

Outcomes of Implementing Cardiac Rehabilitation Protocol for Acute Coronary Syndrome Patients in the Acute Phase

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Abstract

Background: Cardiovascular diseases (CVDs) are the leading cause of death worldwide. The most common form of CVDs is acute coronary syndrome (ACS). To prevent recurrent cardiac adverse effects, acute cardiac rehabilitation (ACR) is critical to be provided for ACS patients in the acute phase. ACR is an evidence-based intervention that includes physical rehabilitation, risk factors modification, nutrition counseling, and psychological rehabilitation. **Objective:** To determine the outcomes of implementing cardiac rehabilitation protocol for acute coronary syndrome patients in the acute phase. **Settings:** The study was carried out in the cardiac care unit (CCU) at Alexandria Main University Hospital, Egypt. **Subjects:** A convenient samples of 60 adult conscious patients diagnosed with ACS who are newly admitted to the previously mentioned CCU. The sample was divided into two equal groups (30 patients each the group). **Tools:** two tools were used. Tool one: "Physical outcomes of cardiac rehabilitation protocol assessment tool". Tool two: "Depression, anxiety and stress scale (DASS)". **Results:** The study showed that there was a significant improvement in physical activity in the study group more than in the control group ($P= 0.038$). Furthermore, the study groups exhibited significant lower depression, anxiety and stress scale levels than the control group ($P=0.038, 0.021$ and 0.005 respectively). **Conclusion:** The implementation of ACR significantly improved physiological, physical and psychological outcomes of ACS patients in the acute phase. **Recommendations:** Critical care nurses should implement an ACR protocol that is tailored to the patients' needs and capabilities. Hospital administration should establish educational program about the ACR protocol for ACS patients in the acute phase after hemodynamic stability to critical care nurses.

Keywords: Acute coronary syndrome, acute phase, cardiac rehabilitation.

Introduction

Cardiovascular diseases (CVDs) are one of the most well-known health issues in the world. CVDs, particularly acute coronary syndrome (ACS), have increased rapidly in recent decades. ACS has become a significant cause of CVDs death, particularly in adult cardiac patients. The treatment of ACS requires a comprehensive treatment strategy that includes medical therapy, surgical treatment and the application of

appropriate interventions as cardiac rehabilitation (CR) (Farsad & Salehi, 2022; Ibanez et al., 2018).

Cardiac rehabilitation is split into three phases. The acute phase, usually known as the hospital phase, tries to decrease myocardium oxygen demand; increase oxygen supply. As a result, acute cardiac rehabilitation (ACR) is recommended for ACS patients in the acute phase to prevent recurrent cardiac events and adverse effects. ACR is comprehensive strategy that requires

a multidisciplinary approach to help ACS patients recovery, reduce disability, and promote the active lifestyle (De Cannière et al., 2020; Sayadi et al., 2021).

The implementation of ACR following ACS receives great attention. The ACR protocol is largely focused on progressively increasing exercise therapy, lifestyle modification; nutritional counselling and psychological rehabilitation. Physical rehabilitation as a part of ACR is indicated in patients with hemodynamic stability. It aims to achieve a progressive increase in activity and independence in basic self-care. The treatment of cardiovascular risk factors, such as arterial hypertension, diabetes mellitus, and obesity as well as cessation of smoking is another important assignment of ACR (Bellmann et al., 2020; Nakamura et al., 2021).

Furthermore, there are several forms of psychological rehabilitation for ACS patients, including as psychological support, and stress management. These may result in improvement in mental well-being, quality of life, cardiovascular morbidity, and mortality (Grace et al., 2021; Shields et al., 2021)

Critical care nurses (CCNs) play a vital role as an integral part of the multidisciplinary team that is needed to meet the ACR protocol for ACS patients. The responsibilities and functions of CCNs are based on the ACR protocol, which was suggested by the AHA to address the requirements of ACS patients in nursing care during the ACR protocol (Andersen et al., 2021; Sayadi et al., 2021)

Aims of the Study

This study aims to determine the outcomes of implementing cardiac rehabilitation protocol for acute coronary syndrome patients in the acute phase.

Research hypotheses

- Acute coronary syndrome patients who are subjected to the ACR exhibit improving

clinical outcomes than those who are not subjected.

- Acute coronary syndrome patients who are subjected to the ACR exhibit positive psychological outcomes than those who are not subjected.

Materials and Method

Materials

Design: A quasi experimental research design was used to conduct this study.

Settings: This study was conducted in the CCU at Alexandria Main University Hospital. It contains 14 beds in two separate rooms. Each one contains 6 beds and the other room contains 8 beds.

Subjects: A convenient sample of 60 adult conscious patients diagnosed with ACS (age 18-60 years) who are newly admitted to the previously mentioned CCU was included in this study. The sample was divided into two equal groups (Thirty patients in each group). Group "A," the control group, and group "B," the study group. The sample size was calculated using power analysis (Epi-info7) program based on the following parameters: population size = 80/3months, expected frequency =50%, acceptance error =10%, confidence coefficient =95%, design effect=1 and power=80%. Hemodynamically unstable patients, communication problems, impaired motor function, and taking anxiolytics were excluded from the study.

Tools: In order to collect the necessary data for the study two tools were used:

Tool one: "physical outcomes of cardiac rehabilitation protocol assessment tool".

This tool was developed by the researcher after reviewing related literature (Bianchi et al., 2021; Costi et al., 2021). This tool was used to determine the physical outcomes of implementing of cardiac rehabilitation protocol for ACS patients in the acute phase.

It consists of four parts:

Part I: Patients' socio-demographic and clinical profile: Socio-demographic data included the age, sex, marital status, and occupation. Clinical data included date of admission, length of stay, current diagnosis, past medical history, list all cardiac medications, compliance with prescribed medications and previous teaching about cardiac medications were obtained from patient and record.

Part II: Risk factors assessment: This part was used to assess risk factors for ACS and it included life style and medical risk factors. Lifestyle risk factors included smoking status, nutritional status as body mass index (BMI) and dietary habits. While medical risk factors such as hypertension, diabetes hyperlipidemia and family history.

Part III: Patient physiological outcomes: This part included: hemodynamic parameters (Temperature, Heart rate, Respiratory rate, Systolic blood pressure, Diastolic blood pressure, peripheral oxygen saturation).The severity of pain using a numerical rating scale adopted from (Haefeli & Elfering, 2006) scored from 0-10. ECG rhythm, cardiac enzymes, the need for oxygen therapy, and the incidence of complications such as recurrent myocardial infarction were recorded.

Part IV: Patient physical outcomes: this part included : the six-minute walk test (6MWT) was adopted from(the American Thoracic Society, 2002).It is the gold standard for determining baseline functional exercise capacity, training intensity and for evaluating training outcomes in patients ACR. The ability to perform activities of daily living including (range of motion exercise, moving out of bed, hygiene, walking, eating and toileting).Assessing patient's intolerance for physical activities.

Tool two: the Depression, anxiety and stress scale (DASS). the Arabic version of the DASS was adopted from Moussa et al., (2017).It consists of 21 self-report instruments designed to measure the severity

of the negative emotional state of depression, anxiety and stress using a subscale for each of the three categories (7 items for each subscale).

Method

Approval of the ethics committee of the faculty of nursing was obtained. An official approval to conduct this study was obtained after providing explanation of the aim of the study. An informed consent was obtained from the patients. The study tools were tested for content validity by 7 experts in the field of the study. The necessary modifications were done accordingly. A pilot study was carried out on 10% of the study sample in order to test the clarity and applicability of the research tools. Reliability of the tools was tested using Cronbach's Alpha test. The reliability coefficient was 0.830 for tool one and 0.798 for tool two which is acceptable. Data was collected by the researchers during the period from June 2021 to October 2021.

Data were collected from group "A" firstly and after its completion, data were collected from the group "B" to prevent the double contamination effect between the studied groups that might affect the study results.

The study was conducted in three phases:

Phase I: patients` assessment for both groups: The demographic, clinical data, risk factors, physiological status and the baseline levels of stress, anxiety and depression were assessed individually for each patient on the first day of admission.

Phase II: Implementing the cardiac rehabilitation protocol. For group "A": the researcher observed the routine CCU care done by CCU team. For group "B": the management of ACS patients were subjected to the acute phase of the cardiac rehabilitation protocol for five days which includes physical rehabilitation ,risk factor

modification, nutritional counseling and psychological rehabilitation were implemented by the researcher from admission until discharge from hospital.

1. Physical rehabilitation (early and progressive mobilization) Patients were provided instructions about certain activities and exercises with explanation of the importance of these exercises for improving their abilities to perform activities of daily living. That exercise was practiced after 12 hours from admission and continued until discharge according to the American Heart Association recommendations (Peixoto et al., 2015). It includes Range of motion (ROM), activities of daily living and Respiratory muscle training.

2. Risk factor modification (Patients were instructed about risk factors modifications that included lifestyle risk factor and medical risk factor). Lifestyle risk factors modifications included cessation of smoking, maintaining a healthy body mass index, and healthy nutritional habits. Medical risk factors modifications included controlled hypertension, diabetes mellitus and hyperlipidemia.

3. Nutritional counseling: Patients were assessed for nutritional habits as phase one then provided education about the importance of appropriate nutrition for healthy eating.

4. Psychological rehabilitation:

Included: Preparing patients psychologically for the acceptance of CCU environment, Participate the patients in care process and decision making. Provide reassurance and emotional support to patients, and Encourage patients to cope with changes in life styles.

Ethical considerations:

Written informed consent was obtained from patient after explaining the aim of the study and the right to refuse to participate in the study and/ or withdraw at any time.

Patient's privacy was respected. Data confidentiality was during implementation of the study.

Statistical Analysis

The collected data were organized, tabulated and statically analyzed using the statistical package for social studies (SPSS) Version 25.0. Qualitative data were described using number and percent. Quantitative data were described mean \pm standard deviation. Finally analysis and interpretation of data were conducted. P-values of 0.05 or less were considered statistically significant.

Results

Table 1 presents the comparison between the control and study groups according to socio-demographic data. Sixty patients were recruited in the current study. There was no significant difference between two groups regarding age and gender.

Table 2 demonstrates comparison between the control and study groups regarding the ability to perform physical activity before and after implementation of the protocol. Regarding range of motion (ROM) exercise on admission (63.3) of the control group had dependent ROM compared to (76.7%) in study group with no significant differences ($p=0.056$). On the contrary, dependency of ROM improved in the study group more than in the control group after implementation of the protocol (73.3%) of the control group had independent ROM compared to (93.3%) in study group with significant differences ($p=0.038$). Concerning Walking, on admission it was noted that more than half (56.7%) of two groups were assisted in walking with no significant differences ($p=0.722$). On the contrary, after implementation of the protocol (63.3%) in the control group and (86.7%) in the study group were independent walking with significant differences ($p=0.037$).

Table 3 shows comparison between the control and study groups regarding to six minute walking test (6 MWT) before and after implementation of the protocol. The Mean distance of 6MWT for control and study group on admission was (15.20 ± 6.01 m and 16.50 ± 5.47 m respectively) with no significant difference ($P= 0.384$). While The Mean distance increased after implementation of the protocol the control group was (24.30 ± 4.36 m) compared to study group was (27.30 ± 5.66 m) with significant difference after ($P= 0.025$).

Table 4 reveals comparison between the control and study groups according to patient psychological outcomes utilizing DASS before and after implementation of the protocol. As regard to depression levels on admission the control group was (36.7%) and the study group was (16.7%) were severe depression level with no significant differences ($p=0.131$). On the contrary, After implementation of the protocol depression levels were improved in the control group was (33.3%) and in the study group was (56.7%) were normal (no depression) with significant differences ($p= 0.014$). Concerning anxiety levels on admission it was noted that (43.3%) in the control group and (40.0%) in the study group were severe anxiety level with no significant differences ($p=0.104$). On the contrary, After implementation of the protocol anxiety levels were improved to (43.3%) in the control group and (40.0%) in the study group were mild anxiety level with significant differences ($p= 0.021$). Finally, stress levels on admission it was noted that (43.3%) in the control group and (53.3%) in the study group were severe stress level with no significant differences ($p=0.368$). On the contrary, After implementation of the protocol stress levels were improved to (53.3%) in the control group and (86.7%) in the study group were normal (no stress) with highly significant differences ($p= 0.005$).

Discussion

Cardiovascular diseases (CVDs) are the first cause of death globally, More people die annually from CVDs than from any other disease. The most common form of CVDs is acute coronary syndrome (ACS). As a result, ACR is essential for ACS patients in the acute phase to preventing recurrent cardiac events In general, ACR can prevent deaths due to heart disease, reduce the possibility of surgery and angiography, and reduces the need for prolonged hospitalization. It is a cornerstone to improve exercise capacity, muscle strength and mobility in ACS patients in the acute phase as well as psychological status (Latsch et al., 2020; Pizzorno et al., 2021).

The main findings of the current study revealed that implementation of the ACR protocol for ACS patients in the acute phase resulted in improvements in physical and psychological outcomes. These findings are reinforced by several studies, as Annett Salzwedel et al., (2019), Zongyue & Peo, (2021) and Idris et al., (2021) studied the effect of the ACR phase on ACS patients. They reported that the early implementation of the ACR phase in patients with ACS is helpful in improving cardiac function, lowering the occurrence of adverse events, and enhancing quality of life, which has clinical value for promotion and application

Similarly, Zhang et al. (2021) conducted a systematic review and meta-analysis of psychological interventions in coronary heart disease patients. They illustrated that psychological intervention has important health benefits for patients with ACS and can effectively reduce negative psychological effects such as depression, anxiety, and stress. Rauch et al (2021) and Pintor Reverte et al (2021) concluded that the face-to-face ACR protocol improves the psychological sphere of the patient with ACS. In addition, those patients who complete specific psychological rehabilitation significantly improve a greater number of psychological variables such as depression, anxiety, and stress.

The current result showed that the study group more independence as they performed range of motion exercises and walked more than the control group after implementation of the protocol. This may be explained by the effectiveness of training and practicing exercises, demonstrated by the researcher, with high compliance by patients on a daily basis. These exercises improve patients' circulation, heart functions, maintain patients' physical activity, and enhance recovery among ACS patients in the acute phase.

The finding is in line with, Wang et al (2020) described that hospitalized patients with ACS who regularly perform physical activity as a part of ACR, even low-intensity physical activity is likely to be associated with better clinical outcomes. They recommended that the ACR interventions focus on enhancing patient awareness of the cardiac benefits of physical activity and supporting them in establishing an individualized physical activity routine based on their stage of change. Grochulska et al (2021) and Prabhu et al(2020) concluded that ACR significantly improves physical performance in patients after ACS.

Regarding the six-minute walking test (6MWT), the study group exhibited a significant increase of 6MWT more than the control group. This may be attributed to that implementation of the ACR after stabilization of hemodynamic status in patients seems to be successful in increasing physical ability, such as getting out of bed and walking. In addition, the study group received health teaching about the difference between physical activity and exercise. This assisted in gaining the patient's cooperation. The result of this study is similar to that of Pizzorno et al. (2021), Bianchi et al (2021) and Grochulska et al. (2021). They showed that a significant improvement ($p < 0.001$) in 6MWT and functional capacity. They suggested that ACR should be performed to enhance positive effects on functional outcomes and reduce length of stay.

Conclusion

Based upon the findings of the current study, it could be concluded that the Implementation of ACR significantly improved the physiological and physical function outcomes of patients and reduced the length of hospital stay. Implementation of ACR significantly decreased negative emotions such as stress, anxiety, and depression associated with ACS disease and hospitalization.

Recommendations

In line with the findings of the study, the following recommendations are made:

- Critical care nurses should implement an ACR protocol that is tailored to the patients' needs and capabilities.
- Hospital administration should establish educational program about the ACR protocol for ACS patients in the acute phase after hemodynamic stability to critical care nurses.
- Replicate the study on a large probability sample is recommended for generalization of the findings

Table (1): Comparison between the control and study groups according to socio-demographic data.

Socio-Demographic Data	Control (n = 30)		Study(n = 30)		Test of Sig.	P
	No.	%	No.	%		
Age (years)						
<50	7	23.3	14	46.7	$\chi^2=$ 3.590	0.058
\geq 50	23	76.7	16	53.3		
Gender						
Male	21	70.0	23	76.7	$\chi^2=$ 1.002	0.317
Female	9	30.0	7	23.3		

Table (2): Comparison between the control and study groups regarding the ability to perform physical activity before and after implementation of the protocol

Ability to perform physical activity	Control (n = 30)				Study (n = 30)				$\chi^2(p_1)$	$\chi^2(p_2)$
	Before		After		Before		After			
	No.	%	No.	%	No.	%	No.	%		
ROM exercises										
Dependent	19	63.3	0	0.0	23	76.7	0	0.0	5.721 (^{MC} p= 0.056)	4.320* (0.038*)
Assisted	1	3.3	8	26.7	4	13.3	2	6.7		
Independent	10	33.3	22	73.3	3	10.0	28	93.3		
Walking										
Dependent	5	16.7	0	0.0	3	10.0	0	0.0	0.753 (^{MC} p= 0.722)	4.356* (0.037*)
Assisted	17	56.7	11	36.7	17	56.7	4	13.3		
Independent	8	26.7	19	63.3	10	33.3	26	86.7		

Table (3): Comparison between the control and study groups regarding to six minute walking test (6 MWT) before and after implementation of the protocol

6 MWT	Control (n = 30)				Study (n = 30)				Test of Sig.(p ₁)	Test of Sig.(p ₂)
	Before		After		Before		After			
	No.	%	No.	%	No.	%	No.	%		
6 MWT (meter)										
Mean \pm SD.	15.20 \pm 6.01		24.30 \pm 4.36		16.50 \pm 5.47		27.30 \pm 5.66		t= 0.876 (0.384)	t= 2.300* (0.025*)

SD: Standard deviation

Table (4): Comparison between the control and study groups according to patient psychological outcomes utilizing DASS 21 before and after implementation of the protocol

Tool two: Patient psychological outcomes (DASS 21) (Severity)	Control (n = 30)				Study (n = 30)				$\chi^2(p_1)$	$\chi^2(p_2)$
	Before		After		Before		After			
	No.	%	No.	%	No.	%	No.	%		
Depression										
Normal	8	26.7	10	33.3	13	43.3	17	56.7	6.919 (^{MC} p=0.131)	10.688* (0.014*)
Mild	4	13.3	3	10.0	7	23.3	8	26.7		
Moderate	4	13.3	9	30.0	5	16.7	3	10.0		
Severe	11	36.7	8	26.7	5	16.7	2	6.7		
Extremely Severe	3	10.0	0	0.0	0	0.0	0	0.0		
Anxiety										
Normal	0	0.0	11	36.7	0	0.0	18	60.0	6.161 (0.104)	7.790* (^{MC} p=0.021*)
Mild	8	26.7	13	43.3	4	13.3	12	40.0		
Moderate	2	6.7	6	20.0	9	30.0	0	0.0		
Severe	13	43.3	0	0.0	12	40.0	0	0.0		
Extremely Severe	7	23.3	0	0.0	5	16.7	0	0.0		
Stress										
Normal	0	0.0	16	53.3	0	0.0	26	86.7	3.167 (^{MC} p=0.368)	7.937 (0.005*)
Mild	8	26.7	14	46.7	4	13.3	4	13.3		
Moderate	2	6.7	0	0.0	5	16.7	0	0.0		
Severe	13	43.3	0	0.0	16	53.3	0	0.0		
Extremely Severe	7	23.3	0	0.0	5	16.7	0	0.0		

MC: Monte Carlo * : Statistically significant at $p \leq 0.05$

p_1 : p value for comparing between the studied groups in before

p_2 : p value for comparing between the studied groups in after

References

- Andersen, J. H., Burns, K., Guassora, A. D. K., Cerqueira, C., Jørgensen, T., & Lundstrøm, S. L. (2021). Taking no for an answer. Nurses' consultations with people with cardiac disease about rehabilitation: A qualitative study. *Applied Nursing Research*, 58(January). <https://doi.org/10.1016/j.apnr.2021.151397>
- Annett Salzwedel, A., Zoch-Lesniak, B., Schlitt, A., Glatz, J., Langheim, E., Bongarth, C., Sporn-Donch, S., Schroder, K., Nothoff, J., Westphal, R., Schubmann, R., Wrenger, M., Marx, R., Schikora, M., & Voller, H. (2019). Holistic effects in multi-modal comprehensive short-term cardiac rehabilitation-preliminary results from the Out Ca Re-registry. *European Journal of Preventive Cardiology*, 26(Supplement 1), S32-S33. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed20&NEWS=N&AN=628581532>
- Bellmann, B., Lin, T., Greissing, K., Rottner, L., Rillig, A., & Zimmerling, S. (2020). The Beneficial Effects of Cardiac Rehabilitation. *Cardiology and Therapy*, 9(1), 35-44. <https://doi.org/10.1007/s40119-020-00164-9>
- Bianchi, S., Maloberti, A., Peretti, A., Garatti, L., Palazzini, M., Occhi, L., Bassi, I., Sioli, S., Biolcati, M., Giani, V., Monticelli, M., Leidi, F., Ruzzenenti, G., Beretta, G., Giannattasio, C., & Riccobono, S. (2021). Determinants of Functional Improvement After Cardiac Rehabilitation in Acute Coronary Syndrome. *High Blood Pressure and Cardiovascular Prevention*, 28(6), 579-587. <https://doi.org/10.1007/s40292-021-00473-7>
- Costi, S., Tonelli, R., Brogneri, A., Florini, F., Tilocca, N., Vicentini, M., Baroncini, S.,

- Cerulli, M., & Clini, E. (2021). Changes in clinical characteristics and outcomes of patients admitted to inpatient cardiac rehabilitation. *International Journal of Environmental Research and Public Health*, *18*(16).
<https://doi.org/10.3390/ijerph18168871>
- De Cannière, H., Smeets, C. J. P., Schoutteten, M., Varon, C., Morales Tellez, J. F., Van Hoof, C., Van Huffel, S., Groenendaal, W., & Vandervoort, P. (2020). Short-term exercise progression of cardiovascular patients throughout cardiac rehabilitation: An observational study. *Journal of Clinical Medicine*, *9*(10), 1–17.
<https://doi.org/10.3390/jcm9103160>
 - Delgado, B. M., Lopes, I., Gomes, B., & Novo, A. (2020). Early rehabilitation in cardiology – heart failure: The ERIC-HF protocol, a novel intervention to decompensated heart failure patients rehabilitation. *European Journal of Cardiovascular Nursing*, *19*(7), 592–599.
<https://doi.org/10.1177/1474515120913806>
 - Farsad, B. F., & Salehi, H. (2022). Cardiovascular Drugs and Hemostasis. In *Practical Cardiology*.
<https://doi.org/10.1016/b978-0-323-80915-3.00032-6>
 - Grace, S. L., Gallagher, J., & Tulloch, H. (2021). The psychological component of cardiac rehabilitation drives benefits achieved. *European Journal of Preventive Cardiology*.
<https://doi.org/10.1093/eurjpc/zwab040>
 - Grochulska, A., Glowinski, S., & Bryndal, A. (2021). Cardiac rehabilitation and physical performance in patients after myocardial infarction: Preliminary research. *Journal of Clinical Medicine*, *10*(11).
<https://doi.org/10.3390/jcm10112253>
 - Haefeli, M., & Elfering, A. (2006). Pain assessment. *European Spine Journal*, *15*(SUPPL. 1), 17–24.
<https://doi.org/10.1007/s00586-005-1044-x>
 - Ibanez, B., James, S., Agewall, S., Antunes, M. J., Bucchiarelli-Ducci, C., Bueno, H., Caforio, A. L. P., Crea, F., Goudevenos, J. A., Halvorsen, S., Hindricks, G., Kastrati, A., Lenzen, M. J., Prescott, E., Roffi, M., Valgimigli, M., Varenhorst, C., Vranckx, P., Widimský, P., ... Gale, C. P. (2018). 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. *European Heart Journal*, *39*(2).
<https://doi.org/10.1093/eurheartj/ehx393>
 - Idris, N. T., Taviyanda, D., & Dian Mahanani, S. (2021). Effect of Phase I Cardiac Rehabilitation to Non-Invasive Hemodynamics in Acute Myocardial Infarction Patients. In *Medico-Legal Update* (Vol. 21, Issue 1).
<https://doi.org/10.37506/mlu.v21i1.2305>
 - Latsch, F., Esefeld, K., Sigl, A., Stegmüller, F., & Halle, M. (2020). The impact of exercise training started early after acute st-elevation myocardial infarction on cardiac remodeling and exercise capacity. *European Journal of Preventive Cardiology*, *27*(1 SUPPL4).
 - Moussa, M. T., Lovibond, P., Laube, R., & Megahead, H. A. (2017). Psychometric Properties of an Arabic Version of the Depression Anxiety Stress Scales (DASS). *Research on Social Work Practice*, *27*(3), 375–386.
<https://doi.org/10.1177/1049731516662916>
 - Nakamura, K., Ohbe, H., Uda, K., Fushimi, K., & Yasunaga, H. (2021). Early rehabilitation after acute myocardial infarction: A nationwide inpatient database study. *Journal of Cardiology*, *78*(5), 456–462.
<https://doi.org/10.1016/j.jjcc.2021.06.004>
 - Pintor Reverte, R., Chabbar Boudet, M. C., Valls Lázaro, E., Albarrán Martín, C., Untoria Agustín, C., & Garza Benito, F. (2021). Evaluation of the efficacy of a psychological intervention program in a Cardiac Rehabilitation Unit after acute coronary syndrome. *Journal of Healthcare Quality Research*, *36*(5).
<https://doi.org/10.1016/j.jhqr.2021.04.001>
 - Pizzorno, M., Desilvestri, M., Lippi, L., Marchioni, M., Audo, A., de Sire, A., Invernizzi, M., & Perrero, L. (2021). Early cardiac rehabilitation: could it improve functional outcomes and reduce length of

- stay and sanitary costs in patients aged 75 years or older? A retrospective case-control study. *Aging Clinical and Experimental Research*, 33(4). <https://doi.org/10.1007/s40520-020-01589-x>
- Prabhu, N. V., Maiya, A. G., & Prabhu, N. S. (2020). Impact of Cardiac Rehabilitation on Functional Capacity and Physical Activity after Coronary Revascularization: A Scientific Review. *Cardiology Research and Practice*, 2020, 1–9. <https://doi.org/10.1155/2020/1236968>
 - Rauch, B., Salzwedel, A., Bjarnason-Wehrens, B., Albus, C., Meng, K., Schmid, J.-P., Benzer, W., Hackbusch, M., Jensen, K., Schwaab, B., Altenberger, J., Benjamin, N., Bestehorn, K., Bongarth, C., Dörr, G., Eichler, S., Einwang, H.-P., Falk, J., Glatz, J., ... Westphal, R. (2021). Cardiac Rehabilitation in German Speaking Countries of Europe—Evidence-Based Guidelines from Germany, Austria and Switzerland LLKardReha-DACH—Part 1. *Journal of Clinical Medicine*, 10(10). <https://doi.org/10.3390/jcm10102192>
 - Sayadi, N., Alteren, J., Zarea, K., & Mohammadi, E. (2021). Development and Psychometric Properties Evaluation of a Care Needs Questionnaire in Phase 1 Cardiac Rehabilitation for Patients with Coronary Artery Disease: CNCR-Q. *Journal of Caring Sciences*, 10(1). <https://doi.org/10.34172/jcs.2021.006>
 - Shields, G. E., Wright, S., Wells, A., Doherty, P., Capobianco, L., & Davies, L. M. (2021). Delivery preferences for psychological intervention in cardiac rehabilitation: A pilot discrete choice experiment. *Open Heart*, 8(2). <https://doi.org/10.1136/openhrt-2021-001747>
 - The American Thoracic Society. (2002). ATS Statement Guidelines for the Six-Minute Walk Test. *American Journal of Respiratory and Critical Care Medicine*, 166(1), 111–117. <https://doi.org/10.1164/ajrccm.166.1.at1102>
 - Wang, J., Liu, H., Chen, C., Chang, W., Ma, Y., Zhao, C., Smith, S. C., Han, J., Yu, M., Ma, J., Qi, J., & Xing, Y. (2020). Physical Activity and Factors Affecting Its Maintenance Among Patients With Coronary Heart Disease Not Undergoing Cardiac Rehabilitation in China. *The Journal of Cardiovascular Nursing*, 35(6), 558–567. <https://doi.org/10.1097/JCN.0000000000000698>
 - Zhang, Y., Liang, Y., Huang, H., & Xu, Y. (2021). Systematic review and meta-analysis of psychological intervention on patients with coronary heart disease. *Annals of Palliative Medicine*, 10(8). <https://doi.org/10.21037/apm-21-1623>
 - Zongyue, M., & Peo, G. (2021). Analysis of Nursing Effect of Early Staged Rehabilitation Nursing in Patients with Acute Myocardial Infarction after PCI. *Foreign Language Science and Technology Journal Database Medicine and Health*. <https://doi.org/10.47939/mh.v2i1.16>