



# Application of Roy's Adaptation Model in Clinical Nursing: A Systematic Review

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**Received:** Nov 24 2021

**Accepted:** Jul 23 2022

## Citation to this article:

Hosseini M, Soltanian M. Application of Roy's Adaptation Model in Clinical Nursing: A Systematic Review. *J Iran Med Counc.* 2022;5(4):540-56.

## Abstract

**Background:** Adaptation is a process in which a person is actively involved for a period of time and uses different strategies. Roy's adaptation model sees individuals as an adaptive system in a stable interaction with internal and external environment; therefore, they constantly change and try to adapt. When the individual does not make the desired adaptation and hence ineffective responses, nurses learn about it. The present study aimed to systematically review the studies conducted in Iran on the Roy's adaptation model.

**Methods:** This is a systematic review study, and it has been done purposefully by focusing on research purpose. A computerized search was performed systematically with no time limitation till October 2021, by using keywords: Roy's adaptation model, Nursing and Iran in Web of Sciences, PubMed, Scopus, Google Scholar, IranDoc, SID and Magiran databases. The articles were evaluated using the Consort checklist. A total of 235 articles were found, and the systematic review of the articles was performed based on PRISMA. Finally, full text of 34 suitable articles were selected and analyzed after several steps of evaluation.

**Results:** Out of the reviewed articles, 23.52% were published in international journals in English and 76.47% were published in Iranian journals in Persian and English. All the articles were original researches and intervention studies that 5.88, 47.05, 41.17, and 5.88% of them were experimental, quasi-experimental, clinical trial, and randomized controlled trials, respectively. Also, in all the studies pre-test and post-test were used, 5.88, 88.23, and 5.88% of them utilized random, availability, and block sampling, respectively.

**Conclusion:** Application of care program based on the Roy's adaptation model increased physical and psychological adaptive (healthy) behaviors in patients with chronic diseases, which might improve the patients' psychological adaptation to the disease, proper disease control, reduction of complications, and quality of nursing care.

**Keywords:** Adaptation, Bibliometrics, Health behavior, Humans, Iran, Psychological

## Introduction

As a scientific profession, nursing requires a scientific basis that theory is its characteristic. Theory sets goals and provides a framework for examination, diagnosis, and nursing practices. Also, it is a tool that makes the clinical care more effective and helps to identify the effects and outcomes. If goals of nursing are not based on nursing perspective, nurses' time is wasted and the quality of care is endangered. When the goals are derived from the nursing knowledge and are clearly explained, patients and their families make more efforts to obtain nursing care (1). As professionals in treatment team, nurses play an important role in case finding, caring for, rehabilitating, and facilitating adaptation to new situations (2).

The application of nursing models in patient care programs is significant for several reasons: It provides a framework for the nurses to examine different conditions of patients, creates a kind of thought structure so that the nurses can better analyze the situation, organize their thinking, and come to the best decision (3). Using nursing theories in patient care is expected to improve care standards, reduce care costs, and promote patients' quality of life. Also, application of nursing theories in research and clinical practice may lead to the development of nursing knowledge (4).

One of the practical and effective models in nursing is the Roy's adaptation model that is commonly used in clinical models and research. The Roy adaptation model provides a context for the development of nursing science. Its theoretical assumptions have been tested in experimental studies (5).

Application of nursing models and theories, especially the Roy's adaptation model, is one of the strategies as an organized framework for evaluating the effectiveness of nursing practices and care programs. Various middle-range theories, such as the Roy adaptation model, were developed for different nursing situations in order to adapt and provide the necessary care with specific definitions and limited variables (6). The Roy's adaptation model is a useful framework for providing nursing care to patients in acute, chronic, and late stages of the disease. It sees individuals as an adaptive system in a stable interaction with internal and external environment; therefore, they constantly change and try to adapt (7).

Roy argues that nursing is required when the human system is sick or prone to illness, there are unusual stressors, adaptive mechanisms are weakened, and one's normal efforts to adapt are ineffective (2,8). To make the proper adaptation, Roy suggests that patients are expected to achieve physical and psychological adaptation (7,8-10). In her view, to maintain their integrity, individuals need to adapt to the surrounding stimuli in the abovementioned dimensions (9,11).

Recently, many studies have been conducted to evaluate the impact of these models in practice; a review of the literature showed that systematic review of RAM has often been practiced in Western culture (12,13). Given that the origin of the Roy adaptation model is in Western culture, there is little information regarding the application of assumptions and RAM alignment in the context of Iranian culture. Therefore, the purpose of this study was to summarize and report structurally the results of various studies conducted in Iran to identify challenges and strategies as evidence to guide clinical practices.

## Materials and Methods

This systematic review was conducted in PRISMA principles including five distinct stages of text search, text selection, data evaluation, data extraction, and data classification. The inclusion criteria in the present study were: the original articles published in reliable scientific journals, publication in Persian or English languages, access to the full text, Iranian study population, and evaluation of nursing care based on the Roy adaptation model in the study and following the principles of PICO. Exclusion criteria included: lack of access to the full text of the article, letter to the editor or articles published in unreliable journals.

In the present study, Web of Science, PubMed, Scopus, Google Scholar, IranDoc, SID and Magiran databases were used. The keywords Roy, Roy's adaptation model, adaptation, and adaptation model/theory/pattern/framework were also searched using two operators, OR and AND in accordance with the strategy (Roy[Title/Abstract]) OR (Roy's adaptation model [Title/Abstract]) OR (adaptation model [Title/Abstract]) OR (adaptation theory [Title/Abstract]) OR (adaptation pattern [Title/Abstract]) OR (adaptationframework [Title/Abstract]) AND

(Iran [Title/Abstract]).

This is a systematic review study, and it has been conducted purposefully by focusing on research purpose. A computerized search was performed systematically with no time limitation till October 2021. First, 235 articles were found in the Persian and English databases. Then a comprehensive search was conducted in Google, related journals, and unpublished sources. In the second stage, sources of the related articles selected in the first stage were searched. After careful study of the titles, abstracts, and full texts, a large number of articles were excluded due to irrelevance and duplication in two or more databases. Finally, 34 articles were included in the study (Figure 1).

Validity of the clinical trials was evaluated using standard checklists of the clinical trial reports (title, abstract, background and objective, participants, intervention, outcomes, sample size, randomization, blinding, statistical methods, study diagram, baseline information, number of analysis, limitations, generalizability, interpretation, registration number, financial resources) (14) and checklist of evaluating non-random designs including 20 items (title, abstract, background, participants, intervention, objective,

outcomes, sample size, sampling method, blinding, unit of analysis, follow-up, duration of follow-up, primary consistency, subgroup analysis, unexpected results, interpretation, generalizability, general evidence) (15). Then, it was separately evaluated by two researchers and the results were compared. In case of conflict, a consultation with the third party would be scheduled. Data were reduced, compared and summarized, and no interpretation was given to the results. Attempts were also made to use the same terms utilized by the author in the original articles.

## Results

First, 235 articles were found in the Persian and English databases. After careful study of the titles, abstracts, and full texts, a large number of articles were excluded because of irrelevance and duplication in two or more databases. In the second stage, sources of the related articles selected in the first stage were searched. In the third stage, a comprehensive search was conducted in Google, related journals, unpublished sources, and related books. Finally, 34 articles were included in the study.

A total of 34 articles were published in this study, which were published between October 2011 and

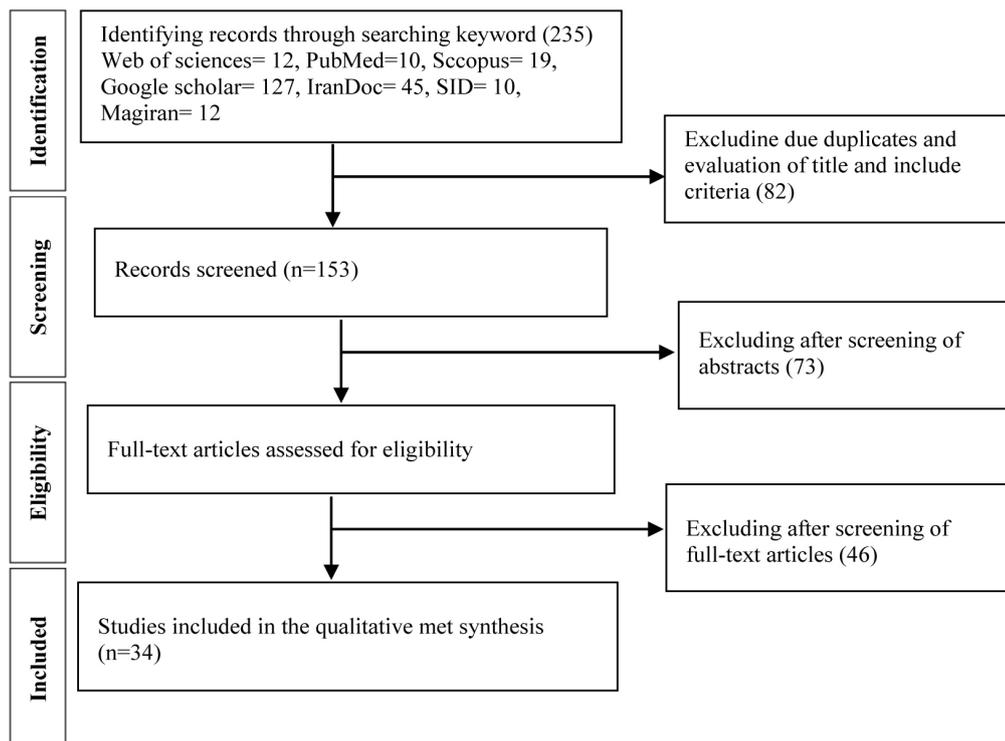


Figure 1 . Steps for selecting and screening the articles for systematic review based on PRISMA.

November 2019. Out of the reviewed articles, 8 (23.52%) were published in international journals in English and 26 (76.47%) were published in Iranian journals in Persian and English. Pre-test and post-test were used in all the studies, and 5.88, 88.23, and 5.88% of them utilized random, availability, and block sampling, respectively. The sample size also varied from 36 to 400 (for both experimental and control groups). The results extracted from the articles were in 3 main areas including intervention, study outcome, and study population. The results of the studies were shown in table 1.

### **Intervention**

**Education:** The interventions based on the Roy adaptation Model in these studies included the training - care program (16-49), training – counseling (18,26,31) and the training-supportive intervention (26,42). Most of the studies have shown that educating patients and their families have a great effect on the basic concepts of the Roy’s model (17,19,41,44,47); however, education alone cannot lead to chronic disease control.

In the reviewed articles, the educational program has been developed as one of the following modalities:

A) Clinical education, in group (groups of 4 to 10) (17-23,25-31,33-36,38-45,47,48), and in combination (2-8 sessions of 20-120 minutes) (16,24,32,37,46,49); with no follow-up and 3-months follow-up in person, by phone or the Web using educational methods, including lectures, group discussions, Q&A, PowerPoints, booklets, pamphlets, posters, pictures, videos, CDs, and educational brochures.

B) In most of the reviewed articles, in addition to the intervention based on the Roy’s model, researchers used educational-supportive intervention (26,42). Accordingly, individuals were involved in identifying their maladaptive behaviors, the stimuli causing those behaviors, and related educational needs to adapt to the disease process, thus increasing their abilities to deal with the stimuli.

C) General education was based on four dimensions of physiological, self-concept, dependence/independence, and role-playing. Also, in most studies, researchers used telephone follow-up along with the main intervention (16-20,21,23,29-32,39,46-49).

### **Training-care program**

In most studies, the interventions, in addition to the educational intervention, included care interventions designed based on the concepts of the Roy Model. The results of these studies have shown that the care program designed base on the Roy model had a great effect on the well-being of the patients. One of the features of the Roy adaptation model is the acceptance of the disease and its related care, during an agreement program between the patient and the nurse. Another characteristic of the “Roy” adaptation model is that it examines the patient in a principled and very precise way through interviewing, observing and measuring, and then the maladaptive behaviors, which are in fact problems of the patients, in four dimensions with determining the stimuli (reasons) of behaviors (50,51). Using a care program based on the “Roy” adaptation model, adaptive (healthy) behaviors in the patient are increased and finally, the reduction of disease complications, which is the most important goal in care, is achieved in patients.

### **Training-counseling**

In some of the reviewed articles, in addition to the intervention based on the Roy’s model, researchers used counseling–support intervention. The purpose of these counseling– support sessions was to answer the patients’ questions and create a sense of support and encouragement in them (26,42).

In 34 included articles, various issues have been considered as the objectives of the intervention based on the Roy’s adaptation model, including fatigue, its severity and impacts (16,29), adaptation, promotion of adaptation and dimensions of adaptation (19,21,29-31,40,42), resilience (44,48), self-perception (18), quality of life (23,27,44,45,47), spiritual well-being (25,34,41), self-esteem (24), life activities, self-efficacy, adherence to diet, hospitalization prediction (39), severity of depression (46), anxiety and stress (46), general health (49), and coping strategies (39).

### **Patient and roy adaptation model**

In general, a wide range of diseases were examined in the studies, including renal failure treated with hemodialysis (16,20,21), multiple sclerosis (35,37,49), heart failure (22,23,28,45), stroke (28,38),

**Table 1.** Summary of the studies on the Roy's adaptation model in Iran

Author/Year/ City	Objectives	Type of study/ study design/ sampling method/sample size	Instruments	Results	Quality score
Asgarpour <i>et al</i> (2011), Mashhad (16)	Determining the effect of care program based on the Roy's adaptation model on fatigue in hemodialysis patients	Clinical trial, pre-test and post-test, availability sampling, random allocation, 54 patients undergoing hemodialysis	Piper fatigue scale and Roy's adaptation model form	There was no significant difference between the two groups in terms of fatigue before the intervention ( $p=0.895$ ), though after the intervention, the difference was significant ( $p<0.001$ ). The mean fatigue in the experimental group decreased by 19.2%.	14
Taghavi <i>et al</i> (2012), Tehran (17)	Evaluating the effect of educational program based on the Roy's adaptation model on mothers of educable mentally retarded children	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 40 mothers with educable mentally retarded child	Adaptation Models Questionnaire (AMQ)	Comparison of adaptation model scores in pre-test and post-test showed a significant difference in all adaptation modes ( $p<0.001$ ).	21
Sadeghnejad Foroutagheh <i>et al</i> (2011), Mashhad (18)	Determining the effect of care program based on the Roy's adaptation model on psychological adaptation of patients with type 2 diabetes	Quasi-experimental, pre-test and post-test, random sampling, 60 patients with type 2 diabetes	Roy's review form and adaptation strategies questionnaire	Paired t-test showed that the two groups were similar in terms of demographic variables ( $p>0.05$ ). Paired t-test showed a significant decrease in glycosylated hemoglobin ( $p<0.05$ ) and Wilcoxon test showed a significant decrease in the number of maladaptive behaviors in the experimental group after intervention (in self-perception, independence and dependence) ( $p<0.05$ ).	24
Akbarzadeh Arani <i>et al</i> (2012), Aran and Bidgol (19)	Determining the effect of education based on the Roy's adaptation model on social adaptation of mothers of educable mentally retarded children	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 40 mothers with educable mentally retarded child	A researcher-made questionnaire consisting of 50 questions based on four dimensions of Roy's adaptation theory	The mean scores of social adaptation in mothers of educable mentally retarded children showed a significant difference in physiological dimension, self-perception, dependence/independence, role-playing and total social adaptation, before and after education ( $p<0.001$ ).	22

Contd. table 1

Amini <i>et al</i> (2012), Mashhad (20)	Determining the effect of care program based on the Roy's adaptation model on daily activities of patients undergoing hemodialysis	Clinical trial, pre-test and post-test, random sampling, 54 patients undergoing hemodialysis	Roy's adaptation model review form, para-clinical findings checklist, follow-up care checklist, and performance-dialysis status checklist	There was no significant difference between the two groups in daily activities before the intervention ( $p=0.060$ ), while after the intervention there was a significant difference between the two groups ( $p<0.001$ ). Daily diets after the intervention showed a significant increase compared to before the intervention, while no significant difference was observed in the control group.	21
Afrasiabifar <i>et al</i> (2013), Yasuj (21)	The effect of education based on the Roy's adaptation model on adaptation of patients undergoing hemodialysis	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 59 patients undergoing hemodialysis	Questionnaire based on the Roy's adaptation model	The mean scores of physiological and self-conception dimensions in the experimental and control groups showed a significant difference ( $p=0.01$ and $p=0.03$ , respectively); and a statistical difference ( $p=0.04$ ) was observed between the two groups in the mean score of the role-playing dimension. There was no significant difference between the two groups in terms of mean score of the interdependence dimension.	29
Naeem Hassani <i>et al</i> (2013), Birjand (22)	Determining the effect of educational program based on the Roy's adaptation model on mental adaptation of heart failure patients	Clinical trial, pre-test and post-test, availability sampling, random allocation, 60 patients with heart failure	Roy's assessment and recognition form and Mental Health Inventory (MHI-38)	The mean score of psychological adaptation and the number of maladaptive behaviors before the intervention were not significantly different between the two groups, while after the intervention there was a significant difference ( $p<0.001$ ). In the experimental group, a significant decrease was observed in the number of maladaptive behaviors in the physiological dimension ( $p<0.001$ ), self-perception ( $p<0.001$ ), role-playing ( $p<0.001$ ), independence and dependence ( $p=0.004$ ) after the intervention. The mean score of patients' psychological adaptation in the experimental group increased significantly after the intervention ( $p<0.001$ ), but no significant difference was observed in the control group ( $p>0.05$ ).	26

Contd. table 1

Khajeh Goodari <i>et al</i> (2014), Tabriz (23)	Determining the effect of educational program based on the Roy's adaptation model on quality of life of patients with heart failure	Clinical trial, pre-test and post-test, availability sampling, random allocation, 44 patients with class II and III heart failure	Minnesota Living with Heart Failure Questionnaire (MLHFQ), Interpersonal Support Evaluation List (ISEL) and 6-Minute Walking Test (6MWT)	Statistical tests showed a significant difference in physical, emotional and total quality of life ( $p < 0.001$ ) in the intervention group, but no significant difference was observed in the control group. There was also a statistically significant increase in 6 MWT in the intervention group before and 3 months after the intervention ( $p < 0.001$ ).	28
Maghsoodi <i>et al</i> (2014), Urmia (24)	Determining the effect of implementing a care program based on the Roy's adaptation model on self-esteem of the elderly	Experimental, pre-test and post-test, availability sampling, 60 elderly people living in nursing home	Rosenberg self-esteem scale	The mean score of elderly self-esteem after the intervention in the two groups were statistically significant ( $p < 0.001$ ). The mean scores of the elderly self-esteem in the intervention group increased after the implementation of the care program ( $p < 0.001$ ).	31
Maghsoodi <i>et al</i> (2015), Urmia (25)	Determining the effect of implementing a care program based on the Roy's adaptation model on self-efficacy of the elderly	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 60 elderly people living in nursing home	Standard self-efficacy questionnaire	The mean score of self-efficacy was significantly different between the two groups ( $p < 0.001$ ). The mean score of self-efficacy of the elderly in the intervention group increased and the results of paired t-tests showed a significant increase ( $p < 0.001$ ).	31
Mohammad-pour <i>et al</i> (2016), Gonabad (26)	The effect of intervention (educational) based on the Roy's adaptation model on physical and interpersonal self-perception of pregnant women	Controlled clinical trial, random sampling, 83 primiparous pregnant women	Questionnaire to assess the level of the Roy's adaptation in the dimension of self-perception	Before the intervention, there was no significant difference between the two groups in terms of adaptation knowledge and self-concept. However, after the intervention, these differences were statistically significant.	26
Borzou <i>et al</i> (2015), Hamedan (27)	The effect of using Roy's adaptation model in clinical nursing (Educational care programs) on quality of life in patients with type 2 diabetes	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 60 patients with type 2 diabetes	Disease-specific health-related quality of life instruments in Diabetes (D-39)	Comparison of the mean scores of quality of life in the two groups before and after the intervention showed a significant difference in terms of diabetes control, energy, mobility, and social support ( $p < 0.01$ ); however, in the terms of stress, anxiety and sexual activity, no significant difference was observed ( $p > 0.05$ ).	31

Contd. table 1

<p>Alimohammadi <i>et al</i> (2015), Isfahan (28)</p>	<p>Determining the effect of care program based on the biological dimension of the Roy's adaptation model on the physiological adaptation of stroke patients</p>	<p>Clinical trial, pre-test and post-test, availability sampling, random allocation, 50 patients with heart failure</p>	<p>Forms related to the Roy's adaptation model</p>	<p>The mean score of adaptation in the physiological dimension in the case group after the intervention (<math>p &lt; 0.001</math>) was significantly different from before the intervention. Comparison of the mean scores of adaptation changes in patients with stroke in the study and control groups showed a significant increase in the physiological dimension with an average of 47.30 after the intervention (<math>p &lt; 0.001</math>).</p>	<p>21</p>
<p>Hemmati Maslak Pak <i>et al</i> (2015), Urmia (29)</p>	<p>Determining the effect of care program based on the Roy's adaptation model on quality of life of people living nursing home</p>	<p>Quasi-experimental, pre-test and post-test, Availability sampling, random allocation, 60 elderly people living in nursing homes</p>	<p>Quality of Life short-form 36 (SF-36)</p>	<p>The mean score of quality of life was significantly different from each other (<math>p &lt; 0.001</math>). In addition, paired t-test showed that after the intervention, the quality of life in the experimental group increased significantly.</p>	<p>31</p>
<p>Azarmi <i>et al</i> (2015), Tehran (30)</p>	<p>Determining the effect of guided education and the Roy's adaptation model on improving the adaptation of veterans with lower limb amputation</p>	<p>Double-blind, pre-test and post-test clinical trial, availability sampling, 60 veterans with lower limb amputation</p>	<p>Roy's adaptation model questionnaire</p>	<p>Independent t-test showed a statistically significant difference between the two groups in terms of total adaptation score (<math>p = 0.001</math>) as well as physiological dimensions (<math>p = 0.001</math>) and role-playing (<math>p = 0.004</math>). Total adaptation score (<math>139.43 \pm 5.45</math> to <math>127.54 \pm 14.55</math>); (<math>p = 0.006</math>) and physiological scores (<math>60.26 \pm 5.45</math> to <math>53.73 \pm 7.79</math>); (<math>p = 0.001</math>) and role playing (<math>20.30 \pm 2.42</math> to <math>18.13 \pm 3.18</math>); (<math>p = 0.01</math>) significantly increased in the intervention group, while the scores of self-conception (<math>42.10 \pm 4.71</math> to <math>39.40 \pm 5.67</math>, <math>p = 0.21</math>) and interdependence (<math>16.76. 2.22</math> to <math>16.30. 2.57</math>, <math>p = 0.44</math>) were not significantly different between the two stages.</p>	<p>30</p>

Contd. table 1

Mohammad-pour <i>et al</i> (2015), Gonabad (31)	The effect of intervention based on the Roy's adaptation model on self-perception in pregnant women	Controlled clinical trial, random sampling, 83 primiparous pregnant women	Questionnaire to assess the level of Roy's adaptation in the dimension of self-perception	Adaptation scores in self-perception in the two groups before the intervention were 26.38±56.7 and 73.40±21.8, respectively; however, after the intervention, the scores in the two groups were 69.30±46.4 and 29.41±40.8, respectively.	31
Feghhi <i>et al</i> (2016), Birjand (32)	The effect of education program based on the Roy's adaptation model on psychosocial adaptation of patients with type 2 diabetes	Quasi-experimental, pre-test and post-test, availability sampling, block allocation, 60 patients with type 2 diabetes	Psychosocial adaptation questionnaire	In the case group, after the intervention, except for the sexual relations (p=0.66), in knowledge and attitude towards illness, work environment, family environment, family relationships, social environment, psychological disorders, there was a significant decrease (p<0.05). In the control group, the mean score of psychosocial adaptation increased significantly only in the family environment after the intervention (p=0.002).	26
Shahed <i>et al</i> (2016), Mashhad (33)	Determining the effect of educational support program based on Roy's adaptation model on marital satisfaction of patients with mastectomy receiving chemotherapy	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 69 patients with mastectomy receiving chemotherapy	ENRICH: Marital Satisfaction Scale	In the experimental group, paired t-test showed an increase in marital satisfaction from 24.7±2.6 to 32.9±3.5 (p=0.03). In the control group, no statistically significant difference was observed (p=0.63).	27
Maghsoudi <i>et al</i> (2016), Urmia (34)	Determining the effect of health care program based on the Roy's adaptation model on spiritual well-being of the elderly living nursing homes	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 60 elderly people from nursing home	SWB questionnaire	The mean total scores of the dual SWB subscale and the mean SWB were statistically significant (p<0.001). Also, the mean score of SWB increased in intervention group after the care program. According to the T-test, the increase was significant p<0.001).	27
Maleki <i>et al</i> (2015), Urmia (35)	Determining the effect of implementing a care program based on the Roy's adaptation model on the severity and effects of fatigue in patients with multiple sclerosis	Quasi-experimental, pre-test and post-test, availability sampling, 80 patients with multiple sclerosis	Fatigue severity scale	Before the intervention, the mean scores of fatigue severity were not statistically significant. After the intervention, the mean score of fatigue severity significantly decreased (p<0.001).	23

Contd. table 1

<p>Farsi <i>et al</i> (2016), Ahvaz (36)</p>	<p>Determining the effect of guided education based on the Roy's adaptation model on adaptive strategies of veterans with lower limb amputation</p>	<p>Double-blind clinical trial, pre-test and post-test, availability sampling, random allocation, 60 veterans with lower limb amputation</p>	<p>Lazarus and Folkman coping strategies questionnaire</p>	<p>Independent t-test showed that the score of coping strategies in the pre-intervention stage was not statistically significant (<math>p&gt;0.05</math>); however, there was a significant difference between the two groups after the intervention.</p>	<p>34</p>
<p>Hemmati Maslak Pak <i>et al</i> (2016), Urmia (37)</p>	<p>Determining the effect of implementing a care program based on the Roy's adaptation model on the effects of fatigue in patients with multiple sclerosis</p>	<p>Quasi-experimental, pre-test and post-test, availability sampling, 80 patients with multiple sclerosis</p>	<p>Fatigue impact scale</p>	<p>Before the intervention, the mean score of the fatigue impact and its dimensions were not significantly different between the two groups; however, the scores significantly decreased after the intervention based on the Roy's adaptation model in the intervention group (<math>p&lt;0.001</math>).</p>	<p>26</p>
<p>Maliki <i>et al</i> (2016), Isfahan (38)</p>	<p>The effect of a care program based on the Roy's model on improving the social and psychological status of stroke patients</p>	<p>Clinical trial, pre-test and post-test, availability sampling, random allocation, 50 patients with stroke</p>	<p>Researcher-made form based on Roy's adaptation model</p>	<p>Before the intervention, the mean score of adaptation in the psychological dimension adaptation (self-perception and independence/dependence) and social dimension (role playing) was not significantly different, while after the intervention, the difference was significant (<math>p .001</math>).</p>	<p>24</p>
<p>Aramesh <i>et al</i> (2017), Mashhad (39)</p>	<p>Determining and comparison of ESI triage with nursing triage based on physiological dimension of Roy adaptation model in predicting the need for ICU hospitalization in patients with head trauma</p>	<p>Clinical trial, block method based on admission day, 400 patients with head trauma</p>	<p>ESI triage form designed in hospital, triage form based on Roy adaptation model designed by the research team</p>	<p>Kappa test showed that there was no significant difference between ESI triage and Roy triage in terms of ICU admission in the first stage (<math>p=0.123</math>), but in terms of admission continuity, Roy triage had significantly less error in prediction of continued hospitalization in the ICU or transfer to the ward (<math>p=0.012</math>).</p>	<p>24</p>
<p>Hamzehpour <i>et al</i> (2017), Sanandaj (40)</p>	<p>Determining the effect of care program based on Roy's adaptation model in physiological dimension on the level of consciousness of intensive care unit patients</p>	<p>Clinical trial, pre-test and post-test, availability sampling, random allocation, 100 patients in intensive care unit</p>	<p>GCS scale</p>	<p>The mean level of consciousness in the first to third times did not show a significant difference between the control and intervention groups (<math>p&lt;0.001</math>). There was a significant difference between the two groups in terms of the mean level of consciousness measured on the fourth day and night (<math>p&lt;0.001</math>).</p>	<p>24</p>

Contd. table 1

<p>Otaghi <i>et al</i> (2018), Ahvaz (41)</p>	<p>The effect of care program based on Roy's adaptation model on spiritual well-being of women with breast cancer</p>	<p>Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 40 women with breast cancer</p>	<p>SWBS scale</p>	<p>Prior to the intervention, there was no significant difference between the two groups in terms of mean score of spiritual well-being. However, the score increased significantly in the experimental group after the intervention (99.99±4.93) (p=0.001). In addition, the spiritual well-being score decreased in the control group after the intervention (72.02±3.58), though, it was not statistically significant.</p>	<p>28</p>
<p>Mastaelizadeh <i>et al</i> (2018), Zabol (42)</p>	<p>The effect of nursing intervention based on the Roy's adaptation model on adaptation of patients with type 2 diabetes</p>	<p>Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 48 patients with type 2 diabetes</p>	<p>Roy's review and recognition form and adaptation strategies questionnaire</p>	<p>There was no statistically significant difference between maladaptive behaviors in the three dimensions of self-perception, role-playing, independence/dependence in the experimental and control groups before the intervention. However, after the intervention, the number of maladaptive behaviors in these dimensions significantly decreased in the experimental group (p&lt;0.05).</p>	<p>16</p>
<p>Alimohammadi <i>et al</i> (2018), Isfahan (43)</p>	<p>The effect of a care program based on the Roy's adaptation model on adolescents with asthma</p>	<p>Clinical trial, pre-test and post-test, availability sampling, random allocation, 46 patients with asthma</p>	<p>A questionnaire based on the Roy's adaptation model</p>	<p>The mean age of adolescents with asthma in the intervention and control groups was 15.8±3.5 and 14.8±3.5 years, respectively. Also, the mean score of maladaptive behaviors in the intervention group before and after education in the four dimensions of physiology, self-concept, role playing and interdependence was significantly different (p&lt;0.001); however, in the control, there was no significant difference (p&gt;0.05).</p>	<p>24</p>

Contd. table 1

<p>Hatami <i>et al</i> (2018), Gorgan (44)</p>	<p>Determining the effect of the Roy's adaptation model on the resilience of mothers of children receiving chemotherapy</p>	<p>Quasi-experimental, pre-test and post-test, simple random sampling, 36 mothers of children receiving chemotherapy</p>	<p>Connor-Davidson Resilience Scale</p>	<p>Paired t-test showed a significant difference between the two groups before and after the intervention. Also, independent t-test did not show a significant difference in the control group before and after the intervention, however, it showed a significant difference in the experimental group (<math>p&gt;0.01</math>).</p>	<p>34</p>
<p>Mansouri <i>et al</i> (2018), Ahvaz (45)</p>	<p>Determining the effect of educational program based on the Roy's adaptation model on quality of life of patients with heart failure</p>	<p>Clinical trial, pre-test and post-test, availability sampling, random allocation, 76 patients with heart failure</p>	<p>Minnesota Living with Heart Failure Questionnaire (MLHFQ)</p>	<p>Patients in the intervention group showed a statistically significant improvement in physiological dimension, performance, role, dependence/independence and total score of Roy's adaptation model over time (<math>p&lt;0.05</math>). The mean score of all three dimensions of quality of life and the total score of quality of life significantly increased (<math>p&lt;0.05</math>).</p>	<p>25</p>
<p>Aghakhani <i>et al</i> (2019), Urmia (46)</p>	<p>The effect of a care program based on the Roy's adaptation model on the severity of depression, anxiety and stress in patients with colorectal cancer</p>	<p>Clinical trial, pre-test and post-test, availability sampling, 36 patients with colorectal cancer</p>	<p>Review and Recognition Form of Roy's Adaptation model and Depression, anxiety, and Stress scale (DASS-21)</p>	<p>In the pre-intervention stage, the mean scores of depression, anxiety and stress in the two groups had no statistically significant difference (<math>p&gt;0.05</math>); however, in the post-intervention stage, the mean scores of the mentioned variables in the control group increase and in the intervention group decreased. And there was a statistically significant difference between the two groups (<math>p&lt;0.05</math>).</p>	<p>26</p>
<p>Nezameslami <i>et al</i> (2019), Bushehr (47)</p>	<p>The effect of adaptation education on quality of life of home caregivers for the mentally ill</p>	<p>Clinical trial, pre-test and post-test, availability sampling, random allocation, 50 home carers of mentally ill patients</p>	<p>Quality of Life short-form 36 (SF-36)</p>	<p>Based on the results of independent t-test, the mean score of total quality of life before the intervention between the two groups was not significant (<math>p&gt;0.05</math>), but the test results showed a statistically significant difference between the two groups in terms of mental health dimension (<math>p&lt;0.05</math>). Comparing the scores before and after the intervention, only a significant difference was observed in the experimental group (<math>p&lt;0.05</math>).</p>	<p>26</p>

Contd. table 1

Bazrafshan <i>et al</i> (2019), Gonbad Kavous (48)	Determining the effect of the Roy's adaptation model on the resilience of mothers with mentally retarded children	Experimental, pre-test and post-test, random allocation, 50 mothers with mentally retarded children	CD-RIS Resilience Questionnaire	Before and after the intervention, resilience in the control group was 54.12±16.67 and 68.11±56.65, respectively; in the experimental group, it was 37.17±32.72 and 92.12±72.82, respectively. Independent t-test did not show a significant difference between the two groups before the intervention (p=0.12), but there was a significant difference after the intervention (p<0.05). Paired t-test before and after the intervention in the two groups showed a significant difference (p<0.01). By removing the pre-test effect, covariance test showed a significant difference between the experimental and the control group before and after the intervention. ETA coefficient and effect of the intervention was 0.39.	26
Mohammadi <i>et al</i> (2019), Shahrekord (49)	Evaluating the effect of the Roy's adaptation model on general health of children of patients with multiple sclerosis	Quasi-experimental, pre-test and post-test, availability sampling, random allocation, 80 children of patients with multiple sclerosis	General Health Questionnaire (GHQ 28)	Prior to the intervention, the mean score of general health between the two groups were not statistically significant (p=0.716). But immediately after the intervention (p=0.025) and two months after the intervention, there was a significant difference (p<0.001). General health scores in the intervention group showed a significant increase.	30

type 2 diabetes (18,27,32,42), cancer (33,41,44,46), lower limb amputation (30,36), and asthma (43). In addition to patients, their families and caregivers were also included in these studies (17,19,41,44,47).

## Discussion

The present study aimed to systematically review the studies conducted in Iran on the Roy's adaptation model. Since the researchers paid special attention to not losing the valuable results of these studies, and despite the large volume of studies based on the Roy's adaptation model, diversity in terms of intervention,

type of disease in the study population, and number of samples, no filtering was applied in the present study. Among different adaptation models, only the Roy's model has a biological holistic approach. The model sees individuals as biological, psychological, and social beings who interact with their surroundings and use adaptation mechanisms to communicate and maintain balance (48). The results of these studies showed that the included studies were focused on three components of stimuli, adaptive behavior, and maladaptive behavior, which are consistent with other studies that reviewed the studies designed based

on the Roy model framework (52,53). According to the model, the degree of adaptation depends on the type of stimulus and how the person responds to the stimulus. In general, there are three types of stimuli including Focal stimuli, Contextual stimuli and Residual stimuli (49).

The results of the present study showed that the interventions targeted the physiological dimensions, self-concept and interdependence, and Role playing which is consistent with the results of other studies (54,55).

The cognitive regulators and subsystems' responses lead to adaptation in four dimensions: physiological dimension which includes the five physiological needs such as oxygenation, defecation, activity, rest, nutrition, and protection (10). Self-perception dimension focuses on psychological aspects, personal beliefs, feelings, and thoughts (10,56). Role-playing dimension consists of behaviors related to the primary, secondary and tertiary roles that individuals play in the society, as well as the expectations that must be met by individuals in each of these roles. Social integrity is the goal of this dimension (10). Independence/dependence dimension which includes adaptation mechanisms arising from closed relationships leading to love, respect, and value. Dependence includes needs that must be met by others. On the other hand, independence includes needs that a person alone can meet. There must always be a balance between the two to keep the human system in balance (10,56).

Application of Roy's theoretical framework in nursing studies contributes to describe different responses of human being to disease and health conditions. Roy's theoretical framework can also be used to investigate chronic patients' experiences, clarify their different responses, and change maladaptive behavior into adaptive behavior. This model is specifically designed to determine the types of responses of chronic patients and helps to accurately identify the needs of a chronic patient at different stages of the disease (57). The results of this study showed that for this purpose, many studies have been conducted in Iran which have used the Roy adaptation model in different chronic diseases with different target populations. The use of this model has been effective in caring and evaluating the degree of adaptation (24-44). This model has also been utilized in some cases for the family and

community (17,19,41,44,47).

An extensive review of 34 articles in the present study suggested that the Roy's adaptation model can be an appropriate framework for evaluation, caring for, intervention, and control of chronic diseases. Application of the Roy's adaptation model in the treatment of chronic diseases is an important factor in involving the patients in the treatment process and helping the nurses to make the best decision. Identification of unknown behavioral stimuli through nursing examinations leads to discovering the exact causes of patients' maladaptive behaviors and thus helping nurses design an accurate plan to solve the patients' problems (maladaptive behaviors). The results of the present study indicated that the studies used different interventions designed based on the Roy's adaptation pattern individually or in combination. These interventions were also used in the field of various diseases and conditions. This represents that the adaptation model is being dynamically complemented by significant contributions to theory, methods and practice through research in different parts of the world. Researchers, including Roy, continue to explore issues such as mood and characteristics with his colleagues.

This study is one of the first studies that has systematically examined the application of a nursing model in research in Iranian society. According to Hassankhani, many factors prevent the model from operationalizing in Iran, including socio-cultural barriers, knowledge and awareness barriers, and executive barriers (58).

The present study had some limitations. Among the most important of which were the impossibility of using unpublished studies, low quality of some articles and non-compliance of articles with CONSORT checklist (though in none of the articles, was there a high probability of bias or incorrect recording of data). Heterogeneity of the articles in terms of conditions, location, study population, type of disease, and type of study were among the other limitations.

## Conclusion

According to the results, application of a specific nursing model in the workplace created a common understanding of individuals and their health-related needs among nurses, and thus more uniform and

improved nursing care. Each of the four dimensions had important implications for the planning and delivery of nursing services. Nurses need theories and models that are most useful in their work situations; therefore, it is recommended to conduct further studies on the comprehensive application of the model by health care professionals, especially nurses in clinical settings to provide more effective care to

patients and improve their quality of life.

### Acknowledgements

The authors would like to thank the researchers who used the results of their study in this article.

### Conflict of Interest

The authors declared no conflict of interest.

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