



The effect of applying the nursing process based on the Theory of Goal Attainment on activities of daily living and quality of life in persons with multiple sclerosis during COVID-19 pandemic: a clinical trial

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Abstract

Background The chronic nature of multiple sclerosis (MS) affects patient's activities of daily living (ADL) and quality of life (QOL). Nursing interventions based on patients' active participation in goal-setting can be beneficial in improving ADL and QOL.

Aims This study aimed to determine the effect of applying the nursing process based on King's Theory of Goal Attainment (TGA) on ADL and QOL of persons with multiple sclerosis (PwMS) during the COVID-19 pandemic.

Methods In this clinical trial, 70 patients referred to the MS Society of Hamadan, Iran, were recruited using the convenience sampling method and randomly assigned into 2 groups. A 4-stage TGA was developed and implemented for the intervention group for a month. Data were gathered by ADL, instrumental ADL (IADL), and QOL questionnaires, and Goal of Attainment Scale (GAS) before and 2 months after the intervention.

Results Intervention group achieved a higher number of prioritized goals ($p < 0.001$) and reported higher QOL ($P < 0.001$) and instrumental ADL (IADL; $P = 0.002$) than the control group.

Conclusions Given the results, TGA could effectively promote mutual goal attainment, QOL, and IADL for PwMS during the COVID-19 pandemic.

Trial registration ClinicalTrials.gov Identifier: IRCT20201210049668N1.

Keywords Clinical trial · COVID-19 · Goals · Multiple sclerosis · Nursing process

Introduction

COVID-19 is a highly infectious respiratory disease caused by SARS-CoV-2 [1], which can be considered an exasperating factor for patients with chronic diseases, reducing their

quality of life (QOL) [2]. One of the most common chronic diseases is multiple sclerosis (MS), an autoimmune disease affecting the central nervous system (CNS) [3]. MS has affected approximately 2.8 million people worldwide, and its prevalence has globally been increasing in recent years

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[4, 5]. In a meta-analysis (2019), the prevalence of MS in Iran was reported to be 5.3 to 89 per 100,000, and its incidence was 7 to 148.1 per 100,000 [6]. It is a disorder that causes loss of function and impacts an individual's ability to perform daily activities [7]. Activities of daily living (ADL) refer to the activities that individuals perform to maintain themselves and gain independence in their daily lives [8]. Studies have shown that factors such as fatigue, medication intake [9], role limitations associated with physical problems [10], and restrictions on one or several parts of the body lead to decreased ADL and consequently reduced QOL in PwMS [11].

QOL is an umbrella concept that encompasses various areas of one's life, including physical, psychological, communicative, and spiritual aspects [12]. Over recent years, the QOL of PwMS has gained significance in research and clinical practice [13]. Since PwMS have a weak immune system, and patients who consume immunosuppressive drugs are at higher risk of infection and associated mortality than the general population, therefore, they are more vulnerable to COVID-19 [14–16]. On the other hand, these patients have become more isolated due to COVID-19 conditions, significantly impacting their physical and mental conditions compared to the general population [17, 18]. Consequently, due to the chronic and complex nature of the disease and poor ADL and QOL, a comprehensive nursing care program is required for these patients [19–21]. According to the literature, nursing interventions based on nursing theories and comprehensive approaches [22] could provide a framework and goals for the nursing process, leading to more effective and thorough clinical care [23]. This results in the development of professional nursing [24], improvement of patient care standards, reduction of health care costs [25], and improvement of patients' QOL [26].

Implementing a comprehensive nursing care program and applying nursing theories in clinical settings is achievable when effective human interactions exist between nurses and patients [27]. One of the most significant nursing theories regarding the nurse-patient relationship is King's Theory of Goal Attainment (TGA), which is based on mutual perception between nurses and patients [28]. TGA specifies that the nurse-patient relationship involves transferring information, setting shared goals, and taking appropriate actions that lead to transactions and attaining goals (outcomes) [29]. The nursing process is a mechanism for attaining the goal. King considers the nursing process as an interaction between nurses and patients. In this process, the nurse and the patient perceive each other and, through communication, determine the goals and reach a consensus to achieve them, and their actions indicate the goal attainment [30]. TGA accentuates patient participation in decisions such as setting and agreeing on self-care goals, prioritizing goals, agreeing on

methods to achieve goals, and understanding the patient to determine the extent to which goals are attained [31].

Various studies have shown the effect of TGA on improving nursing care outcomes in chronic diseases. It includes improving care and adherence to treatment in patients with diabetes [32], improving the perception and self-care behavior in patients with diabetes [33], goal attainment in cancer patients undergoing chemotherapy [34], applying the nursing process in a case study of patients with heart failure [35], improving the life quality in patients with congestive heart failure [36], modification of lifestyle in patients with acute myocardial infarction [37], and improving the pharmacist-patient relationship [38]. However, based on available resources, there was no study on TGA in PwMS. Therefore, regarding TGA, the present clinical trial was carried out to determine the effect of the nursing process on the instrumental ADL (IADL) and QOL of PwMS during the COVID-19 pandemic.

Study design

This study was a pre-post clinical trial conducted between January and August 2021. A total of 70 PwMS (who met inclusion criteria) were enrolled using a convenience sampling method and randomly assigned into intervention and control groups using the quadruple block method. These PwMS were referred to the MS Association of the Neshat Rehabilitation Center affiliated with Hamadan University of Medical Sciences, Hamadan, Iran. The sample size was considered 35 participants based on the pilot study on 16 individuals, the standard deviation of $s_1 = s_2 = 9.1$, $d = 7$ in the two groups, 95% confidence interval, and test power of 0.9 according to the following formula:

$$n = \frac{(s_1^2 + s_2^2)(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2}{d^2} = 35$$

Inclusion criteria were age 20–50 years, at least primary school education, diagnosis and confirmation of the disease by a neurologist for at least 6 months, relapsing–remitting type of the disease, non-acute phase of the disease, being mentally balanced and alert to time, place, and person based on medical records and patient statements. Having disability between 0 and 5.5 according to the Expanded Disability Status Scale (EDSS), a measure of disability ranging from 0 (normal) to 10 (death due to MS) in eight functional systems of CNS [39].

Data collection tools

1. The demographic and disease-related information questionnaire, including 9 questions (age, sex, marital status, level of education, occupation, income status, dura-

- tion of illness, relapse frequency during the past year, patient's EDSS).
2. The 12-item Short Form Survey (SF-12) is a shortened form of SF-36 designed by Ware et al. [40]. It includes 12 questions with 8 subscales. SF-12 examines perceptions of general health, physical functioning, role physical, role emotional, body pain, social functioning, vitality, and mental health. The overall score is between 12 and 48, indicating poor (12–24), fair (36–25), and good (37–38) conditions. A higher score indicates a better QOL [40]. The permission of using questionnaire has been accomplished for this study. The validity and reliability of this questionnaire were measured in Iran [41], and in the present study, its Cronbach's alpha coefficient was estimated to be 0.87.
 3. The ADL questionnaire was first introduced by Katz et al. (1963) [42]. In this study, the Persian version of the questionnaire was used; its validity, reliability, and localization were confirmed by Taheri Tanjani et al. The permission of using questionnaire in Persian has been got for this study. This scale assesses ADL, which includes 8 questions: personal hygiene, eating, dressing, transfers, walking, bathing/showering, continence, and toileting. Each question has 3 options: dependent (0 points), needs assistance (1 point), and independent (2 points). The overall score is between 0 and 16, indicating dependent (0–7 points), needs assistance (8–11 points), and independent (12–16 points) [43]. In the present study, Cronbach's alpha of this questionnaire was calculated as 0.71.
 4. The Lawton IADL standard scale was first developed by Lawton and Brody (1969). The components of this questionnaire include using the telephone, handling medication, preparing food, housekeeping, shopping, using transportation, and handling income and expenses. Each question has 3 options: dependent (0 points), needs assistance (1 point), and independent (2 points). The overall score is between 0 and 14, indicating dependent (0–6), needs assistance (7–10), and independent (11–14) [44]. The validity and reliability of this scale were confirmed by Taheri Tanjani and Azadbakht [43]. The permission of using questionnaire in Persian has been got for this study, and its Cronbach's alpha was 0.75 in the present study.
 5. Goal Attainment Scale (GAS) was originally described by Kirusek and Sherman in the context of mental health intervention in the 1960s, a scoring method of the level to which patient's individual goals are accomplished during the intervention. So, each patient has own outcome level which scored in a standardized way as to allow statistical analysis GAS is an internationally documented measure broadly used in educational, counseling, and clinical settings to identify and evaluate individuals' goals. Each goal is divided into 5 sections ranging from "much less than expected" (–2) to "much more than expected"

(+2). This scale examines the extent to which predefined goals are attained in both groups at the end of the interactive period [45, 46]. The GAS content validity for each patient's goal was confirmed by the research team.

Furthermore, the scientific validity of the study tools were confirmed by an expert panel of at least 10 nursing professors of the School of Nursing and Midwifery, Hamadan University of Medical Sciences.

The nursing process based on TGA consisted of 4 stages:

1. Assessment stage

King's evaluation form was developed according to the literature [29, 31, 47]. To complete the questionnaires, face-to-face interviews were conducted to establish perception, communication, and interaction with the patients and collect their health history, physical examinations, and profile. Finally, a list of problems was provided separately for each participant in the intervention and control groups, and the problem was scored based on GAS criteria.

2. Planning

First, the identified goals were shared with the intervention group based on the nurse-patient interaction. In other words, the goals and their significance were discussed through a discussion, and the following questions were asked: "Which one is more important to you?" "Attaining which goal has the greatest impact on your daily living?" Participants were also requested to determine the chronological order of attaining the goals. After patients' approval, goals were prioritized. Thus, a 2-way interactive and educational plan was created based on each patient's goals, and a set of goals was documented, along with prioritization and measures, to attain them. Regarding predefined goals, educational, supportive, and functional content was designed to facilitate the goal attainment process.

3. Implementation

The nursing procedures itemized in the previous stage were implemented through the nurse-patient interaction. Follow-up sessions were held for 4 consecutive weeks by phone (20–45 min) and on social networks based on the patient's needs and desires. Participants actively participated in this stage, and at the end, educational content was provided to them.

4. Evaluation

The evaluation was performed based on the goals set. The rate of goal attainment was scored using GAS criteria.

Statistical analysis

The data were analyzed using SPSS software version 16 (SPSS Inc., Chicago, IL, USA). Mean and standard deviation were used to describe quantitative variables, and frequency and percentage were utilized to describe qualitative variables. The normality of quantitative variables was determined by the Kolmogorov–Smirnov test. In addition, independent *t*-test was used to compare the mean between the two independent groups when the data were normally distributed; otherwise, Mann–Whitney *U* nonparametric test was used. To compare the pre-post mean in each group, if data were normally distributed, paired *t*-test and otherwise Wilcoxon test was used. If the two variables were significant shortly before the intervention, analysis of covariance was used, and to compare the qualitative variables in both groups, Chi-square and Fisher's exact test were used. In the study statistical significance level was less than 0.05.

Ethical considerations

The present study was extracted from a research project approved by Hamadan University of Medical Sciences and Health Services (number: 9910096961). This study was approved by the Ethics Committee

of Hamadan University of Medical Sciences (code: IR.UMSHA.REC.1399.773). This study was also registered on the Iranian Registry of Clinical Trials website (ID: IRCT20201210049668N1). Informed consent was obtained from all participants. All participants were free to withdraw from the study at any stage and were ensured about the confidentiality of their data. It should be noted that the educational content was provided to the control group after the study, and they were requested to contact the researcher for any questions and guidance.

Findings

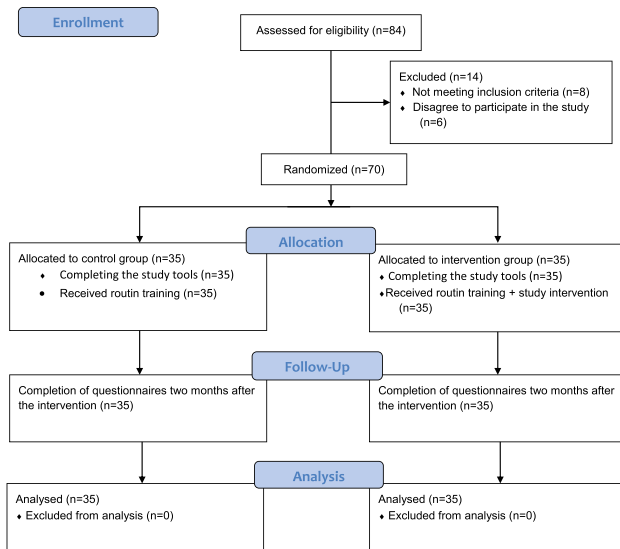
The mean age of PwMS in the intervention and control groups was 37.14 ± 7.46 and 37.34 ± 5.93 years, respectively. Of all participants, 82.9% in the intervention group and 85.7% in the control group were female. Patients in both groups were homogeneous regarding all demographic and disease-related characteristics except for the EDSS score. The mean and SD of EDSS of patients in the intervention and control groups was 3.63 ± 0.8 and 3.17 ± 0.51 , respectively. The results of the Mann–Whitney test showed a statistically significant difference between the 2 groups in terms of EDSS scores. The mean EDSS score in the control group was better than the intervention group ($P=0.009$; Table 1).

Table 1 The Frequency distribution of demographic characteristics of the patients

Variable		Group		<i>p</i> -value
		Control <i>N</i> (%)	Intervention <i>N</i> (%)	
Female	Gender	30 (85.7)	29 (82.9)	0.743a
Male		5 (14.3)	6 (17.1)	
Single	Married status	11 (31.4)	12 (34.3)	1.000 b
Married		21 (60)	20 (57.1)	
Separated or divorced		3 (8.6)	3 (8.6)	
High school or less	Education levels	9 (25.7)	8 (22.9)	0.722a
Diploma		8 (22.9)	11 (31.4)	
Post-diploma and higher		18 (51.4)	16 (45.7)	
Employee	Job	11 (31.4)	11 (31.4)	1.000 a
Unemployed		24 (68.6)	24 (68.6)	
It is not enough	Income status	9 (25.7)	7 (20)	0.826 a
To some extent it is not enough		12 (34.3)	12 (34.3)	
It suffices		14 (40)	16 (45.7)	

^aPearson chi-square

^bFisher's exact test



The mean score of QOL before the intervention was higher in the control group than in the intervention group. The independent *t* test showed a statistically significant difference between the 2 groups ($P = 0.020$). Moreover, an analysis of covariance (ANCOVA) between the intervention and control groups showed a statistically significant difference in terms of the mean score of QOL after the intervention ($P < 0.001$). In other words, implementing the goal attainment nursing process increased patients' QOL. The paired *t*-test, which was used to compare each group before and after the intervention showed a statistically significant difference in terms of the QOL score in the intervention group before and after the intervention, and it increased ($P < 0.001$). However, in the control group, this difference was significant and decreased ($P = 0.016$; Table 2).

The mean score of common ADL before the intervention was not significantly different in the 2 groups ($P = 0.210$). Moreover, after the intervention, an analysis of variance (ANCOVA) did not show a statistically significant difference between the 2 groups ($P = 0.670$). Besides, there was no change in the mean score of ADL

Table 2 Comparison of mean and SD of the QOL score of patients in the 2 groups

<i>p</i> -value	Control group Mean (SD)	Intervention group Mean (SD)	Variable
			QOL
0.02 ^a	35.26 (7.31)	31 (7.68)	Prior to intervention
<0.001 ^b	33.49 (7.13)	39.71 (6.66)	After the intervention
	0.016	<0.001 ^c	<i>p</i> -value

^a*T*-test
^bANCOVA
^cPaired *t*-test

Table 3 Comparison of mean and SD of ADL of patients in the 2 groups

<i>p</i> -value	Control group Mean (SD)	Intervention group Mean (SD)	Variable
			ADL
0.210 ^a	15.94 (0.24)	15.8 (0.53)	Prior to intervention
0.385 ^b	15.94 (0.23)	15.88 (0.4)	After the intervention
	1.000 ^c	0.800 ^c	<i>p</i> -value

^a*t*-test
^bANCOVA
^cPaired *t*-test

in the intervention and control groups before and after the intervention (Table 3).

The mean score of IADL before the intervention was not statistically significant between the 2 groups ($P = 0.180$). After the intervention, ANCOVA showed a statistically significant difference between the 2 groups ($P = 0.002$). The paired *t*-test, used to compare each group before and after the intervention, showed a statistically significant difference in the intervention group before and after the intervention ($P < 0.001$; Table 4).

The GAS score before the intervention showed no statistically significant difference between the 2 groups. After the intervention showed a statistically significant difference between the 2 groups ($P = 0.001$). In addition, compare each group before and after the intervention, showed an increased statistically significant difference in the intervention group before and after the intervention ($P < 0.001$; Table 5).

Discussion

This study aimed to determine the effect of applying the nursing process based on King's Theory of Goal Attainment (NP-TGA) on activities of daily living (ADL), IADL, GA, and the quality of life (QOL) of individuals with multiple sclerosis (MS) during the COVID-19 pandemic.

Table 4 Comparison of mean and SD of IADL of patients in the 2 groups

<i>p</i> -value	Control group Mean (SD)	Intervention group Mean (SD)	Variable
			IADL
0.180 ^a	12.65 (2.01)	12.2 (1.92)	Prior to intervention
0.002 ^b	12.8 (1.74)	13.37 (1.05)	After the intervention
	0.41 ^c	<0.001 ^c	<i>p</i> -value

^a*t*-test
^bANCOVA
^cPaired *t*-test

Table 5 Assessment of GAS in the 2 groups

Goals	Intervention group		Control group	
	Prior to intervention	After the intervention	Prior to intervention	After the intervention
The first patients' preferred goal				
-2	16 (44.4)	0 (0)	20 (55.6)	20 (100)
-1	18 (54.5)	0 (0)	15 (45.4)	14 (100)
0	1 (100)	3 (75)	0 (0)	1 (25)
+1	0 (0)	16 (100)	0 (0)	0 (0)
+2	0 (0)	16 (100)	0 (0)	0 (0)
<i>p</i> -value	<i>P</i> < 0.001		<i>p</i> > 0.05	
The second patients' preferred goal				
-2	11 (45.8)	0 (0)	13 (54.2)	11 (100)
-1	24 (52.2)	0 (0)	22 (47.8)	24 (100)
0	0 (0)	11 (100)	0 (0)	0 (0)
+1	0 (0)	24 (100)	0 (0)	0 (0)
+2	0 (0)	0 (0)	0 (0)	0 (0)
<i>p</i> -value	<i>P</i> < 0.001		<i>p</i> > 0.05	
The third patients' preferred goal				
-2	8 (42.1)	1 (8.3)	11 (57.9)	11 (91.7)
-1	27 (52.9)	1 (4)	24 (47.1)	24 (96)
0	0 (0)	0 (0)	0 (0)	0 (0)
+1	0 (0)	11 (100)	0 (0)	0 (0)
+2	0 (0)	22 (100)	0 (0)	0 (0)
<i>p</i> -value	<i>P</i> < 0.001		<i>p</i> > 0.05	

Goals achievement was scaled from "much less than expected" (-2) to "much more than expected" (+2)

The results of the present study showed that although at the beginning of the study, the QOL of the participants in the control group was significantly higher than the intervention group, after the intervention and adjustments to the impacts of disability severity, the QOL increased significantly only in the intervention group. Therefore, it can be concluded that the increase in the QOL score was due to the TGA intervention. Along with our results, Arauji et al. (2018) showed that TGA led to compliance with the treatment and improved the QOL of the diabetes patients [32]. Also, using of the TGA for a patient with heart failure resulted to elimination of the modifiable risk factors regarding the level of activity, diet, medication, and adherence to the treatment [35]. It is confirmed that a TGA nursing program targeting behavior modification through empowerment was effective in improving self-management behaviors among high-risk hypertensive patients [48].

Another finding of this study was that implementing the nursing process based on TGA on the ADL in PwMS was not significantly different. This results may be due to our patients' ability level, the EDSS scores 0–5.5 indicating our patients can do activities such as bathing, self-care, eating, toileting, and continence. However, TGA could improve ADL in cancer patients [49]. Likewise, in Iran, Hojjatoleslami et al. [50] reported improved ADL using TGA in a patient with acute

coronary syndrome [50]. So, further studies are needed in using TGA for MS patients with more disability severities in their ADL.

Another finding of this study was that implementing the nursing process based on TGA was effective on patients' IADL. After the intervention, the mean score of IADL in the intervention group significantly increased. This study showed that implementing TGA enabled patients to independently perform tasks requiring motor and cognitive skills and more complex daily tasks, such as shopping, driving, managing finances, etc.

Another finding of this study was the extent of patients' goal attainment; the patients were able to attain most of their prioritized goals beyond the expected level. Consistent with the present study, De Oliveira indicated that effective nursing counseling along with the patient's efforts and motivation to change the lifestyle led to the attainment of mutual goals [51]. Khan et al. suggested that GAS was a responsive and useful outcome measure for the rehabilitation of PwMS, providing added value to standardized outcome measurement [52].

Regarding the effectiveness of the nursing process based on TGA on QOL, IADL, and goal attainment, a probable explanation of the findings could be as follows: The crucial point of this theory is the patient's participation in setting

shared goals and care plan. By establishing patient-nurse interaction and the patient's active participation in nursing care, patients were able to discuss their questions, worries, and concerns with the researcher, and their misunderstanding of the disease and its complications was eliminated. Through telephone followups, the patient and their family could have their questions answered by the researcher if needed.

Therefore, the choice of middle-range theories, such as TGA, can be used in a variety of contexts where regular objective care is provided. Using TGA as a guide, optimum results can be achieved from health care even during the COVID-19 pandemic. Besides, by applying this theory as an effective nursing intervention, costs of frequent visits to health centers are excluded, and treatment complications are reduced; consequently, patients' confidence in caring for themselves in the treatment process can increase. Regarding the weakness of traditional education in terms of considering the active role of patients in their disease management and clarifying the effectiveness of TGA in the active participation of patients in managing the disease, increased independence in patients is expected.

Due to coincidence of this study and COVID-19 pandemic and the need to comply with the health protocols to prevent the spread of disease, which is of particular importance in persons with special conditions, MS, telephones, and Internet-based social media were used to exchange information between the researcher and the statistical population. This issue is considered as one of the strengths of this study.

One of the limitations of the present study is the small sample size, limiting the generalizability of the findings. Consequently, conducting further studies with a larger sample size can be advantageous in eliminating this limitation. In addition, the conditions and problems in the patients' living environment could affect their performance, partly managed by constant telephone follow-ups and communication with patients' family members.

Conclusion

During the COVID-19 pandemic, using the nursing theory of goal attainment allowed to the MS patients to achieve their prioritized goals and improve the QOL and IADL as well. This can be related to the patients' active participation in mutual goal-setting and nurse-patient interaction. Therefore, it is recommended that clinical nurses, managers, educators, and nursing researchers use TGA in PwMS care. Further studies are needed to show the TGA effects on the MS patients' outcomes. In addition, more studies should be conducted on the effectiveness of TGA in the other chronic patients.

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