

# Strategies for Improving Nurses' Performance Regarding Cardiovascular Patient's Adherence to Treatment Regimen: Content Analysis

## Abstract

**Background:** Patient adherence to the treatment regimen is an important goal of treatment; finding appropriate strategies to improve treatment adherence is a nursing challenge. This study aimed to explore strategies to improve nurses' performance to enhance cardiovascular patients' adherence to treatment regimens. **Materials and Methods:** This is a qualitative content analysis study that was performed in an educational hospital of the Urmia University of Medical Science. Data were collected through semi-structured individual and group interviews. Sixteen individual interviews were conducted with nurses, patients, and physicians. A focus group was conducted with the presence of six nurses and nursing managers. Data were analyzed by conventional content analysis using MAXQDA 2020. **Results:** After analyzing the interviews, five strategies were explored; these strategies include: follow-up of the patient after discharge (systemic and organizational follow-up, educational follow-up, counseling follow-up, and motivational follow-up), sending reminders for necessary cases to the patients (risk reminders, care reminders); improving patient education methods (modern and up-to-date education, conventional and routine education), improving support services (home care services, social support, Psychological support), and optimizing the structure and processes of the hospital (making structural changes, making process changes). **Conclusions:** Much needs to be done to improve patient's adherence to treatment. Nurses are at the forefront of this work. In this study, we introduced ways to improve nurses' performance in order to increase patient adherence.

**Keywords:** Medication adherence, nurses, patient acceptance of health care, patient compliance, patient education, qualitative research

## Introduction

A third of the world's death is caused by cardiovascular pathologies.<sup>[1]</sup> Ischemic Heart Disease (IHD) and Cardiovascular Disease (CVD) are the leading causes of death worldwide.<sup>[2]</sup> Although the risk of cardiovascular ischemia is reduced by up to 80% with the use of aspirin, antihypertensive, antihyperlipidemic, and serum cholesterol-lowering drugs, about 30–50% of adults with CVD, do not pay attention to recommendations and do not take medication as prescribed.<sup>[3]</sup> As soon as a patient is discharged from the hospital, the rate of adherence to the medication regimen gradually decreases.<sup>[4]</sup> Also, to treat this disease, long-term drug treatments are usually needed which are effective in controlling the disease, but about 50% of patients do not take them as prescribed.<sup>[5]</sup>

It contributes to reduced medication compliance, including “patient-related factors”: suboptimal health literacy and lack of involvement in treatment decision making, “physician-related factors”: complex medication prescribing, and communication; and those related to the medical system: time-limited medical visits, restricted access to care, and lack of medical information technology. The barriers to medication compliance are complex and diverse, so solutions to improve medication compliance must be multifactorial.<sup>[5]</sup> In most cases, the patient's nonadherence to the medication regimen leads to treatment failure.<sup>[6]</sup> Adherence is defined as the extent to which a patient's behavior follows treatment recommendations.<sup>[7]</sup> Nonadherence to treatment has various causes and factors. Patients' medication adherence is very important and this has been addressed

Soroor Parvizey<sup>1</sup>,  
Yaghoob Nadery<sup>1</sup>,  
Parvaneh  
Khorasani<sup>2</sup>,  
Aram Feizi<sup>3</sup>

<sup>1</sup>University of Medical Sciences, Tehran, Iran, Pediatric Nursing Department, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran, <sup>2</sup>Nursing and Midwifery Care Research Center, Department of Community Health and Geriatric Nursing, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, <sup>3</sup>School of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran

**Address for correspondence:**  
Dr. Yaghoob Nadery,  
Iran West Azerbaijan, Boukan  
City, Saheli Boulevard, Bahrami  
Street, Sahel 1 Alley, Iran.  
E-mail: nadery2013@hotmail.  
com

### Access this article online

**Website:** <https://journals.iww.com/jnmr>

**DOI:** 10.4103/ijnmr.ijnmr\_17\_22

### Quick Response Code:



**How to cite this article:** Parvizey S, Nadery Y, Khorasani P, Feizi A. Strategies for improving nurses' performance regarding cardiovascular patient's adherence to treatment regimen: Content analysis. Iran J Nurs Midwifery Res 2023;28:758-63.

**Submitted:** 17-Jan-2022. **Revised:** 28-Dec-2022.  
**Accepted:** 31-Dec-2022. **Published:** 09-Nov-2023.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow\_reprints@wolterskluwer.com

in several studies<sup>[8-10]</sup> Researchers studied nurses' performance,<sup>[11,12]</sup> and introduced some strategies for improving patients' adherence to treatment.<sup>[13]</sup> Although practice standards have been introduced for this issue,<sup>[14]</sup> the role of the nurse or nurse practitioners in patient education and adherence to treatment has been less qualitatively investigated. Nurses often have an established personal relationship with patients before they receive medication;<sup>[15]</sup> therefore, they are always looking for ways to improve patients' adherence to treatment. The main goal of this study was to identify Strategies for Improving Nurses' Performance Regarding Cardiovascular Patient's Adherence to Treatment Regimen.

## Materials and Methods

This study is part of qualitative action research that started in June 2018 and lasted for 2 years. The study has been conducted with conventional qualitative content analysis using MAXQDA 2020. Qualitative content analysis is a widely used research technique<sup>[16]</sup> to analyze text data.<sup>[17]</sup> The purposive sampling method is used to select knowledgeable individuals.<sup>[18]</sup> Patients, physicians, and nurses from the cardiac ward and Cardiac Care Unit (CCU) in an educational hospital affiliated with the Urmia University of Medical Science were invited to participate. Data were gathered through 16 semi-structured individual interviews and a focus group with the presence of six nurses and nurse managers. Each interview lasted about 30 to 40 min and was located in the training room of the CCU, which was a quiet place. The time of the interviews was chosen in coordination with the interviewees in the morning or evening shifts.

The main questions in the interview were: "What can nurses do to improve medication adherence in cardiovascular patients? What are the best strategies in this regard?" followed by probing questions.

To increase the rigor and credibility of the data, member check, peer check, inversion, and prolonged engagement with participants and data were used. All interviews were recorded, and transcribed within a short period of time. To ensure data accuracy, the text was controlled and edited several times in concordance with recorded audio files. Each interview was coded immediately after execution using conventional content analysis. All sentences and paragraphs were read word by word, and then, the most appropriate code was selected for each sentence or paragraph. Similar codes were placed below categories and subcategories, and finally, themes were identified and revealed.

## Ethical considerations

This study has an ethical approval code IR.IUMS.REC.1398.253 from the Iran University of Medical Sciences which was received in 2018. All participants participated in the study with full informed consent. Before conducting the interviews, the researcher spoke to all

study participants and consent forms were filled out for all participants.

## Results

The study was conducted with 16 men and women aged 30 to 50, including 12 nurses, two physicians, and two patients. Six nurses also participated in the group interview. Participants' education varies from bachelor's degree to doctorate. After analyzing the interviews, five strategies were identified, including "follow-up of the patient after discharge" (systemic and organizational follow-up, educational follow-up, counseling follow-up, and motivational follow-up), "Sending reminders to patient for specific and necessary issues" (risk reminders, care reminders); "Improving methods of patient education" (modern and up-to-date education, conventional and routine education), "Improving support services" (home care, social support, and psychological support services), and "Optimizing the structure and processes of the hospital" (making structural changes, making process changes). Themes, categories, and subcategories related to mentioned strategies are presented in Table 1.

**Follow-up of the patient after discharge:** After analyzing the data, one of the themes that were revealed was the follow-up of the patients after discharge, which had four categories: systemic and organizational follow-up, educational follow-up, counseling follow-up, and motivational follow-up.

**Systemic and organizational follow-up:** Participants in this study stated that nurses should follow up on the cardiovascular patient's adherence to the medication regime after discharge. "I think patients who need follow-up should be referred to the patient education unit and the home care unit. The patient's education really should be to follow up," said one nurse (N13).

**Educational follow-up:** One of the important points mentioned in the interviews of the participants is educational follow-up. "The system needs to move towards patient independence," says one nurse in the field (N13).

**Counseling follow-up:** Providing telephone and online nursing counseling to patients has also been emphasized in interviews. One patient (P1) states, "When I have a problem, being able to consult with someone with medical information is very helpful."

**Motivational follow-up** means motivating the patient to follow a medication regimen by giving a warning or life expectancy. "We have to warn the patient if you do not take the medicine, there is a possibility of exacerbation of the disease, there may be complications. These can be a yellow card that warns the patient not to stop the medicine," said one doctor (D1).

**Sending reminders to patients for specific and necessary issues:** reminders were the next strategy. **Risk reminders:** most participants believe that necessary items and risks of

**Table 1: Categories, subcategories, and theme of the causes and factors of the patient's nonadherence to cardiovascular disease**

Themes	Categories	Subcategories
Follow-up of the patient after discharge	Systematic and organizational follow-up	Establishing a cardiac follow-up system after discharge, using volunteers for patient follow-up, the role of community nurses, and home care inpatient follow-up
	Educational follow-up	Home care training, focus on self-care, correct timing for patients' next visits, correct timing of medication for patients
	Consulting follow-up	Establishment of a telephone communication line for patients' contact, creation of telephone and internet communication channels for patients' access to information, creation of a nursing counseling system for patients after discharge, having an on-call system for patients' call if they need help and education, creation of permanent communication channel between Patient and treatment team
Sending reminders for necessary cases to the patient	Motivational follow-up	Warning the patient about the dangers of the disease, raising life expectancy among patients, creating a positive attitude toward treatment in patients, creating responsibility and self-interest in patients, motivating and self-efficacy in patients
	Risk reminders	Remind the patient of the potential risks of not following treatment, reminding the patient of a heart attack and stroke pain
Improving patient education methods	Care reminders	Telephone contact with patients and reminders of care, telephone calls with patients and reminders of necessary follow-ups, providing a system of reminders to patients,
	New and modern training	Virtual and Internet education, use of short health messages, education of peers, production of educational videos, use of mass media as a solution to improve adherence to treatment, health literacy education in schools as a solution, promotion of nursing education and continuing education
Improving support services	Codified and common trainings	Provide treatment recommendations appropriate to the patient's age and educational status, educate patients about the side effects of medication to make them ready to face them, increase physician education to the patient, emphasize adherence to treatment in patient education programs, empowerment and retraining nurses, educating the patient's family, internalizing self-care and adherence to treatment in patients, nurse-patient education as a way to improve patient adherence
	Home care services	Providing home care for single patients, supporting family members, introducing patients to social work, providing patients with access to medical facilities
	Social support	Introducing patients to social work
Optimizing the structure and processes of the hospital	Psychological support	Psychosocial support for patients after heart attacks
	Making structural changes	Involvement of clinical pharmacists in the stage of prescribing medicine, improving the medical environment, employing caring and conscientious staff, paying more attention to the living needs and welfare of nurses, increasing the number of nurses
	Making process changes	Emphasizing the role of the nurse in patient compliance, motivating nurses, improving the nurse-patient relationship, making medication and treatment process more pleasant, building trust in patients, creating empathy between patients and staff

heart disease should be reminded to the patients. These include: reminding the patient of the potential risks of not following treatment and reminding the patient of heart attack and stroke pain. According to one nurse (N6), “we must scare patients into being compliant with treatment.” Another nurse notes (N2): “Remind the patient what condition he was in, and if he does not take care of himself properly and does not take medicine, there is a possibility of another stroke”. **Care reminders** include: Telephone contact with patients and reminders of care, telephone calls with patients and reminders of necessary follow-ups, and providing a system of reminders to patients. One of the nurses in this field states (N15): “We should have a follow-up center that is responsible for following up patients. Call any patient who is discharged from this center. And remind them of the necessary items.” “There are reminder systems and reminder software that can be

introduced to the patient if they have the financial ability and education to benefit from such reminders,” said one participant (N3).

**Improving methods of patient education:** This strategy consisted of two categories: new and modern training and conventional and common training.

**New and modern training** included: Virtual and Internet education, use of short health messages, education of peers, production of educational videos, use of mass media as a solution to improve adherence to treatment, health literacy education in schools as a solution, promotion of nursing education and continuing education. According to one nurse (N5), “Everyone has a cell phone now, and e-learning is more convenient and less expensive.” One of the nurses (N3) says about the importance of media: “The most important thing is the education that should be provided to the patient in

any way, and especially the radio and television in this regard, I think is really useful and can be helpful in the field of education.” Another nurse (N1) talks about starting education from schools and says: “In response to social issues, I told you that we can start from schools, schools can really help.”

**Conventional and common trainings:** Conventional training means using common education strategies to help the improvement of treatment adherence, which include: providing treatment recommendations appropriate to the patient's age and educational status, educating patients about the side effects of medication to make them ready to face them, increasing physician education to the patient, emphasizing adherence to treatment in patient education programs, empowerment, and retraining nurses, educating the patient's family, internalizing self-care and adherence to treatment in patients, nurse-patient education as a way to improve patient adherence. The greatest emphasis of patients and nurses participating in this study was on patient education by nurses. One of the nurses says in this regard: “Perhaps one way is to strengthen our education” (N14). “Patient education is much more effective than general education, especially if it is face-to-face because patients have problems and have questions about their problems that need to be answered,” says one patient (P1).

**Improving support services:** Patient support services, which include: home care, social services, and psychological services, were also extracted as a theme.

**home care services:** By providing home care services, nurses can play a role in promoting patient adherence to treatment. “Having a nurse next to each patient who gives them medication is very helpful for patients who live alone” (N9).

**social support services:** Social support is the basis of patient support. Doctor (D2) in this case says: “Another strategy is to organize patient support groups. For example, patients who suffer from a heart attack at a young age due to genetics or other reasons may be at their best. Typically, they have young children, which affects their mood and requires a lot of support.”

**Psychological support services:** Another need of patients is psychological support. “There is a need for support systems for patients that increase their life expectancy and provide them with peace of mind,” explains one nurse (N5).

**Optimizing the structure and process in the hospital:** Both structural and process changes were included in this theme.

**Making structural changes:** Structural changes include clinical pharmacists, changes in the environment, employing caring staff, paying more attention to the needs and well-being of nurses, and increasing the number of nurses. According to one of the nurses (N4): “A very important solution is to place a professional

relationship with patients at the top of their work in medical environments, and to become a kind of professional system and environment.” “According to another nurse (N5), if nurses are well-off, if doctor and nurse needs are met, all of this will certainly benefit the patient. By doing so, patients will be more satisfied and their treatment will be of better quality.”

**Making process changes:** Some process changes are also required. These include: emphasizing the role of the nurse in patient compliance, motivating nurses, improving the nurse-patient relationship, making the medication and treatment process more pleasant, building trust in patients, and creating empathy between patients and staff. One of the nurses (N2) says in this regard: “The nurse should have an important role in every field. Patient's adherence to treatment is also related to the duties of the nurse and the nurse should have a role in this regard.” One of the nurse's points to the optimization of the treatment process and says: “One is to make the medication easier for them. To make it pleasant. For example, do not give the patient a drug that causes sleep disorders at night. A drug that reduces sexual potency is introduced and the patient is told to take these drugs after sexual intercourse.” (N7)

## Discussion

In this study, five strategies were identified for improving nurses' performance regarding cardiovascular patients' adherence to the treatment regimen. Follow-up of the patient after discharge was one of the extracted themes. Following up after discharge can be structural, motivational, educational, and counseling. The effect of educational follow-up on treatment adherence has not been studied. But Laal *et al.*<sup>[19]</sup> in a study showed that educational follow-up reduced the readmission of patients with heart failure. A systemic and organizational follow-up involves setting up a follow-up center for patients after they leave the hospital, so patients can be followed up by that center after discharge. In Iranian hospitals, there is a home care center, but it does not follow up on patients' treatment adherence. Health Quality Ontario Points to the importance of Early Follow-Up After Hospital Discharge and in a Systematic Review, shows that this follow-up is involved in the readmission of patients.<sup>[20]</sup> In a systematic review, Couturier also discusses the importance of this issue and how the organization can play a role here.<sup>[21]</sup> The possibility of providing counseling and motivational follow-up to patients after discharge is called counseling and motivational follow-up. The effectiveness of counseling after discharge was noted by Liebmann in a study. According to him, patients were more likely to quit smoking when they received counseling and motivational follow-up after discharge.<sup>[22]</sup>

The second theme extracted in this study was sending reminders for necessary cases to the patient. Reminders

play a very important role in improving treatment adherence. The importance of these reminders has been stated in various studies. For example, Fenerty *et al.*<sup>[23]</sup> in a study showed the effect of reminders, and in a meta-analysis showed a statistically significant increase in adherence in groups receiving a reminder intervention compared to controls. Eight of eleven studies showed a statistically significant increase in adherence for at least one of the reminder group arms compared to the control groups receiving no reminder intervention. Other studies point to the effects of electronic reminders<sup>[24]</sup> and drug reminder packaging on medication adherence.<sup>[25]</sup> Another reminder can be mobile-based. Many applications have been created on mobile phones to remind patients to take medication. Virtudes Pérez-Jover *et al.* showed in their study that the use of these mobile applications improves treatment adherence in patients.<sup>[26]</sup>

One of the strategies presented in this study is to improve the patient's education. Patient education has many items. Adherence to treatment can be improved by adding treatment adherence to patient education. Patients' treatment adherence is improved by patient education, according to a randomized controlled trial.<sup>[27]</sup> The key to adherence to treatment is patient education, according to another study.<sup>[28]</sup>

Improving support services is another strategy that can be used to improve treatment adherence. As a result of the study's context, many participants referred to this strategy. Social support and treatment adherence have not been studied extensively. There were only two studies found in Iran. In heart patients, perceived social support is positively correlated with adherence to medical recommendations.<sup>[29]</sup> There was also a study that suggested psychological factors played a role in treatment adherence.<sup>[30]</sup>

Optimizing the structure and processes of the hospital is the last strategy. Rahmani *et al.*<sup>[31]</sup> According to a study, most hospitals are in good shape when it comes to management, activity, space, facilities, and equipment, but lagging behind when it comes to staffing, educational processes, and instructions. In the study of Maleki *et al.*,<sup>[32]</sup> the need for structural changes was mentioned. According to him, hospitals should plan so that nurses and patients can reap the benefits of professional performance in order to improve their professional performance. The relationship between structural empowerment and nursing profession performance suggests that structural empowerment should be implemented in the workplace. During the course of this study, a number of limitations were encountered. Despite the fact that most of the strategies presented in this study can be applied to other conditions and centers, their generalizability is limited. It attempted to solve this problem by providing readers with a rich description of the information. Other health centers should investigate the strategies presented in this study in quantitative and qualitative studies.

## Conclusion

The result of this study was that new strategies were introduced to improve treatment compliance in cardiovascular patients. Healthcare centers and hospitals must change their main structures to implement some of these strategies. However, some of these changes are due to the attitudes of care providers and changes in the delivery of health care. In spite of this, all of these strategies can be implemented in a dynamic and transformational manner, and the goals can be achieved with ease. This article is taken from a doctoral dissertation in nursing, Improvement of Nurses' Performance in Drug Adherence of Patients with Myocardial Infarction after Discharge: An Action Research Study.

## Acknowledgements

We would like to thank all the nurses and patients who have actively participated and helped us in this study.

## Financial support and sponsorship

Iran University of Medical Sciences, Iran

## Conflicts of interest

Nothing to declare.

## References

- Ogungbe O, Himmelfarb CRD, Commodore-Mensah Y. Improving medication adherence in cardiovascular disease prevention: What's new? *J Cardiovasc Nurs* 2020;35:6–10.
- Virani SS, Alonso A, Benjamin EJ, Bittencourt MS, Callaway CW, Carson AP, *et al.* Heart disease and stroke statistics—2020 update: A report from the American Heart Association. *Circulation* 2020;141:E139–596.
- Naderi SH, Bestwick JP, Wald DS. Adherence to drugs that prevent cardiovascular disease: Meta-analysis on 376,162 patients. *Am J Med* 2012;125:882–7.e1.
- Butler J, Arbogast PG, BeLue R, Daugherty J, Jain MK, Ray WA, *et al.* Outpatient adherence to beta-blocker therapy after acute myocardial infarction. *J Am Coll Cardiol* 2002;40:1589–95.
- Brown MT, Bussell JK. Medication adherence: WHO cares? *Mayo Clin Proc* 2011;86:304–14.
- Masror Roudsari D, Dabiri Golchin M, Haghani HJIJoN. Relationship between adherence to therapeutic regimen and health related quality of life in hypertensive patients. *Iran Journal of Nursing* 2013;26:44–54.
- Unverzagt S, Meyer G, Mittmann S, Samos F-A, Unverzagt M, Prondzinsky R. Improving treatment adherence in heart failure: A systematic review and meta-analysis of pharmacological and lifestyle interventions. *Dtsches Arztebl Int* 2016;113:423.
- Mickelson RS, Holden RJ. Medication adherence: Staying within the boundaries of safety. *Ergonomics* 2018;61:82–103.
- Khabbazi A, Kavandi H, Paribanaem R, Khabbazi R, Mahdavi A. Adherence to medication in patients with rheumatic diseases during COVID-19 pandemic. *Ann Rheum Dis* 2022;81:e200. doi: 10.1136/annrheumdis-2020-218756.
- Yfantopoulos J, Protoupa M, Chantzaras A, Yfantopoulos P. Doctors' views and strategies to improve patients' adherence to medication. *Hormones (Athens)* 2021;20:603–11.
- Bunting J, de Klerk M. Strategies to improve compliance with clinical nursing documentation guidelines in the acute hospital

- setting: A systematic review and analysis. *SAGE Open Nurs* 2022;8:23779608221075165. doi: 10.1177/23779608221075165.
12. Lincoln PA, Whelan K, Hartwell LP, Gauvreau K, Dodsden BL, LaRovere JM, *et al.* Nurse-implemented goal-directed strategy to improve pain and sedation management in a pediatric cardiac ICU. *Pediatr Crit Care Med* 2020;21:1064–70.
  13. Yasmin F, Nahar N, Banu B, Ali L, Sauerborn R, Soares R. The influence of mobile phone-based health reminders on patient adherence to medications and healthy lifestyle recommendations for effective management of diabetes type 2: A randomized control trial in Dhaka, Bangladesh. *BMC Health Serv Res* 2020;20:1–12. doi: 10.1186/s12913-020-05387-z.
  14. Kardas P, Aguilar-Palacio I, Almada M, Cahir C, Costa E, Giardini A, *et al.* The need to develop standard measures of patient adherence for big data. *J Med Internet Res* 2020;22:e18150. doi: 10.2196/18150.
  15. Hughes, M. C. (2012). Improving medication adherence. *Nursing made Incredibly Easy*, 10:56.
  16. Hsieh H-F, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res* 2005;15:1277–88.
  17. Kondracki NL, Wellman NS, Amundson DR. Content analysis: Review of methods and their applications in nutrition education. *J Nutr Educ Behav* 2002;34:224–30.
  18. Speziale HS, Streubert HJ, Carpenter DR. *Qualitative Research in Nursing: Advancing the Humanistic Imperative*. Lippincott Williams and Wilkins, Philadelphia; 2011.
  19. Laal N, Shekarriz-Foumani R, Khodaie F, Abadi A, Heidarnia MA. Effects of patient education and follow up after discharge on hospital readmission in heart failure patients. *Res Med* 2017;41:24–30.
  20. Health Quality Ontario. Effect of early follow-up after hospital discharge on outcomes in patients with heart failure or chronic obstructive pulmonary disease: A systematic review. *Ont Health Technol Assess Ser* 2017;17:1–37
  21. Couturier B, Carrat F, Hejblum G. A systematic review on the effect of the organisation of hospital discharge on patient health outcomes. *BMJ Open* 2016;6.
  22. Liebmann EP, Richter KP, Scheuermann T, Faseru B. Effects of post-discharge counseling and medication utilization on short and long-term smoking cessation among hospitalized patients. *Prev Med Rep* 2019;15:100937. doi: 10.1016/j.pmedr. 2019.100937.
  23. Fenerty SD, West C, Davis SA, Kaplan SG, Feldman SR. The effect of reminder systems on patients' adherence to treatment. *Patient Prefer Adherence* 2012;6:127–35.
  24. Vervloet M, Linn AJ, van Weert JC, De Bakker DH, Bouvy ML, Van Dijk L. The effectiveness of interventions using electronic reminders to improve adherence to chronic medication: A systematic review of the literature. *J Am Med Inform Assoc* 2012;19:696–704.
  25. Boeni F, Spinatsch E, Suter K, Hersberger KE, Arnet I. Effect of drug reminder packaging on medication adherence: A systematic review revealing research gaps. *Syst Rev* 2014;3:1–15. doi: 10.1186/2046-4053-3-29.
  26. Pérez-Jover V, Sala-González M, Guilabert M, Mira JJ. Mobile apps for increasing treatment adherence: Systematic review. *J Med Internet Res* 2019;21:e12505.
  27. Taibanguay N, Chaiamnuay S, Asavatanabodee P, Narongroeknawin P. Effect of patient education on medication adherence of patients with rheumatoid arthritis: A randomized controlled trial. *Patient Prefer Adherence* 2019;13:119–29.
  28. Seltzer A, Roncari I, Garfinkel P. Effect of patient education on medication compliance. *Can J Psychiatry* 1980;25:638–45.
  29. Masoudnia E, Foroosannia K, Montazeri M. Relationship between Perceived social support and adherence to medical advices among patients with coronary heart disease after by-pass surgery. *SSU\_Journals* 2012;19:798-806.
  30. Khalili F, Eslami AA, Farajzadegan Z, Hassanzadeh A. The association between social-psychological factors and treatment adherence behaviors among maintenance hemodialysis patients in Isfahan, Iran: A conceptual framework based on social cognitive theory. 3:278-289.
  31. Rahmani H, Arab M, Akbari FA, Zeraati Hjjosoph, Research IOPH. Structure, process and performance of the emergency unit of teaching hospitals of Tehran University of Medical Sciences. *Journal of School of Public Health and Institute of Public Health Research* 2006;4:13–22.
  32. Maleki M, Ghorbanian A. Structural empowerment in hospital and professional nursing practice in Nurses of Hashemi-Nejad Hospital: 2010. *Occup Med Quart J* 2014;6:32–40.