

*The Predictive Roles of Self-efficacy, Illness Perception, and Social Support in Self-care of Patients with Heart Failure*

Mansouriyeh N<sup>1\*</sup>, Poursharifi H<sup>2</sup>, Taban Sadeghi MR<sup>3</sup>, Seirafi MR<sup>4</sup>

<sup>1</sup>PhD. Dept. of Health Psychology, Young Researchers and Elite Club, Tabriz Branch, Islamic Azad university, Tabriz, Iran

<sup>2</sup>PhD. Dept. of Psychology, Associated Professor, University of Tabriz, Tabriz, Iran

<sup>3</sup>MD, Dept. of heart, Assistant Professor, Tabriz University of Medical Sciences, Tabriz, Iran

<sup>4</sup>PhD. Dept. of psychology, Assistant Professor, Karaj Branch, Islamic Azad University, Alborz, Iran

**\*Corresponding Author:** Dept. of Health Psychology, Young Researchers and Elite Club, Tabriz Branch, Islamic Azad university, Tabriz, Iran

**Email:** n.mansoreye1984@gmail.com

**Received:** 7 April 2017      **Accepted:** 12 July 2018

**Abstract**

**Background:** As a chronic disease, heart failure (HF) is a growing problem that not only impacts patients but also their family members and friends. Self-care is the main part of HF treatment. Despite the significance of determining variables involved in self-care, the relationships of self-efficacy, illness perception, and social support with self-care and the predictive roles of these variables in the treatment of HF have not been investigated.

**Objectives:** The present study was aimed at exploring the predictive roles of self-efficacy, illness perception, and social support in self-care of patients with heart failure.

**Methods:** In this predictive correlation study, 149 patients with HF were selected through convenience sampling from Tabriz Research Treatment Centre of Heart in 2016. To collect data, a demographic information questionnaire, self-care behaviour scale, general self-efficacy (GSE), brief illness perception questionnaire (Brief-IPQ), and social support scale were used. To analyse data, SPSS software version 16, descriptive statistics, Pearson correlation coefficient, and multiple stepwise regression analyses were employed.

**Results:** Out of 149 subjects, 102 (68%) participants were male, and 47 (32%) of them were female. The mean and standard deviation of samples' age were (64.40±10.32) ranging from 37 to 88 years. Most of participants were married (82%). The mean scores were as follows: Self-care (40.66±13.16), self-efficacy (45.81±22.03), illness perception (56.05±18.24), and social support (49.09±6.74). Data analysis demonstrated significant correlations between illness perception and self-care ( $p<0.001$ ,  $r=0.649$ ), self-efficacy and self-care ( $p<0.001$ ,  $r=-0.678$ ), social support and self-care ( $p<0.001$ ,  $r=-0.518$ ), and age and self-care ( $p<0.001$ ,  $r=-0.506$ ). The standardized coefficient of illness perception was ( $\beta=0.274$ ), social support was ( $\beta=-0.237$ ), self-efficacy was ( $\beta=-0.230$ ), and age was ( $\beta=-0.211$ ). In addition, 56% of self-care variance is explained by age, social support, self-efficacy, and illness perception.

**Conclusion:** All of the investigated variables were found to have a predictive role in self-care. Illness perception was recognized as the most effective factor in predicting self-care. Hence, illness perception can be used to explain 27% of self-care ability of patients with HF.

**Keywords:** heart failure, illness perception, self-care, self-efficacy, social support

**Introduction**

Heart failure (HF) is an important problem affecting not only patients but also their relatives. HF reduces patients' functional capacity and

disrupts their social life [1]. In Iran, HF is one of the main causes of disability and mortality. Currently, out of 100,000 people, 3,500 cases suffer from HF [2].

The role of self-care of patients with HF in managing their condition has been recently investigated [3]. In HF, self-care maintenance involves adherence to pharmacological recommendations, consumption of a low-salt diet, cessation of tobacco use, limited alcohol consumption, and daily monitoring of body weight and symptoms of acute decompensated heart failure (ADHF).

World health organization (WHO) defines self-care as “the ability of individuals, families and communities to promote health, prevent disease, maintain health, and to cope with illness and disability with or without the support of a health-care provider”. Self-care includes health promotion, disease prevention and control, self-medication, provision of care to dependent persons, search for hospital or specialist care if necessary, and rehabilitation including palliative care [4]. Practice of self-care by HF patients can usually decrease hospitalization [5] and mortality [6]. It potentially reduces the debilitating effect of HF on quality of life. However, health care required for HF becomes more complex as HF deteriorates and comorbidity may occur [7].

Self-efficacy is effective in health care outcomes as it changes patients’ behavior toward chronic diseases. In fact, self-efficacy is considered to be one of the most important parameters for predicting behavioral modifications and self-care in patients [8]. Psychologist, Albert Bandura, characterized self-efficacy as one’s belief in one’s ability to succeed in specific situations or to accomplish a task. One’s sense of self-efficacy can play a major role in how one approaches goals, tasks, and challenges [8,9]. Self-efficacy has a direct relationship with healthy behavior and indirectly influences healthy behavior to reach goals, face challenges, and have perseverance, show commitment, and make an effort to achieve objectives. Self-efficacy impacts health care choices and behavior in HF patients [10]. A number of studies found that high self-efficacy improves self-care ability [10]. Many studies have shown that self-efficacy is associated with diabetes self-care [11]. It is indicated that low self-efficacy is correlated with poor self-care in HF patients [12].

Illness perception also is deemed as a key variable predicting self-care; however, the results in this area are contradictory [13,14]. Illness perceptions are conceptualized as organized cognitive representations or beliefs that patients have about their illness. Illness perceptions are found to be important determinants of behavior and are associated with several important outcomes such as treatment adherence and functional recovery. Illness perceptions constitute central concepts in common sense model of self-regulation of health and illness [15]. People’s perceptions and beliefs to a great extent determine their response to condition of diseases. Illness perceptions include many components such as perceived symptoms associated with a condition (identity), beliefs about the timeline of the condition, consequences of the condition, perceived ability to control the condition, the extent to which treatment can control the condition, understanding of the condition, emotional responses and concerns about the condition, and attitudes about possible causes of the condition. Illness perceptions are based on factors such as medical information, social communication (media, friends and family, and other patients), and personal experiences [16]. As a result of gaining new information and experience, illness perceptions are not permanent and change over time [14]. The impact of optimistic illness perceptions on efficient self-care of chronic illnesses have been examined [13,17,18]. The evidence for the effects of optimistic perceptions on self-care was found in the relationship between patients’ perceptions of seriousness and controllability of their disease, and how perceptions affect their lives and the emotional distress they experience [19].

Social support is one of the most investigated parameters defined as the degree of passion, care, and help provided by family members, friends, and others. Social support is a multidimensional concept indicating a variety of actual or perceived sources. The supportive sources can be emotional (e.g., nurturance), tangible (e.g., financial assistance), informational (e.g., advice), or companionship (e.g., sense of belonging), and intangible (e.g., personal advice). The supportive sources can be available to an individual through his/her relationship with others [20]. Social

support has been shown to positively influence health outcomes for several chronic diseases [7], while others argue that social support is associated with reduced self-care [21].

The main objective of this study was to explore the predictive roles of self-efficacy, illness perception, and social support in self-care of patients with HF. Previously, the relationship among self-care and other variables has been investigated. Nonetheless, the correlations among the three variables of social support, self-efficacy, and illness perception and the predictive role of these variables in self-care of Iranian patients with heart failure have not been studied. Considering that the illness perception and social support in different cultural and social conditions could be different, and given that self-efficacy improves adherence to healthy behaviour, the role of these variables in self-care of Iranian patients with HF is an under-investigated area. It seems that determining HF self-care predictors can help medical staff identify patients' self-care promoting factors and take measures to boost healthy behaviour and self-management, thereby improving the quality of patients' lives.

## Methods

This predictive correlation study was conducted on 149 heart failure patients attending Tabriz Research Treatment Centre of Heart, Iran, during 2016 was selected by convenience sampling. All the patients signed the consent form and voluntarily agreed to participate in the study were recruited. Participant characteristics were being able to speak in Persian language, having the tendency to participate in the study, being

recognised as Heart failure disease due to echocardiography and cardiologist diagnosis, with at least one year's experience of heart failure certified by cardiologist. Data were gathered through a self-report five parts questionnaire including background data, Self-care behaviour scale, General self-efficacy (GSE) Scale, Brief illness perception questionnaire (Brief-IPQ) and Social support scale with the validity and reliability reported in the previous article [22]. This research is compliance with ethical standards. Data was analysed by SPSS version 16 software by using Pearson correlation statistics and multiple stepwise regression tests.

## Results

Out of 149 subjects, 102 subjects (68.4%) were men, and 47 subjects (31.6%) were women. Moreover, the mean and standard deviation of the samples' age were ( $64.40 \pm 10.32$ ) ranging from 37 to 88 years old. A total of 122 subjects were married (82%).

The mean and standard deviation of the patients' self-care were ( $40.66 \pm 13.16$ ), self-efficacy were ( $45.81 \pm 22.03$ ), social support were ( $49.09 \pm 6.74$ ), and illness perception were ( $56.05 \pm 18.24$ ).

The results showed that there was a significantly positive relationship between self-care and illness perception ( $p < 0.001$ ,  $r = 0.649$ ). Additionally, self-care and social support were found to have a significantly negative relationship ( $p < 0.001$ ,  $r = -0.518$ ). There was a significantly negative relationship between self-care and self-efficacy ( $p < 0.001$ ,  $r = -0.678$ ). However, self-care and age were found to have a significantly positive correlation ( $p < 0.001$ ,  $r = -0.506$ ) (See Table 1).

**Table 1: Correlations of self-care with self-efficacy, social support, illness perception, and age**

component	1	2	3	4	5
<b>1 self-care</b>	1				
<b>2 Self-efficacy</b>	-0.678	1			
<b>Sig. (1-tailed)</b>	0.000				
<b>3 illness perception</b>	0.649	-0.772	1		
<b>Sig. (1-tailed)</b>	0.000	0.000			
<b>4 Social support</b>	-0.518	0.517	-0.436	1	
<b>Sig. (1-tailed)</b>	0.000	0.000	0.000		
<b>5 age</b>	0.506	-0.542	0.449	-0.203	1
<b>Sig. (1-tailed)</b>	0.000	0.000	0.000	0.000	

To predict self-care based on self-efficacy, illness perception, social support, and age multiple

stepwise regressions analyses were carried out. The findings indicated that illness perception held

the most power to predict self-care in HF patients. The standardized coefficients also showed that illness perception ( $\beta=0.274$ ), and social support

( $\beta=-0.237$ ), self-efficacy ( $\beta=-0.230$ ), and age ( $\beta=-0.211$ ) influenced the dependent variable of self-care (See Table 2).

**Table 2: Multiple stepwise regression analyses predicting HF self-care through the variables of self-efficacy, social support, illness perception, and age**

Model	R	R Square	Durbin-Watson
1	.750 <sup>a</sup>	.563	1.739

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	41.260	9.636		4.282	.000	
	age	.269	.084	.211	3.189	.002	.695
	Social support	-.462	.127	-.237	-3.646	.000	.720
	Self-efficacy	-.137	.058	-.230	-2.350	.020	.317
	illness perception	.197	.063	.274	3.143	.002	.401

## Discussion

The results of the present study demonstrated the predictive roles of self-efficacy, illness perception, and social support in self-care of patients with heart failure in Tabriz, Iran, in 2016. The mean score of self-care among Iranian patients with HF was found to be 40.66 representing the average self-care among patients. In this study, people with higher scores in self-care scale were considered to lack proper self-care behaviour. These results are consistent with those of Abootalebi et al.'s (2012) study. According to Abootalebi's findings, moderate self-care ability was observed. Treatment adherence in chronic diseases involves effective self-care behaviour. Self-care poses a challenge for HF patients from. For example, many HF patients are elderly suffering from comorbid diseases [32,17]. Shojaei notes that to maintain efficient self-care behaviour, HF patients encounter numerous problems such as lack of information, physical limitations, incompatibility with complex treatments, emotional problems, and development of other chronic diseases that greatly affect their self-care behaviour [24].

In the present study, gender and marriage were not found as significant predictors of self-care in HF patients, and in the regression model, these variables were removed in line with the results of Liang and et al.'s (2010) study [33]. Furthermore, age was detected as a predictor of self-care in patients with HF in Iran, and old age has been found to have a positive correlation with lack of self-care, which was consistent with the findings of Carlson and et al.'s (2001) study. Carlson et al. (2001) posit that changes caused as a result of aging including decrease visual acuity, reduced hearing, and cognitive impairment lead to disability in self-care. On the other hand, older patients are dependent on others because of their disability to handle self-care properly [34]. In this study, a negative correlation was found between self-efficacy and self-care, which was consistent with the results of Schnell-Hoehn's (2009) study [11]. Self-efficacy was detected as a predictor of self-care in patients with HF in Iran. The mean score of self-efficacy among HF patients was found to be 45.81. The mean score of self-efficacy was higher than the average score on questionnaire. Hence, patients in the study had higher scores in self-efficacy questionnaire but

lower scores on the self-care scale indicating efficient self-care behaviour in patients. Negative correlation between self-efficacy and self-care in HF patients demonstrates patients' responses to challenges and their expectations when a change in behaviour is affected by self-efficacy. Self-efficacy may influence primary outcomes. It has been found that as self-efficacy increases, self-care ability improves [11,12].

Additionally, the mean score of illness perception among HF patients was found to be 56.05. The mean score of illness perception was high indicating that patients are cognizant of threats posed by their disease. Illness perception was positively found to correlate with the lack of self-care in line with the results of Gherman et al.'s (2011) and McSharry, Moss-Morris, and Kendrick's (2011) studies [17,18]. Nonetheless, in this study, illness perception was found to be the strongest predictor of self-care in patients with HF. Patients with worst perceptions and those who were more threatened with HF scored higher on the illness perception scale. This had a positive correlation with scores of self-care, and self-care score of patients with HF was higher on the scale. It is noteworthy that higher scores on the self-care scale is indicative of poor self-care behaviour in patients as indicated by research findings on the link between optimistic illness perception and self-care [17,18]. Nevertheless, in general, illness perception is not strongly correlated with and self-care [16]. There are conflicting results in this area [16], and a number of studies indicate that there is a relationship between illness perception and individual management behaviour [14].

The relationship between illness perception and self-care can be attributed to the influence of a patient's beliefs on his/her behaviour. When patients believe that their disease is chronic and incurable, because of feeling helpless, they tend to refuse treatment, and consequently, their condition deteriorates. Likewise, when patients have to face severe consequences due to their illness, they usually do not understand the nature of their disease and are constantly worried about it. It seems that a clear perception of cardiac disease could be important to make more patients conscious of their condition. As a result of a deeper understanding of a disease, patients'

general self-efficacy enhances enabling them to cope efficiently with their illness and maintain healthy behaviour in the long-term. Clinical education programmes can be designed to enhance patients' understanding of their condition, especially those admitted for the first time. Designing educational programmes by educational managers, doctors, nurses, and health psychologists can help develop a deeper and better perception of a disease and reduce the threat of the disease, thereby promoting proper self-care in HF patients.

In this study, the average score of social support among HF patients was found to be 49.9. The mean score of social support was above average in the perceived social support questionnaire. Higher scores in social support indicate satisfactory social support from family, friends, and other significant individuals. The patients in this study perceived optimal social support as a negative correlation was found between social support and lack of self-care in HF patients. Social support was detected as a predictor of self-care in patients with HF in Iran as patients with higher scores in social support received lower scores on the self-care scale. While these findings contradict those of some previous studies [21], they are consistent with Luttik et al.'s (2005) findings [7].

High social support results in higher life satisfaction and better feeling as providing tangible assistance impacts on one's quality of life and health. Social support leads to healthy behaviour and ultimately enhances people's quality of life. Patients suffering from HF in Iranian society benefit from satisfactory family support. The results showed that more than half of the patients enjoyed satisfactory social support owing to the on-going effective support provided by families during illness. HF patients received sympathy and affection from their close relatives. Variables predicting self-care should be detected to encourage self-management and self-care.

Based on the findings, age had the highest mean score, and self-care and the lowest mean score. Self-care in HF patients was found to be moderate. Illness perceptions, social support, self-efficacy, and age displayed the strongest and weakest correlations with self-care in this study.

Illness perceptions and age were positively correlated with the lack of self-care. In contrast, social support and self-efficacy were negatively correlated with the lack of self-care. Age was found to least predict self-care. A total of 56% of self-care variance was explained by age, social support, self-efficacy, and illness perception. Educational administrators, doctors, nurses, and health psychologists are recommended to identify variables involved in the self-care and to design programs, train, and employ strategic plans to increase self-efficacy, positive perceptions of a disease, and the ability to control the disease. Enhancing HF patients; self-care highly declines mortality rates, hospital readmission, and burden of the disease.

One of the limitations of this study is that the data was collected using a self-report method, which may affect the accuracy of results. Furthermore, personal differences of the participants may influence the generalizability of the results. It is suggested that this study be replicated using a broader population including patients from other cities to enhance the generalizability of the findings.

#### Acknowledgments

The authors would like to thank all participant patients. This article is an original study and part of the first author's Ph.D. dissertation (Approval code is 6120709941011). The second and the third authors were supervisor and adviser of the dissertation.

**Conflict of interest:** There was no conflict of interests to declare.

#### Funding:

None to be declared.

#### References

- Gardetto NJ. Self-management in heart failure: where have we been and where should we go?. *J Multidiscip healthc*. 2011; 4: 39-51.
- Bagheri H, Yaghmaei F, Ashktorab T, Zayeri F. Relationship between illness-related worries and social dignity in patients with heart failure. *Nursing ethics*. 2016: 0969733016664970.
- Riegel B, Moser DK, Anker SD, et al. State of the science: promoting self-care in persons with heart failure: a scientific statement from the American Heart Association. *Circulation*. 2009; 120(12): 1141-63.
- WHO Health organization, Regional Office for South-East Asia. *Self Care for Health, A Handbook for Community Health Workers & Volunteers*. 2013. Available at : [http://apps.searo.who.int/PDS\\_DOCS/B5084.pdf](http://apps.searo.who.int/PDS_DOCS/B5084.pdf).
- Lainscak M, Blue L, Clark AL, et al. Self-care management of heart failure: practical recommendations from the Patient Care Committee of the Heart Failure Association of the European Society of Cardiology. *European journal of heart failure*. 2011; 13(2): 115-26.
- Ditewig JB, Blok H, Havers J, van Veenendaal H. Effectiveness of self-management interventions on mortality, hospital readmissions, chronic heart failure hospitalization rate and quality of life in patients with chronic heart failure: a systematic review. *Patient education and counseling*. 2010; 78(3): 297-315.
- Gallagher R, Luttk ML, Jaarsma T. Social support and self-care in heart failure. *Journal of Cardiovascular Nursing*. 2011; 26(6):439-45.
- Son YJ, Kim SH, Park JH. Role of depressive symptoms and self-efficacy of medication adherence in Korean patients after successful percutaneous coronary intervention. *International journal of nursing practice*. 2014; 20(6): 564-72.
- Bandura A. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ, US: Prentice-Hall, Inc; 1986.
- Friedman MM, Quinn JR. Heart failure patients' time, symptoms, and actions before a hospital admission. *Journal of Cardiovascular Nursing*. 2008; 23(6):506-12.
- D'Souza MS, Karkada SN, Parahoo K, Venkatesaperumal R, Achora S, Cayaban AR. Self-efficacy and self-care behaviours among adults with type 2 diabetes. *Applied Nursing Research*. 2017; 36: 25-32.
- Yehle KS, Plake KS. Self-efficacy and educational interventions in heart failure: a review of the literature. *Journal of Cardiovascular Nursing*. 2010; 25(3): 175-88.
- Goodman H, Firouzi A, Banya W, Lau-Walker M, Cowie MR. Illness perception, self-

- care behaviour and quality of life of heart failure patients: a longitudinal questionnaire survey. *International Journal of Nursing Studies*. 2013; 50(7): 945-53.
14. Skinner TC, Khunti K, Carey ME, Dallosso H, Heller S, Davies MJ. Stability and predictive utility, over 3 years, of the illness beliefs of individuals recently diagnosed with Type 2 diabetes mellitus. *Diabetic Medicine*. 2014; 31(10): 1260-3.
15. Leventhal H, Brissette I, Leventhal EA. The common-sense model of self-regulation of health and illness. *The self-regulation of health and illness behaviour*. 2003; 1: 42-65.
16. Van Puffelen AL, Heijmans MJ, Rijken M, Rutten GE, Nijpels G, Schellevis FG. Illness perceptions and self-care behaviours in the first years of living with type 2 diabetes; does the presence of complications matter?. *Psychology & health*. 2015; 30(11): 1274-87.
17. Gherman A, Schnur J, Montgomery G, Sassu R, Veresiu I, David D. How are adherent people more likely to think? A meta-analysis of health beliefs and diabetes self-care. *The Diabetes Educator*. 2011; 37(3): 392-408.
18. Mc Sharry J, Moss-Morris R, Kendrick T. Illness perceptions and glycaemic control in diabetes: a systematic review with meta-analysis. *Diabetic Medicine*. 2011; 28(11): 1300-10.
19. Thoolen B, De Ridder D, Bensing J, Gorter K, Rutten G. No worries, no impact? A systematic review of emotional, cognitive, and behavioural responses to the diagnosis of type 2 diabetes. *Health Psychology Review*. 2008; 2(1): 65-93.
20. Akinin LB, Dunn EW, Sandstrom GM, Norton MI. Does social connection turn good deeds into good feelings?: On the value of putting the 'social' in prosocial spending. *International Journal of Happiness and Development*. 2013; 1(2): 155-71.
21. Sayers SL, Riegel B, Pawlowski S, Coyne JC, Samaha FF. Social support and self-care of patients with heart failure. *Annals of Behavioral Medicine*. 2008; 35(1): 70-9.
22. Mansouriyeh N, Poursharifi H, Taban Sadeghi M.R, Seirafi M.R. Self-Efficacy as a Mediator in the Relationship between Social Support and Self-Care in Patients with Heart Failure. *Int J Med Res Health Sci*. 2017; 6(6): 157-62.
23. González B, Lupón J, Parajón T, Urrutia A, Herreros J, Valle V. Use of the European Heart Failure Self-care Behaviour Scale (EHFScBS) in a heart failure unit in Spain. *Revista Española de Cardiología (English Edition)*. 2006; 59(2): 166-70.
24. Shojaei F, Asemi M, Yarandi AN, Hosseini FA. Self care behaviours, quality of life among patients with heart failure. *Iran Journal of Nursing*. 2006; 18(44): 49-55. [In Persian]
25. Chen G, Gully SM, Eden D. Validation of a new general self-efficacy scale. *Organizational research methods*. 2001; 4(1): 62-83.
26. Najafi M, Fooladchang M. The relationship between self-efficacy and mental health among high school students. *The bimonthly science - research journal of Shahed University*. 2007. 14(22): 69-81. [In Persian]
27. Broadbent E, Petrie KJ, Main J, Weinman J. The brief illness perception questionnaire. *Journal of psychosomatic research*. 2006; 60(6): 631-7.
28. Bagherian sararudi R, Bahrami ehsan H, Sanei H. Relationship between history of myocardial infraction and cognitive representation of myocardial infraction. *Research in psychological health*. 2008; 2(2): 29-39. [In Persian]
29. Ng TS. Brief Illness Perception Questionnaire (Brief IPQ). *Journal of physiotherapy*. 2012; 58(3): 202.
30. Cauty-Mitchell J, Zimet GD. Psychometric properties of the Multidimensional Scale of Perceived Social Support in urban adolescents. *American journal of community psychology*. 2000; 28(3): 391-400.
31. Rostami R, Shahmohamadi K, Ghaedi G, Besharat MA, Akbari Zardkhaneh S, Nosratabadi M. Relations among self-efficacy, emotional intelligence and perceived social support in university students. *The Horizon of Medical Sciences*. 2010; 16(3): 46-54. [In Persian]
32. Abootalebi Daryasari G, Vosoghi Karkezloo N, Mohammadnejad E, Namadi Vosooghi M, Kagi M A. Study of the self-care agency in patients with heart failure. *Iranian Journal of Critical Care Nursing*. 2012; 4(4): 203-208. [In Persian]
33. Liang CC, Tsan KW, Ma SM, Chow SF, Wu CC. The relationship between fasting glucose and HbA1c among customers of health examination

services. *Formos J Endocrin Metab.* 2010; 1(3):1-5.

34. Carlson B, Riegel B, Moser DK. Self-care abilities of patients with heart failure. *Heart &*

*Lung: The Journal of Acute and Critical Care.* 2001; 30(5): 351-9.