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Research Article

Development and Implementation of a Self-Management Program Based on the Five-A Model and Its Impact on the Self-Efficacy of Caregivers for Trauma Patients with Head Injuries

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Abstract

Introduction: Patients with head injuries are considered the most challenging group of trauma victims. Head traumas are the most dangerous type of trauma and affect all economic, financial, social, and emotional aspects of the individual, family, and community. Providing continuous care creates chronic stress for the caregivers of these patients, jeopardizing their self-efficacy and quality of life. This study was conducted to develop and implement a self-management program based on the five-A model and examine its impact on the self-efficacy of caregivers for patients with head trauma.

Method: This clinical trial, of a quasi-experimental type, was conducted as a pre-test and post-test design at Shohada-ye Haftom-e Tir Hospital, affiliated with Iran University of Medical Sciences. In this research, 70 caregivers of patients with head trauma who met the inclusion criteria were selected using a convenience sampling method. Simultaneously with continuous sampling, the allocation of research units into two groups, test and control, was carried out using a four-block randomization method. The self-efficacy questionnaire was completed by both the test and control groups before the intervention and three months after the intervention. The caregivers in the test group participated in eight face-to-face 60-minute self-management training sessions. The data were analyzed using SPSS version 21, employing statistical tests including the chi-square test, Fisher's exact test, independent t-test, and paired t-test.

Results: Prior to the intervention, there was no statistically significant difference in mean self-efficacy between the test and control groups. However, after three months of self-management training based on the Five-A model, a statistically significant difference was observed between the two groups ($p = 0.04$). Additionally, in the test group, a statistically significant difference was observed in self-efficacy scores and their dimensions before the intervention and three months after it ($p = 0.003$).

Conclusion: The implementation of a self-management program based on the Five A's model can improve the self-efficacy of caregivers for patients with traumatic brain injuries. Interventions such as self-management educational programs can assist caregivers of patients, especially those with traumatic brain injuries, and enhance their self-efficacy, quality of care, and quality of life.

Keywords: Self-Management, Self-Efficacy, Patient Caregivers, Head Trauma Patients

Introduction

Patients who survive a critical illness rely on both professional caregivers and non-professional care. Non-professional caregivers are defined as "any relatives, partners, friends, or neighbors who have a significant personal relationship with an adult suffering from a debilitating illness and provide a range of assistance to them [1]. Caregivers and families play a significant and pervasive role in the rehabilitation

process of the patient. This role is often accompanied by intense feelings of stress experienced by the affected individual and all family members [1, 2].

Studies have shown that caregivers of individuals with head trauma experience higher levels of distress compared to caregivers of other populations, such as those caring for individuals with intellectual disabilities. Caregivers have been described as a significant and positive influence on the psychological well-being of patients, and they have been shown to provide important support that may improve patient outcomes. A lack of familiarity among families with caregiving methods increases the likelihood of hospital readmission for patients [3, 4].

Typically, the families of trauma patients face challenges regarding how to care for these patients after their discharge from the hospital. These issues are often unsolvable for caregivers and can lead to the readmission of patients to the hospital. As a result, most families hesitate to accept the patient and believe that an early discharge from the hospital has occurred. Therefore, to help families adapt to the patient's condition effectively, they must receive adequate and necessary support. A study conducted by Pereira aimed to examine patients' perspectives on post-trauma care and to investigate and describe the nursing care issues that are important for trauma patients in emergency departments in the UK. In their findings based on seven interviews with trauma patients, they concluded that touch, companionship, information and awareness, regaining control, and the need to trust healthcare professionals are very important [5].

Research assessing the long-term needs of patients and caregivers of individuals with traumatic brain injury shows that many of these needs, including information and support, are often rated as unmet [6]. Caregiver needs, such as health and rehabilitation information, counseling and financial assistance, emotional and social support, change over time and reflect the care environment, the stage of recovery (from acute care to long-term living in the community), and the level of functioning. Therefore, care resources that cannot adapt to the dynamic process of a patient's trauma may fall short in meeting care needs. Hence, increasing knowledge and skills related to the methods that patients use to manage their recovery process is important in order to enhance the ability of patients and caregivers to anticipate and address the needs and resources of patients.

Various studies have shown that caregiver involvement in patient education enables patients to benefit more effectively from the training. This approach can enhance important variables such as self-efficacy, self-belief, and self-care [7, 8], thereby improving the patient's quality of life. The abilities of caregivers, as the constant companions of the patient who endure significant anxieties, will be essential. According to the results of studies conducted by Boncin and Fuller, a significant decrease in the self-efficacy and self-belief of patient caregivers has been observed [9, 10].

A study highlights the reduction of self-efficacy and self-belief as two significant issues affecting the capabilities of patients with debilitating diseases. Since self-efficacy and self-belief in patients and their families are considered factors that promote health, and the regulation of these two indicators is effective in moderating individuals' ability to engage in health-related behaviors, it is essential to provide appropriate strategies to enhance these two factors in caregivers of patients [11]. The results of studies indicate the educational needs of patients and caregivers in enhancing caregiving skills and self-efficacy [12]. However, studies have shown that there is usually insufficient attention and examination regarding the implementation of management programs aimed at enhancing self-efficacy [13, 14]. The present study was conducted to develop and implement a self-management program based on the Five-A model and its impact on the self-efficacy of caregivers of patients with trauma.

Methods

This study is a semi-experimental study with a control group conducted on caregivers of patients with head trauma at Shohada-ye Haftom-e Tir Hospital affiliated with the University of Iran. The study population comprises all caregivers of head trauma patients treated at the Shohada-ye Haftom-e Tir Hospital Educational and Treatment Complex between January 2024 and May 2024, as well as those who visited the clinic or patient education unit for periodic outpatient examinations. The criteria for entering the study included all caregivers of trauma patients visiting Shohada-ye Haftom-e Tir Hospital with a diagnosis of head trauma and aged over 18 years. Sampling was conducted continuously among patients in the educational and therapeutic complex of

Shohada-ye Haftom-e Tir Hospital who were either hospitalized or visited the neurology clinic or the patient education unit on an outpatient basis, and the caregivers of these patients were selected.

Simultaneously with continuous sampling, the allocation of research units to the experimental and control groups was done using a four-way random block design. In the block design method, blocks of equal size (usually four or six individuals) were created, and within each block, half of the individuals were randomly assigned to one group. In contrast, the other half was assigned to the other group. The blocks were selected until the required sample size was achieved (15).

The data collection tools in this study included a demographic data form and the Sherer Self-Efficacy Questionnaire. Sampling was conducted continuously among caregivers of trauma patients who were hospitalized in the educational and research treatment sections of Shohada-ye Haftom-e Tir Hospital or who visited the neurology clinic or patient education unit on an outpatient basis. Simultaneously with the continuous sampling, the allocation of research units to the test and control groups was done using a randomized block design in groups of four. In the block randomization method, blocks of equal size (usually four or six individuals) are created, and within each block, half of the individuals are randomly assigned to one group, while the other half is assigned to the other group. Blocks are then selected until the required sample size is reached [15].

Demographic Characteristics Questionnaire

The demographic profile form for caregivers included questions such as gender, age, relationship to the patient, marital status, education, occupation, cohabitation with the patient, and history of chronic illnesses.

Sherer's Self-Efficacy Questionnaire

In 1982, Schwarzer introduced a questionnaire consisting of 17 items, based on a 5-point Likert scale, to measure self-efficacy in performing tasks. This questionnaire assesses an individual's beliefs about their abilities to overcome various situations. A high score on this test indicates stronger self-efficacy. The Persian version of this questionnaire has been translated and validated by Barati. The scoring scale assigns a score of 1 to 5 to each item. Questions 1, 3, 8, 9, 13, and 15 are scored from right to left, while the other questions are scored in reverse, that is, from left to right. Therefore, the maximum score an individual can achieve on this scale is 85, and the minimum score is 17. Sharer and colleagues obtained the reliability of the mentioned questionnaire with a Cronbach's alpha coefficient of 0.86. In the study by Rezapour Mir Saleh, the validity of this questionnaire was examined, and its reliability was also reported, with a Cronbach's alpha coefficient of 0.86 [16], which is referenced in the present study.

Designing and Developing a Management Program Based on the Five-Factor Model

Step One (Review): After obtaining ethical approval from Tehran University of Medical Sciences and securing the consent of the research environment authorities, the researcher visited the clinic, patient education unit, and discharge unit of Shohada-ye Haftom-e Tir Hospital. They selected caregivers of patients presenting with head trauma who met the entry criteria for the study and provided them with comprehensive explanations about the research objectives. If they were willing to participate in the study, they completed an informed consent form. Using questionnaire forms, a detailed examination of the level of self-efficacy among caregivers in both the case and control groups was conducted, along with demographic information and the Sherer Self-Efficacy Questionnaire. All caregivers were asked to respond to the questionnaires carefully. Additionally, the researcher conducted an interview to further extract their problems in the case group.

Step Two (Guidance): Based on the assessment conducted in Step One, the problems of each caregiver were listed separately, and the risks arising from low self-efficacy, as identified through the issues extracted from the self-efficacy questionnaire and the interviews conducted, were communicated to each individual.

Step Three (Agreement): In this stage, an agreement was made with the caregivers of the target group to reduce or eliminate the identified problems by setting and adjusting realistic behavioral goals. Therefore, the researcher developed a program to address the issues with their participation (the caregivers) and they were asked to adhere to this educational program.

Step Four (Assistance): Based on the researcher's assessments and the issues faced by the caregivers in the target group, they were invited to participate in eight training sessions aimed at achieving goals and addressing problems, organized in groups of up to five people. These sessions were held one week after the first individual training session. The training was conducted

based on the patients' issues, utilizing slides, lectures, and providing an educational booklet that included content, images, and videos. Training sessions were held in the library unit of the Shohada-ye Haftom-e Tir Hospital. Each session was planned for 60 minutes and lasted up to 90 minutes. The intervals between sessions were three days. The content of the patient education booklet was designed based on the assessment of the needs of similar caregivers (such as determining the level of consciousness, types of head trauma, diagnostic and therapeutic methods, complications of trauma, and strategies to reduce complications) and interviews with patients, patient education supervisors, and neurologists, and was compiled with input of ten professors from universities in Tehran.

Step Five (Follow-up): The performance of patients in the intervention group was followed up for three months to ensure the implementation of educational programs by the researcher. This follow-up was conducted through phone calls as well as in-person visits to the patient education unit at Shohada-ye Haftom-e Tir Hospital. During the first two weeks after completion of the training, daily phone consultations were conducted, followed by weekly reminders to reinforce the implementation of the educational program. After three months, the mentioned questionnaires were once again provided to the caregivers of both groups, and they were examined regarding the studied variables. The control group only received the usual training. After collecting data, materials, and an educational booklet were also provided to the caregivers of the control group.

Statistical Analysis

For data analysis, descriptive statistics and paired t-tests, independent t-tests, chi-square tests, and Fisher's exact test were used in SPSS version 21 of the computer software, with a significance level set at less than 0.05.

Results

The average age of the research units in the training group and the control group was 40.29 years with a standard deviation of 9.75 and 41.51 years with a standard deviation of 1.23, respectively. The majority of the research units in both groups were women (77.1%), single individuals (65.7%), had a high school diploma (34.3%), were caregivers for a mother or father (28.6%), were Muslim (97.1%), were homemakers (54.3%), owned a personal residence (68.6%), and had underlying health conditions (71.4%) (Table 1). The results indicated that the two groups were homogeneous in terms of demographic variables. The specifications of the research units are summarized in Table 1.

The results of the paired t-test indicate that there is no statistically significant difference between the mean scores of the domains, dimensions, and total self-efficacy score before and after the intervention in the control group. However, a statistically significant difference was observed between the mean scores of the domains, dimensions, and total self-efficacy score before and after the intervention in the test group ($P<0.001$) (Table 2).

Table 1: Frequency distribution of the personal characteristics of caregivers of trauma patients in the intervention and control groups

Personal Features		Case	Control	Test Result
		frequency(%)	frequency(%)	
Age(Year)	30Under	(14/3)5	(17/1)6	**Independent t-test t=0/489 df=68 P=0/627**
	39-30	(20)7	(28/6)10	
	49-40	(57/1)20	(31/4)11	
	50above	(8/6)3	(22/9)8	
	Standard deviation ± mean	40/9±29/75	41/11±51/23	
Gender	Male	(22/9)8	(37/1)13	**Chi-squared test χ^2 = 1/701 df=1 P=0/192**
	Female	(77/1)27	(62/9)22	
Marital Status	Single	(65/7)23	(88/6)31	**Fisher's Exact Test P=0/078**
	Married	(20)7	(8/6)3	
	Devorced The wife is dead	(14/3)5	(2/9)1	
Education Level	primary	(17/1)6	(11/4)4	**Chi-squared test χ^2 = 2/662 df=4 P=0/616**
	Sub diploma	(20)7	(22/9)8	
	diploma	(34/3)12	(48/6)17	
	expert	(22/9)8	(11/4)4	
	Masters and above	(5/7)2	(5/7)2	
Caregiver-patient relationship	mother or father	(28/6)10	(22/9)8	**Chi-squared test χ^2 = 1/272 df=4 P=0/866**
	sister or brother	(22/9)8	(22/9)8	
	spouse	(17/1)6	(25/7)9	
	child	(25/7)9	(20)7	
	Other	(5/7)2	(8/6)3	
religion	Muslim	(97/1)34	(100)35	**Fisher's Exact Test P=0/999**
	Christian	(2/9)1	(0)0	
job	employee	(22/9)8	(14/3)5	**Fisher's Exact Test P=0/457**
	self-employment	(11/4)4	(25/7)9	
	retired	(5/7)2	(5/7)2	
	labor	(5/7)2	(11/4)4	
	housekeeper	(54/3)19	(42/9)15	
private house	Yes	(68/6)24	(65/7)23	**Chi-squared test χ^2 =0/065 df=1 P=0/799**
	No	(31/4)11	(34/3)12	
Preexistence of Chronic Diseases	Yes	(28/6)10	(28/6)10	–
	No	(71/4)25	(71/4)25	

Table 2: Mean and standard deviation of self-efficacy of caregivers of patients with head trauma before and after intervention in the intervention and control groups.

Self-efficacy of the caregiver	Case		Control		Test Result
	Mean	Standard deviation	Mean	Standard deviation	
Before	60/65	8/53	59/6	7/19	**t=0/56 df=68 0/577 P=**
After	64/17	8/72	60/65	6/76	**F=4/399 p=0/04 η^2 = 0/062**
Paired t-test result	t=3/144 df=34 0/003 P=		t=1/205 df=68 0/237 P=		
η^2= partial eta-squared					

According to the table above, the self-efficacy of caregivers before the intervention did not show a statistically significant difference between the two groups. However, after the intervention, based on the

analysis of covariance results (p=0.04), this difference was significant, with the mean score achieved in the intervention group being higher than that in the control group. The results of the paired t-test showed that the mean score of self-efficacy among caregivers in the intervention group increased significantly after the intervention compared to before (p = 0.003). In contrast, in the control group, this difference was not significant.

Discussion

The present study was conducted to evaluate the effectiveness of a self-management program based on the Five-A model on the self-efficacy of caregivers of head trauma patients. The findings indicate that patient caregivers play an important and increasing role in the range of brain trauma care; So that one third of trauma survivors become dependent on a caregiver, and most of their caregivers are not ready to fulfill the tasks related to the caring role and do not receive support for the change made in living conditions [17].

The findings of the present study were similar to those of Nikan et al.'s 2018 study in Iran, which aimed to compare the effectiveness of implementing two discharge program methods and telephone follow-up by nurses on the self-efficacy of caregivers of stroke patients. A comparison of the findings from both studies revealed no difference in the average score of self-efficacy between the control group before and after the intervention. However, statistically, the average score of self-efficacy in the test group increased significantly after the intervention [18]. In the present study, 77.1% of the participants in both groups were women. In Shalfroshan's study, the ratio of women to men was 1:6. Additionally, a comparison of the findings from both studies revealed that the duration of both interventions was three months. The number of women as caregivers exceeded that of men, and the average age fell within the fourth and fifth decades of life in both studies [19].

In the study by Jafari et al. in Iran, the self-efficacy score in the test group was 17.2±3.48 before the intervention and increased to 19.34±11.3 after the intervention, a statistically significant difference (P<0.001). Seventy-four point three percent of caregivers were women, and eighty-seven point one percent were married. The results of the studies show that acceptance of the role of primary care is the responsibility of women, which among other responsibilities such as childbearing and keeping house, pressures and stresses specific to the female gender and doubling the roles of spouses, cause more anxiety and sickness symptoms in women compared to men [20]. In addition, 75% of caregivers are family members, and more than 84% of unofficial and chronic patient caregivers are also women [21]. A similar finding was also reported in a study by Akosile et al., which justified the observation that in Africa and Nigeria, caregiving is often perceived as a female task [22].

Moreover, the duration of the intervention in the present study was three months, whereas in Araújo et al.'s study, the length of the training and follow-up period was reported to be between 1 and 3 months. Although most of the caregivers in both groups were educated (62.9%) in the present study, it was reported that the level of self-efficacy was respectively low and then high before and after the intervention, indicating that the level of education was directly related to the self-efficacy score, while in Araújo et al.'s study, education level had an inverse relationship with self-efficacy score. Caregivers with no reading and writing literacy had higher scores, and people with higher levels of education had lower self-efficacy scores [23]. This was explained by the fact that although caregivers have acquired technical and practical skills in taking care of brain injury survivors, caregivers did not benefit from the intervention of the training program, and their health status worsened, especially in the field of mental health.

The present study demonstrated that the implementation of the support plan was associated with a significant increase in the average self-efficacy score in the test group compared to the control group. The scores in the test group were (60.65±8.53) before the intervention and (64.17±8.72) after the intervention, while the scores in the control group were (59.6±7.19) before the intervention and (65.6±6.76) after the intervention. Before the intervention was implemented, there was no significant difference between the test and control groups. The difference between the average score of self-efficacy in the test group before and after the intervention was significant. Also, the difference between the two control and test groups was reported to be significant after the intervention. In other words, the intervention has had a positive impact on the self-efficacy scores of caregivers of patients with brain trauma, increasing their self-efficacy scores.

A similar finding was reported in Barani et al.'s study in

1400. The average self-efficacy score of the caregivers before the intervention was (53.63±11.41). After the implementation of the training plan, the average self-efficacy score in the first follow-up was 63.83. In the second follow-up, it was 65.56, indicating an increase in the self-efficacy of the caregivers [24]. The findings of the present study are consistent with those of Rouch et al. Rouch showed that problem-solving and coping skills training, self-management training, and clinical skills training lead to improved knowledge and level of care among caregivers of individuals with chronic conditions [25].

On the other hand, contradictory findings have been reported in comparison to the present study, particularly in contrast to the results of the study by Khan et al. In Khan et al.'s study, a concept analysis method by Walker and Avant (2019) was employed, involving an eight-step iterative process. The results of this study, which drew on a quarter of a century of research to update the definition of self-efficacy, demonstrated that self-efficacy requires attention and emphasizes the importance of interventions to improve self-efficacy in vulnerable populations. The importance of the self-efficacy score is attributed to the type and nature of the support program [26]. Supportive programs that combine educational and supportive approaches may be associated with increased self-efficacy.

The evidence shows that the chronic process of brain injuries and the multidimensional effects caused by the disease in the life of caregivers can bring many physical and psychological risks for the patient and the caregiver. In this regard, by designing community-based interventions, nurses can play a very significant role in providing necessary support to patients with brain trauma, caregivers, families, and communities to facilitate the recovery of patients with brain injury and support their caregivers [20, 27]. On the other hand, various interventions for caregivers are effective in reducing the burden of care and depression, increasing self-efficacy, improving well-being, perceived satisfaction, and knowledge and ability among caregivers [28].

Conclusion

Based on the present study, the implementation of a self-management program based on the Five-A's model can improve the self-efficacy of caregivers for patients with traumatic brain injuries. Considering that patients with traumatic injuries face environmental, economic, and specific conditions, the implementation of such a method will enhance the quality of life, self-efficacy, and self-care abilities of the patients themselves as well. By implementing this self-management training program for caregivers of patients with traumatic brain injuries by healthcare providers, especially nurses, a practical step can be taken to enhance the self-efficacy of these caregivers.

Since the implementation of this program is straightforward, inexpensive, safe, and impactful, utilizing this method will improve the quality of life and self-efficacy of caregivers in caring for patients with traumatic brain injuries and progressive diseases. Given the limitations of this research, further studies are needed in this area. In this study, the duration of training and the examination of the intervention were conducted over three months with a limited number of participants. Therefore, it is essential to investigate the long-term sustainability of the effects of this intervention for a larger number of caregivers of patients with traumatic brain injury. Since patients can also play an active role in their treatment process, it is recommended that a study be conducted to examine the impact of self-management education on patients' self-efficacy behaviors and quality of life.

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Conflict of Interest Disclosures

By this means, all authors declare that there is no conflict of interest regarding the present study.

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Authors' Contributions

Conceptualization: Asghar Dalvandi, Jamileh Mohtashami; Methodology: Asghar Dalvandi; Formal analysis and investigation: Asghar Dalvandi,Jamileh Mohtashami; Writing-original draft preparation: Shirin Nasrolahnejhad; writing-review and editing: Shirin Nasrolahnejhad, Asghar Dalvandi, Jamileh Mohtashami; Supervision: Asghar Dalvandi.
All Authors read and approved the final manuscript.

Ethical Statement

According to the Helsinki Declaration, approval was obtained from the Institutional Review Board (code: IR.IAU.PS.REC.1403.074) of the Ethics Committee at Tehran University of Medical Sciences. The present study did not interfere with the diagnosis and treatment of patients, and all participants provided informed consent.

Declaration of Generative AI and AI-assisted technologies

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