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# The impact of knowledge and effectiveness of educational intervention on readiness for hospital discharge and adherence to therapeutic recommendations in patients with acute coronary syndrome

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## ABSTRACT

**Introduction:** ESC guidelines emphasize the importance of educating patients after acute coronary syndromes aimed at familiarizing the patient with the essence of the disease, the principles of self-control and self-care as well as actions enhancing health maintenance.

**Aim:** The aim of the study was to assess the impact of knowledge and effectiveness of educational intervention on readiness for discharge from the hospital and compliance with therapeutic recommendations six months after discharge.

**Material and methods:** The study group consisted of 218 patients (28.9% women and 71.1% men) aged 31 to 90 years ( $63.0 \pm 11.24$ ) treated with coronary angioplasty for myocardial infarction. The effectiveness of educational intervention was assessed by comparing patients' knowledge on the day of admission (1KE) and discharge from the hospital (2KE). Knowledge was assessed in 3 aspects: knowledge of symptoms, knowledge of the disease, and knowledge of prevention. Education was provided between 1KE and 2KE based on the brochure entitled "Myocardial Infarction". The level of knowledge on the day of discharge and the increase in knowledge obtained after education ( $\Delta$ KE) were referred to the level of Readiness for Hospital Discharge after Myocardial Infarction Scale (RHD-MIS) and to the level of adherence in chronic diseases scale (ACDS).

**Results:** As a result of the education carried out between 1KE and 2KE, a significant increase in knowledge was obtained ( $p < 0.05$ ). There was no correlation between  $\Delta$ KE and RHD-MIS. However, it was shown that a higher level of knowledge at discharge (2KE) was associated with a higher RHD-MIS result ( $R = 0.17$ ;  $p = 0.01$ ). The highest impact on the RHD-MIS result was due to the level of knowledge of disease symptoms in 2KE:  $75.5 \pm 19.5\%$ ,  $76.4 \pm 21.1\%$ ,  $85.8 \pm 16.4\%$  for low, medium and high RHD-MIS results ( $p = 0.002$ );  $R = 0.15$ ;  $p = 0.0003$ . Knowledge of the disease symptoms in 2KE was associated with the patient's expectations in RHD-MIS - a higher level of knowledge was associated with higher patient expectations, respectively:  $73.2 \pm 21.7\%$ ,  $80.0 \pm 18.5\%$ ,  $82.9 \pm 19.2$  for low, medium and high RHD-MIS ( $p = 0.02$ );  $R = 0.19$ ;  $p = 0.006$ . There was no correlation between  $\Delta$ KE or 2KE and ACDS results 6 months after discharge.

**Conclusions:** The educational brochure is an effective tool in improving patients' level of knowledge. Better knowledge of the symptoms of coronary artery disease and myocardial infarction is associated with a higher degree of readiness for discharge from the hospital but does not affect the observance of therapeutic recommendations in the field of pharmacotherapy after 6 months.

**Key words:** health education, myocardial infarction, readiness for hospital discharge

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## Introduction

Cardiovascular diseases, including myocardial infarction, are a serious health, social, and economic problem [1, 2]. Despite the good results in the acute phase, up to 20% of patients die within a year of having a heart attack [3].

One of the reasons for this is the insufficient degree of implementation of the therapeutic plan [4]. As indicated by WHO data in highly developed countries, only 50% of patients with chronic diseases follow the recommendations [5]. It is estimated that among patients with low levels of adherence, the risk of death is twice as high as in patients who follow the established treatment plan [6].

In order to improve the implementation of the therapeutic plan, the ESC guidelines emphasize the importance of conducting educational activities aimed at familiarizing the patient with the essence of the disease, the principles of self-control and self-care as well as actions enhancing health maintenance [7, 8].

The aim of the study was to assess the impact of knowledge and effectiveness of educational intervention on readiness for discharge from the hospital and compliance with therapeutic recommendations six months after discharge.

## Material and methods

The presented analysis is part of a larger study entitled The impact of educational intervention on compliance with therapeutic recommendations in patients with chronic diseases, which was planned in accordance with the principles of ethics contained in the Helsinki Declaration, obtaining the consent of the Bioethical Committee at the Collegium Medicum UMK in Bydgoszcz (KB 232/2015).

The analysis included 218 patients hospitalized in the Department of Cardiology, University

Hospital No. 1 in Bydgoszcz, who met the following criteria:

- Within 48 hours of being admitted to the hospital:
  - gave informed consent to participate in the study,
  - completed the patient's questionnaire and a questionnaire assessing the patient's knowledge of coronary artery disease and myocardial infarction,
  - adopted the author's educational brochure entitled "Myocardial infarction".
- On the day of discharge from the hospital:
  - completed the Readiness for Hospital Discharge after Myocardial Infarction Scale (RHD-MIS) and the questionnaire assessing knowledge about coronary heart disease and myocardial infarction.

- After six months they answered questions regarding compliance with pharmacological recommendations (ACDS scale).

The effectiveness of educational intervention was assessed by comparing patient's knowledge of admission (1KE) and discharge from the hospital (2KE). Education was provided between 1KE and 2KE based on the brochure entitled Myocardial infarction. The level of knowledge on the day of discharge and the increase in knowledge obtained after education ( $\Delta$ KE) was related to the level of readiness to discharge from the hospital (RHD-MIS) and to the level of adherence in the field of pharmacotherapy (ACDS).

The detailed characteristics of the study group are provided in Table 1.

The questionnaire for assessing patient knowledge of coronary artery disease and myocardial infarction (KE) consisted of 20 questions. The patient received 1 point for each correct answer. The questions in the questionnaire tested knowledge in three areas: knowledge of the symptoms of coronary artery disease and myocardial infarction (questions 1–5), knowledge about the disease (questions 6–10), and knowledge about prevention (questions 11–20).

In the brochure entitled "Myocardial Infarction" contains information needed to give correct answers to all questions of the questionnaire assessing the knowledge of patients. The person submitting the brochure indicated that it contained information related to the disease and preventive measures necessary for proper functioning after leaving the hospital. In addition, standard education was carried out during the hospital stay in accordance with the procedure adopted at the clinic.

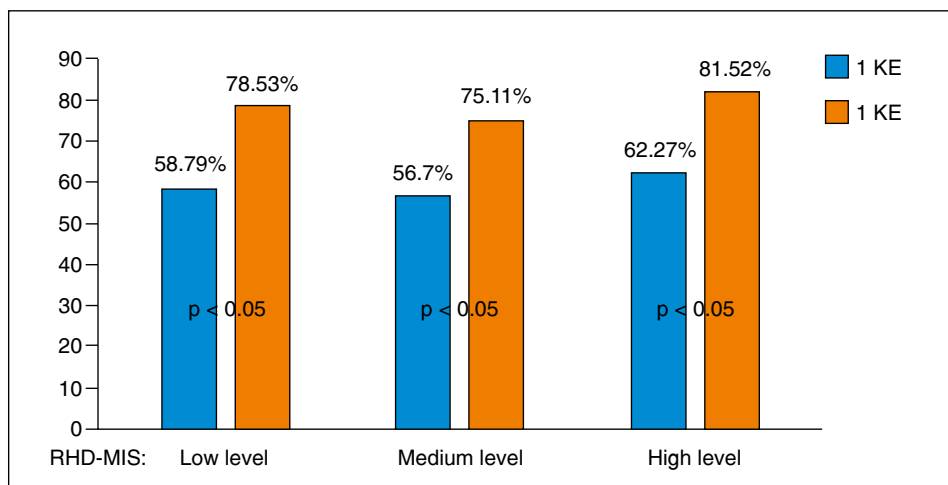
The Readiness for Hospital Discharge after Myocardial Infarction Scale (RHD-MIS) is a validated, free and publicly available tool. The questionnaire consists of 27 questions divided into 4 parts: non-scoring opinions about the disease and 3 scoring subscales assessing patient's expectations of education and patient's; knowledge (patient's self-assessment) and the information they have (objective assessment of patient's; knowledge). The patient can achieve low, medium, or high levels both as a result of the summary and in each of the subscales [9].

The Adherence in Chronic Diseases Scale (ACDS) is used to assess the level of adherence in the field of pharmacotherapy in patients with chronic diseases. It is a free, publicly available tool, validated in a group of patients treated for the acute coronary syndrome. It consists of 7 questions assessing compliance with therapeutic recommendations in the field of pharmacotherapy. The first 5 refers to behaviors directly determining adherence, while questions 6 and 7 relate to situations and views indirectly influencing the implementation of a therapeutic plan [10].

**Table 1.** The characteristics of the study group

Variable		Amount (n)	Percentage of the total (%)
Sex	Women	63	28.9
	Men	155	71.1
Age	< 65 years	122	55.96
	≥ 65 years	96	44.04
Education	Primary education	28	12.84
	Basic vocational education	77	35.32
	Secondary education	83	38.07
	Higher education	30	13.76
Employment status	Employed	86	39.45
	Unemployed	14	6.42
	Pensioner	89	40.83
	Invalid	29	13.30
Economic status	Very good	12	5.5
	Satisfactory	194	88.99
	Bad	12	5.5
	Very Bad	0	0.0
Place of residence*	City	113	51.83
	Town	49	21.1
	Village	59	27.06
Marital status	Single	23	10.55
	In a relationship	166	76.15
	Widow/widower	29	13.30
Lives	Alone	26	11.93
	With family	192	88.07
History of CAD	Yes	130	55.62
	No	88	40.37
Prior hospitalization for CAD	Yes	100	45.87
	No	118	54.13
Prior MI	Yes	62	28.44
	No	156	71.56
Prior PCI	Yes	80	36.7
	No	138	63.3
Prior CABG	Yes	33	15.14
	No	185	84.86
Level of knowledge	Sufficient	32	14.68
	Insufficient	186	85.32

\*City > 100 000 inhabitants; Town ≤ 100 000 inhabitants



**Figure 1.** Comparison of the level of knowledge before education (1KE) and after educational intervention (2KE) in relation to the level of readiness for discharge (RHD-MIS)

**Table 2.** Relation of the results of knowledge about education (2KE) and transfer of educational intervention ( $\Delta$ KE) to the level of improvement to discharge (RHD-MIS)

Questionnaire	Range of patients' knowledge	Readiness from Hospital Discharge after Myocardial Infarction Scale (RHD-MIS)						P
		Low		Medium		High		
		Mean	SD	Mean	SD	Mean	SD	
2KE	Knowledge of signs and symptoms disease	75.52	19.48	76.38	21.14	85.76	16.37	0.002
	Knowledge of the disease	87.93	20.84	81.49	26.60	90.00	18.97	0.08
	Knowledge of prevention	75.34	15.70	71.28	17.73	75.15	16.66	0.28
	Total score	78.53	12.21	75.11	15.86	81.52	12.59	0.03
2KE-1KE	Knowledge of signs and symptoms of the disease	16.90	25.63	22.55	29.80	26.06	26.71	0.08
	Knowledge of the disease	29.60	32.59	21.49	36.54	19.39	28.92	0.49
	Knowledge of prevention	17.59	23.86	14.79	25.89	15.76	23.54	0,73
	Total score	19.74	16.47	18.40	22.37	19.24	18.17	0,74

## Results

In the analysis performed, no correlation was observed between the increase in knowledge ( $\Delta$ KE) and the RHD-MIS level ( $R = -0.01$ ;  $p = 0.85$ ) (Fig. 1, Tab. 2).

It was shown that a higher level of knowledge at discharge (2KE) was associated with a higher RHD-MIS result, although the correlation was very weak ( $R = 0.17$ ;  $p = 0.01$ ). The differences between the various areas of knowledge with regard to the level of RHD-MIS were not significant, except for the knowledge of the symptoms of the disease (Tab. 2).

The results of the assessment of the level of knowledge of patients after intervention using the brochure (2KE) referring to individual components of the RHD-MIS questionnaire are presented in Table 3.

The resources of patients' knowledge (2KE), despite the visible trend ( $p$  for trend = 0.023) and very weak positive correlation ( $R = 0.1445$ ;  $p = 0.0037$ ) did not differentiate between groups of patients according to the RHD-MIS level in the subscale of subjective knowledge assessment. However, a relationship between better knowledge of disease symptoms and higher self-assessment results were noted.

The objective knowledge assessments of patients (only with respect to disease symptoms) were consistent with two methods – the 2KE survey and the RHD-MIS scale, which was also confirmed by correlation ( $R = 0.1606$ ;  $p = 0.02$ ). The level of general knowledge on discharge (2KE) very weakly correlated with the results of the RHD-MIS subscale objectively assessing the knowledge of patients ( $R = 0.1384$ ;  $p = 0.04$ ).

**Table 3.** Comparison of the results of the assessment of patients' knowledge after educational intervention (2KE) in relation to the level of readiness for discharge in individual subscales of the RHD-MIS questionnaire

Questionnaire	Range of patients' knowledge	Readiness from Hospital Discharge after Myocardial Infarction Scale (RHD-MIS)						P
		Low		Medium		High		
		Mean	SD	Mean	SD	Mean	SD	
<b>RHD-MIS – subjective assessment of patient's knowledge</b>								
2KE	Knowledge of signs and symptoms of the disease	75.00	21.66	77.63	19.33	81.94	18.69	0.08
	Knowledge of the disease	86.07	20.86	89.78	24.24	85.05	24.05	0.47
	Knowledge of prevention	70.71	17.15	73.39	16.25	75.15	17.14	0.16
	Total score	75.63	14.65	77.80	13.90	79.32	14.11	0.18
<b>RHD-MIS – objective assessment of patient's knowledge</b>								
2KE	Knowledge of signs and symptoms of the disease	72.50	21.76	80.94	19.00	81.79	18.00	0.02
	Knowledge of the disease	81.79	27.31	86.04	21.76	89.29	21.22	0.20
	Knowledge of prevention	72.86	17.76	72.92	16.09	75.36	17.78	0.38
	Total score	75.00	15.95	78.24	12.77	80.45	14.69	0.07
<b>RHD-MIS – the patient's expectations</b>								
2KE	Knowledge of signs and symptoms of the disease	73.21	21.67	80.00	18.52	82.86	19.23	0.02
	Knowledge of the disease	83.21	24.65	87.74	22.52	84.64	23.20	0.43
	Knowledge of prevention	72.32	17.27	73.87	16.88	74.11	16.93	0.80
	Total score	75.27	14.88	78.87	14.13	78.93	13.58	0.24

Patients with higher expectations (in RHD-MIS) had a higher level of knowledge about the symptoms of coronary artery disease and myocardial infarction than patients with less knowledge ( $p = 0.02$ ), which was also confirmed by weak correlation ( $R = 0.1875$ ;  $p = 0.0056$ ).

The results of knowledge assessment on discharge (2KE) were not a determining factor for ACDS in the follow-up study six months after discharge from hospital (low ACDS:  $79.02 \pm 13.93$  vs. average ACDS:  $76.81 \pm 19.92$  vs. high ACDS:  $79.15 \pm 15.03$ ;  $p = 0.28$ ). There was also no correlation between the level of adherence and the increase in knowledge ( $\Delta KE$ ), which was respectively:  $21.57 \pm 17.73$ ,  $18.47 \pm 21.36$ ,  $17.80 \pm 17.91$  for low, medium and high ACDS ( $p = 0.20$ ).

## Discussion

The patient's readiness for discharge is an important element of conditioning compliance with medical recommendations. During hospitalization, the patient's participation in the implementation of the therapeutic plan is passive, consisting in agreeing to the proposed actions, while the medical team is responsible for the

implementation of this plan. After leaving the hospital, the patient takes over responsibility for the treatment process [11].

Health education is an important element of therapeutic management, affecting the understanding of the essence of the disease, helping to accept and take action to achieve the best therapeutic effects [12].

The use of an educational brochure in the study resulted in a clear, though it seems still insufficient, an increase in the level of knowledge.

The obtained results confirmed our previous observations assessing the effectiveness of using the brochure in improving knowledge in patients treated for acute coronary syndrome [13–15].

As expected, the patients' knowledge measured by the 2KE questionnaire was consistent with the objective assessment of knowledge on the RHD-MIS scale but was not reflected in the results of the subjective assessment of patients on this scale. The subjective assessment of knowledge made by patients is unreliable and insufficient for planning educational activities.

Self-assessment of discharge readiness carried out by Andruszkiewicz et al. [16] indicates that patients after cardiovascular incidents experience a lower level prepared for discharge in the following categories: knowledge of drug use and reasons for taking it, and

the ability to notice symptoms/changes related to health in comparison to patients with other chronic conditions.

In turn, Piwońska et al. [17], comparing the results of two multicentre cross-sectional observational studies, showed a significant improvement in knowledge about health and risk factors for cardiovascular diseases in the WOBASZ II study (2013–2014) compared to the previously conducted WOBASZ study (2003–2005).

In our study, we showed that better knowledge of disease symptoms had the greatest impact on the overall assessment of readiness for discharge. Undoubtedly, knowledge of the symptoms of the disease, making it easier for the patient to make decisions adequate to the clinical situation, can positively influence the prognosis in the pre-hospital phase.

Previous studies have shown that the time from the onset of pain to the call of medical services in patients with acute coronary syndrome is often longer than recommended in international guidelines [18, 19]. Among factors influencing the delay of the call are older age, female gender, low level of education and lack of knowledge about the knowledge of symptoms and prevention [18].

We expected patients with low knowledge to have higher expectations of education, while the results were the opposite. Patients with a relatively high level of knowledge also had a greater need to obtain health information. It can be assumed that a higher level of knowledge was necessary to realize our own needs in many of our patients influencing their attitudes.

In the face of illness, mechanisms aimed at dealing with the problem are launched. The most beneficial are active behaviors that focus on seeking information to control and influence your illness. On the other hand, the subjective picture of the disease, inadequate to both scientific knowledge and the patient's current state, may be associated with unfavorable attitudes, such as denying, repression, anxiety, or avoidance [20].

Among patients with coronary artery disease, convictions about the disease predict health behavior [21] and involvement in the rehabilitation process [22]. In our study, we did not show that the level of knowledge of patients on the day of discharge affected compliance with therapeutic recommendations in the field of pharmacotherapy after 6 months of observation. On the other hand, another study analyzing the impact of readiness for discharge on adherence showed that an increase in the objective assessment of patients' knowledge (RHD-MIS subscale) affects a higher level of compliance [23].

A systematic review of research on educational interventions applied to cardiological patients by Ghisi et al. [24] indicates education as an element supporting the therapeutic process. It should be remembered, that therapeutic education cannot be limited only to the

transfer of knowledge, but above all it should develop awareness, incline to reflection and give support in implementing the therapeutic plan [25]. Researchers emphasize the need to motivate patients as a necessary element complementing educational interventions [26].

Both our research and those previously published [27–35] suggest that the practical implementation of these guidelines has a number of limitations. It is advisable to conduct further research on the determinants of readiness for discharge and implementation of the therapeutic plan.

## Limitations of the study

The study did not include the patient's mental construct, which may affect the results obtained.

## Conclusions

The educational brochure is an effective tool for improving patient knowledge. Better knowledge of the symptoms of coronary artery disease and myocardial infarction is associated with a higher degree of readiness for discharge from the hospital, however, it does not affect the observance of therapeutic recommendations in the field of pharmacotherapy after 6 months.

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