	29	
		Percentage (%)	62.5	47.2	12.5	0.0	39.7	
	In respiratory failure after SCA	Frequency (n)	0	4	1	0	5	
		Percentage (%)	0.0	11.1	6.3	0.0	6.8	
	In hypoventilation syndromes of obese people	Frequency (n)	1	7	3	0	11	
		Percentage (%)	6.3	19.4	18.8	0.0	15.1	
	In post-traumatic respiratory failure	Frequency (n)	1	1	1	1	4	
		Percentage (%)	6.3	2.8	6.3	20.0	5.5	
	Respiratory failure as a result of COVID-19 infection	Frequency (n)	3	1	0	0	4	
		Percentage (%)	18.8	2.8	0.0	0.0	5.5	
	Total		Frequency (n)	16	36	16	5	73
			Percentage (%)	100.0	100.0	100.0	100.0	100.0
<b>Cramer's V</b>	0.402	35.399	15	0.002	0.003			
<b>coefficient</b>	<b>value</b>	<b>Chi-square</b>	<b>df</b>	<b>p</b>	<b>Monte Carlo p</b>			

Source: Own

The average level of disease acceptance among the respondents was 20.73 +/- 5.36 (the min. value was 8 and the max. value was 40). Patients showed the highest mean on the eight items of the AIS questionnaire for the fifth criterion "I think people staying with me are often embarrassed by my illness" (3.66 +/- 1.16), and the lowest for the criterion "Health problems make me more dependent on others than I want to be" (1.74 +/- 0.50).

The mean level of satisfaction with life (SWLS) of respondents on long-term home mechanical ventilation was 17.66 +/- 5.37 (min. value was 5 and max. value was 35). Patients showed the highest mean on the five items of the SWLS questionnaire with regard to the fourth criterion "In life I have achieved the most important things I wanted" (3.97 +/- 1.78), and the lowest with regard to the criterion "In many respects my life is close to ideal" (2.95 +/- 1.28).

There is a positive statistically significant correlation between the level of AIS and the level of SWLS with a fairly pronounced strength of association. It is observed that a higher level of acceptance of the disease is associated with greater satisfaction with life (Table 4).

**Table 4. Illness acceptance level vs. life satisfaction of surveyed patients.**

			Life satisfaction SWLS (5-35)	Illness acceptance AIS (8-40)
Spearman's rho	Life satisfaction SWLS (5-35)	Correlation coefficient	1.000	0.348**
		Significance (two-tailed)		0.003
		Frequency (n)	73	73
	Illness acceptance AIS (8-40)	Correlation coefficient	0.348**	1.000
		Significance (two-tailed)	0.003	
		Frequency (n)	73	73

\*\* Correlation significant at the 0.01 level (two-tailed).

Source: Own



There are statistically significant correlations between age and levels of life satisfaction (SWLS) and acceptance of illness (AIS). Older respondents have higher life satisfaction and higher levels of disease acceptance, but it is between age and SWLS levels that there is a more pronounced strength of association. There were no statistically significant correlations between duration of home mechanical ventilation coverage and SWLS or AIS (Table 5).

**Table 5. Impact of respondents' age on SWLS and AIS.**

			Age	Period of coverage of home mechanical ventilation
Spearman's rho	Life satisfaction SWLS (5-35)	Correlation coefficient	0.535**	0.037
		Significance (two-tailed)	0.000	0.756
		Frequency ( <i>n</i> )	73	73
	Illness acceptance AIS (8-40)	Correlation coefficient	0.248*	0.096
		Significance (two-tailed)	0.035	0.421
		Frequency ( <i>n</i> )	73	73

\*\* Correlation significant at the 0.01 level (two-tailed).

Source: Own

Analysis by Mann Whitney U test showed that gender does not statistically significantly differentiate SWLS life satisfaction and AIS disease acceptance levels. Life satisfaction and disease acceptance levels are not statistically significantly differentiated by type of ventilation as evidenced by the “p” values of the Mann Whitney U test. Analysis by the Kruskal Wallis test showed that the type of disease for which mechanical ventilation was used did not statistically significantly differentiate SWLS life satisfaction and AIS disease acceptance levels.

#### 4. Discussion

The aim of this paper was to assess the level of acceptance of chronic disease and life satisfaction of patients receiving long-term home invasive and non-invasive mechanical ventilation. Analyzing the level of acceptance of the disease showed that it was at an average level. Patients showed the highest average on the eight items of the AIS questionnaire for the fifth criterion “I think people staying with me are often embarrassed by my illness,” and the lowest for the criterion “Health problems make me more dependent on others than I want to be.” The level of satisfaction with life (SWLS) was also at an average level. Despite the increasing prevalence of the use of home invasive and non-invasive ventilation worldwide, there are very few publications available in this area.

Studies by other authors have shown that the life satisfaction of mechanically ventilated patients was severely impaired, despite the provision of patient care and necessary equipment. The most important areas of dissatisfaction were mobility, communication, social contact and dependence on care. Importantly, 32% of patients, in retrospect, would rather die than receive invasive HMV [25,26]. Another study found that patients undergoing invasive HMV reported varying levels of life satisfaction. Older patients with COPD and more comorbidities are likely to have a poorer quality of life than patients with neu-romuscular disease [27], a finding supported by our own and other authors' studies [7,26,27]. According to some patients, treatment with home mechanical ventilation resulted in better well-being and made it easier to live in the community and at home

compared to institutional treatment. However, patients also reported difficulty coming to terms with constant supervision by others, which undermined their autonomy and self-determination, as well as lingering fears and uncertainty about their future lives [28]. One hundred correctly completed questionnaires were analyzed in South Korea. The patient satisfaction rate was high. Satisfaction with health care among patients treated with HMV in most of the components studied was also high [29]. Rarely described experiences of patients undergoing HMV show that this treatment causes suffering and distress in patients' lives, as they have a constant sense of dependency [28,29]. Studies by other authors have shown that the quality of life of patients ventilated non-invasively is significantly higher than that of those on invasive ventilation [31,32], which was not confirmed by our own study.

Non-randomized studies in China have demonstrated the benefits of NIV in the post-hospital population. There was a small but significant reduction in hospital admissions [33]. In their studies, Fox et al. found that in the case of elderly patients or patients with heart failure, home non-invasive ventilation may not be beneficial and its use may be potentially harmful [34].

The possibility of using mechanical ventilation in the home environment is an opportunity for all people whose lives depend on a ventilator. These patients have a higher survival rate, a lower risk of infections and other complications than in a hospital environment. They also have the opportunity to improve their quality of life despite their chronic disease. This is a major caregiving challenge for loved ones, who, from the moment a sick family member is discharged from the hospital, must reorganize their existing lives to provide adequate help and support. This often requires a great deal of knowledge, patience and dedication [35].

#### Limitations of the Study

The main limitation of our study is the sample size, which may be considered small; however, previously published studies on patients with HMV have used similar sample sizes [8,10,30]. Another limitation of the study may be the need to obtain assistance in completing the questionnaire from the immediate family due to the severity of the disease especially in invasively ventilated patients. Responses may not have always been consistent with the actual condition. Therefore, further studies on a larger group of respondents are needed to verify the current findings.

### Conclusions

A survey of patients receiving long-term home care for mechanically ventilated patients using non-invasive and invasive methods provides insight into the impact of the treatment method used on the patients' level of disease acceptance and life satisfaction. The results of our study proved that the level of acceptance of the disease and satisfaction with life among the surveyed patients was at an average level. Statistical analysis showed that higher levels of disease acceptance were associated with higher life satisfaction. Further research in this area is needed due to the increasing use of this treatment method and demographic changes.

### References

1. Putowski Z, Czok M, Liberski P, Krzych ŁJ. Podstawy wentylacji mechanicznej dla nianestezjologów. Część 1: Aspekty teoretyczne, *Pneum Pol* 2020;1(3):177-185.
2. Borys M, Kubicz M. Raport Wentylacja Mechaniczna w Polsce Październik 2021; Raport przygotowany przez: JEDNYM TCHEM! Stowarzyszenie pacjentów na rzecz wentylacji domowej.

3. Kastrup M, Tittmann B, Sawatzki T, Gersch M, Vogt C, Rosenthal M, Rosseau S, Spies C. Transition from in-hospital ventilation to home ventilation: process description and quality indicators. *Ger Med Sci*. 2017 Dec 19;15:Doc18. doi: 10.3205/000259. PMID: 29308061; PMCID: PMC5738500.
4. Rozporządzeniu Ministra Zdrowia w sprawie świadczeń gwarantowanych z zakresu świadczeń pielęgnacyjnych i opiekuńczych w ramach opieki długoterminowej z dnia 22 listopada 2013 r. (tj. Dz.U. z 2015 r. poz. 1658 z późn. zmianami).
5. Kwiatosz-Muc M, Kopacz B. Home Mechanical Ventilation: A Patient's Perspective Survey Study. *Int J Environ Res Public Health*. 2021 Apr 12;18(8):4048. doi: 10.3390/ijerph18084048. PMID: 33921363; PMCID: PMC8069923.
6. Povitz M, Rose L, Shariff S.Z, Leonard S, Welk B, Jenkyn K.B, Leasa D.J, Gershon A.S. Home Mechanical Ventilation: A 12-Year Population-Based Retrospective Cohort Study. *Respir Care*. 2017;63:380–387. doi: 10.4187/respcare.05689.
7. Klingshirn H, Gerken L, Hofmann K, Heuschmann PU, Haas K, Schutzmeier M, Brandstetter L, Wurmb T, Kippnich M, Reuschenbach B. Comparing the quality of care for long-term ventilated individuals at home versus in shared living communities: a convergent parallel mixed-methods study. *BMC Nurs*. 2022 Aug 11;21(1):224. doi: 10.1186/s12912-022-00986-z. PMID: 35953810; PMCID: PMC9368695.
8. Valko L, Baglyas S, Gyarmathy VA, Gal J, Lorx A. Home mechanical ventilation: quality of life patterns after six months of treatment. *BMC Pulm Med*. 2020 Aug 17;20(1):221. doi: 10.1186/s12890-020-01262-z. PMID: 32807149; PMCID: PMC7433042.
9. MacIntyre EJ, Asadi L, Mckim DA, Bagshaw SM. Clinical Outcomes Associated with Home Mechanical Ventilation: A Systematic Review. *Can Respir J*. 2016;6547180. doi: 10.1155/2016/6547180.
10. Jacobs JM, Marcus EL, Stessman J. Prolonged Mechanical Ventilation: Symptomatology, Well-Being, and Attitudes to Life. *J Am Med Dir Assoc*. 2021 Jun;22(6):1242-1247. doi: 10.1016/j.jamda.2020.07.037. Epub 2020 Sep 6. PMID: 32907755; PMCID: PMC7474963.
11. Mirczak A. The role of a nurse in home care of mechanically ventilated patients. *Piel Zdr Publ*. 2018;8(1):61–66
12. Windisch W, Geiseler J, Simon K, Walterspacher S, Dreher M. German National Guideline for Treating Chronic Respiratory Failure with Invasive and Non-Invasive Ventilation: Revised Edition 2017 - Part 1. *Respiration*. 2018;96:66–97. doi: 10.1159/000488001.
13. Mattson J, Lunnelie J, Löfholm T, Andersson ES, Aune RE, Björling G. Quality Of Life in Children With Home Mechanical Ventilation - A Scoping Review. *SAGE Open Nurs*. 2022 Apr 26;8:23779608221094522. doi: 10.1177/23779608221094522. PMID: 35493542; PMCID: PMC9047042.
14. Ambrosino N, Vitacca M. The patient needing prolonged mechanical ventilation: a narrative review. *Multidiscip Respir Med*. 2018 Feb 26;13:6. doi: 10.1186/s40248-018-0118-7. PMID: 29507719; PMCID: PMC5831532.
15. Rose L, McGinlay M, Amin R, Burns KE, Connolly B, Hart N, Jouvet P, Katz S, Leasa D, Mawdsley C, McAuley DF, Schultz MJ, Blackwood B. Variation in Definition of Prolonged Mechanical Ventilation. *Respir Care*. 2017 Oct;62(10):1324-1332. doi: 10.4187/respcare.05485. Epub 2017 Jun 13. PMID: 28611229.

16. Stein D, Sviri S, Beil M, Stav I, Marcus EL. Prognosis of Chronically Ventilated Patients in a Long-Term Ventilation Facility: Association with Age, Consciousness and Cognitive State. *J Intensive Care Med.* 2022 Dec;37(12):1587-1597. doi: 10.1177/08850666221088800. Epub 2022 Mar 29. PMID: 35350916; PMCID: PMC9647314.
17. Masefield S, Vitacca M, Dreher M. Attitudes and preferences of home mechanical ventilation users from four European countries: An ERS/ELF survey. *ERJ Open Res.* 2017;3 00015-2017.
18. Frengley JD, Sansone GR, Kaner RJ. Chronic Comorbid Illnesses Predict the Clinical Course of 866 Patients Requiring Prolonged Mechanical Ventilation in a Long-Term, Acute-Care Hospital. *J Intensive Care Med.* 2020 Aug;35(8):745-754. doi: 10.1177/0885066618783175. Epub 2018 Oct 1. PMID: 30270713.
19. Wojciechowska W. Sense of coherence and psychosocial aspects of the process of aging as determinants of acceptance and coping with a chronic disease in patients under long-term care. *PIEŁĘGNIARSTWO POLSKIE NR 1 (83) 2022;11-18*, DOI: <https://doi.org/10.20883/pielpol.2022.1>
20. Wysokiński M, Fidecki W, Gawlik IA, Wrońska I, Kulina D, Kuszplak K, Przylepa K. Acceptance of the disease and functional capacity of geriatric patients hospitalized in surgical wards. *GERIATRIA* 2019;13:2011-2018
21. Hamerlińska A, Kamyk-Wawryszuk A. Akceptacja choroby i satysfakcja z życia dorosłych osób z chorobami rzadkimi. Acceptance of the disease and satisfaction with life of adults with rare diseases. *Niepełnosprawność - Dyskursy Pedagogiki Specjalnej*, 2022;(44):42–53.
22. <https://czasopisma.bg.ug.edu.pl/index.php/niepelnospawnosc/article/view/6874> (dostęp: 6.12.2022).
23. Spurr L. The treatment burden of long-term home noninvasive ventilation. *Breathe (Sheff).* 2021 Mar;17(1):200291. doi: 10.1183/20734735.0291-2020. PMID: 34295400; PMCID: PMC8291946.
24. Dale CM, Carbone S, Istanbulian L, Fraser I, Cameron JI, Herridge MS, Rose L. Support needs and health-related quality of life of family caregivers of patients requiring prolonged mechanical ventilation and admission to a specialised weaning centre: A qualitative longitudinal interview study. *Intensive Crit Care Nurs.* 2020 Jun;58:102808. doi: 10.1016/j.iccn.2020.102808. Epub 2020 Feb 27. PMID: 32115334.
25. Juczyński Z. Narzędzia pomiaru w promocji zdrowia. Pracownia testów Psychologicznych Polskiego Towarzystwa Psychologicznego, Warszawa 2001
26. Huttmann SE, Magnet FS, Karagiannidis C, Storre JH, Windisch W. Quality of life and life satisfaction are severely impaired in patients with long-term invasive ventilation following ICU treatment and unsuccessful weaning. *Ann Intensive Care.* 2018 Mar 16;8(1):38. doi: 10.1186/s13613-018-0384-8. PMID: 29549456; PMCID: PMC5856853.
27. Huttmann SE, Windisch W, Storre JH. Invasive home mechanical ventilation: living conditions and health-related quality of life. *Respiration.* 2015;89(4):312-21. doi: 10.1159/000375169. Epub 2015 Mar 19. PMID: 25791249.
28. Windisch W, Freidel K, Matthys H, Petermann F. Gesundheitsbezogene Lebensqualität bei Patienten mit Heimbeatmung [Health-related quality of life (HRQL) in patients receiving home mechanical ventilation]. *Pneumologie.* 2002 Oct;56(10):610-20. German. doi: 10.1055/s-2002-34609. PMID: 12375223.

29. Ørtenblad L, Carstensen K, Væggemose U, Løvschall C, Sprehn M, Küchen S, Nørregaard O, Jensen LG. Users' Experiences With Home Mechanical Ventilation: A Review of Qualitative Studies. *Respir Care*. 2019 Sep;64(9):1157-1168. doi: 10.4187/respcare.06855. Epub 2019 Jul 23. PMID: 31337740.
30. Song K, Kim SW, Sim YS, Park TS, Lee YS, Ha JH, Park JY, Jung KS, Park S. Cross-sectional survey on home mechanical ventilator use: major deficiencies in a home care system in South Korea. *J Thorac Dis*. 2021 Jul;13(7):4271-4280. doi: 10.21037/jtd-21-269. PMID: 34422355; PMCID: PMC8339732.
31. Ribeiro C, Jácome C, Oliveira P, Conde S, Windisch W, Nunes R. Patients experience regarding home mechanical ventilation in an outpatient setting. *Chron Respir Dis*. 2022 Jan-Dec;19:14799731221137082. doi: 10.1177/14799731221137082. PMID: 36417310; PMCID: PMC9706049.
32. Bourke SC, Tomlinson M, Williams TL, Bullock RE, Shaw PJ, Gibson GJ. Effects of non-invasive ventilation on survival and quality of life in patients with amyotrophic lateral sclerosis: a randomised controlled trial. *Lancet Neurol*. 2006;5(2):140-7.
33. Hannan LM, Sahi H, Road JD, McDonald CF, Berlowitz DJ, Howard ME. Care Practices and Health-related Quality of Life for Individuals Receiving Assisted Ventilation. A Cross-National Study. *Ann Am Thorac Soc*. 2016 Jun;13(6):894-903. doi: 10.1513/AnnalsATS.201509-590OC. PMID: 27295155.
34. Dretzke J, Wang J, Yao M, Guan N, Ling M, Zhang E, Mukherjee D, Hall J, Jowett S, Mukherjee R, Moore DJ, Turner AM. Home Non-Invasive Ventilation in COPD: A Global Systematic Review. *Chronic Obstr Pulm Dis*. 2022 Apr 29;9(2):237-251. doi: 10.15326/jcopdf.2021.0242. PMID: 35259290; PMCID: PMC9166324.
35. Fox BD, Bondarenco M, Shpirer I, Natif N, Perl S. Transitioning from hospital to home with non-invasive ventilation: who benefits? Results of a cohort study. *BMJ Open Respir Res*. 2022 Nov;9(1):e001267. doi: 10.1136/bmjresp-2022-001267. PMID: 36357150; PMCID: PMC9660620.
36. Oga T, Taniguchi H, Kita H, Tsuboi T, Tomii K, Ando M, Kojima E, Tomioka H, Taguchi Y, Kaji Y, Maekura R, Hiraga T, Sakai N, Kimura T, Mishima M, Windisch W, Chin K. Comparison of Different Disease-Specific Health-Related Quality of Life Measurements in Patients with Long-Term Noninvasive Ventilation. *Can Respir J*. 2017;2017:8295079. doi: 10.1155/2017/8295079. Epub 2017 May 15. PMID: 28588383; PMCID: PMC5447275.