

Analysis of providing emergency care to patients with myocardial infarction without ST segment elevation

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A high mortality rate due to acute myocardial infarction (AMI) stimulates the analysis of the quality of emergency medical care at the prehospital stage. Firstly, an analysis of the reasons for the treatment of patients with AMI to general practitioners is necessary. Secondly, the quality of the provision of medical services by general practitioners is one of the criteria for the effectiveness of the implementation of patient management protocols, which requires a systematic analysis and relevant studies.

The objective: to analyze the provision of emergency medical care to patients with acute myocardial infarction without ST segment elevation (NSTEMI) when they seek medical care.

Materials and methods. The referral routes for hospitalization of patients with acute coronary syndrome and clinical manifestations were analyzed among 280 patients with STEMI and 91 patients with NSTEMI. The assessment of treatment tactics in patients with NSTEMI was carried out in the following paragraphs of the emergency medical care protocol: determination of blood saturation, ensuring reliable venous access, administration of nitroglycerin in aerosol (1–2 doses or 0,4–0,8 mg), use of acetylsalicylic acid (ASA) after chewing 160–325 mg, the use of clopidogrel 300 mg orally; the appointment of β -blocker; narcotic analgesic; anticoagulant. Statistical data processing was carried out using non-parametric criterion χ^2 .

Results. Appeals to primary health care centers were significantly more frequent in patients with NSTEMI, due to the clinical course of the disease.

Conclusion. At the stage of medical care by general practitioners, only the appointment of acetylsalicylic acid met the criteria for the implementation of the protocol for the provision of emergency medical care to patients with NSTEMI.

Key words: acute myocardial infarction, NSTEMI, emergency medical care, primary health care.

Аналіз надання екстреної медичної допомоги хворим на інфаркт міокарда без елевації сегмента ST при зверненні по медичну допомогу

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Високий рівень летальності при гострому інфаркті міокарда (ГІМ) стимулює до аналізу якості надання екстреної медичної допомоги (ЕМД) на догоспітальному етапі. По-перше, необхідний аналіз причин звернення хворих на ГІМ до сімейної амбулаторії. По-друге, якість надання медичних послуг лікарями загальної практики є одним із критеріїв ефективності впровадження протоколів з ведення пацієнтів, що потребує систематичного аналізу та проведення відповідних досліджень.

Мета дослідження: аналіз надання екстреної медичної допомоги хворим на ГІМ без елевації сегмента ST (NSTEMI) при їхньому зверненні по медичну допомогу.

Матеріали та методи. Шляхи направлення на госпіталізацію хворих на гострий коронарний синдром і клінічні прояви були проаналізовані у 280 пацієнтів зі STEMI та 91 хворого з NSTEMI. Оцінювання лікувальної тактики у пацієнтів із NSTEMI проводили за наступними пунктами протоколу ЕМД: визначення сатурації крові, забезпечення надійного венозного доступу, призначення нітрогліцерину в аерозолі (1–2 дози або 0,4–0,8 мг), застосування ацетилсаліцилової кислоти (АСК) в дозі 160–325 мг, застосування клопидогрелю 300 мг всередину, призначення β -адреноблокатора, наркотичного анальгетика та антикоагулянту. Статистичне оброблення даних проводили з використанням непараметричного критерію χ^2 .

Результати. Звернення до центрів первинної медико-санітарної допомоги (ЦПМСД) було достовірно більш частим у пацієнтів із NSTEMI, що обумовлено клінічним перебігом захворювання.

Заключення. На етапі центрів первинної медико-санітарної допомоги достовірно якісним було виконання протоколу надання екстреної медичної допомоги пацієнтам з NSTEMI лише за пунктом призначення ацетилсаліцилової кислоти.

Ключові слова: гострий інфаркт міокарда, NSTEMI, екстрена медична допомога, первинна медико-санітарна допомога.

Анализ предоставления экстренной медицинской помощи больным инфарктом миокарда без подъема сегмента ST при обращении за медицинской помощью

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Высокий уровень летальности при остром инфаркте миокарда (ОИМ) стимулирует к анализу качества оказания экстренной медицинской помощи (ЭМП) на догоспитальном этапе. Во-первых, необходим анализ обращения больных ОИМ в семейные амбулатории. Во-вторых, качество оказания медицинских услуг врачами общей практики является одним из критериев эффективности внедрения протоколов по ведению пациентов, что требует систематического анализа и проведения соответствующих исследований.

Цель исследования: анализ оказания экстренной медицинской помощи больным острым инфарктом миокарда без элевации сегмента ST (NSTEMI) при их обращении за медицинской помощью.

Материалы и методы. Пути направления на госпитализацию больных острым коронарным синдромом и клинические проявления были проанализированы у 280 больных с STEMI и 91 пациента с NSTEMI. Оценку лечебной тактики у пациентов с NSTEMI проводили по следующим пунктам протокола ЭМП: определение сатурации крови, обеспечение надежного венозного доступа, назначение нитроглицерина в аэрозоле (1–2 дозы или 0,4–0,8 мг), применение ацетилсалициловой кислоты (АСК) в дозе 160–325 мг, применение клопидогрела 300 мг внутрь, назначение β -адреноблокатора, наркотического анальгетика и антикоагулянта. Статистическая обработка данных проводилась с использованием непараметрического критерия χ^2 .

Результаты. Обращение в центры первичной медико-санитарной помощи (ЦПМСП) было достоверно более частым у больных NSTEMI, что обусловлено клиническим течением заболевания.

Заключение. На этапе центров первичной медико-санитарной помощи достоверно качественным было исполнение протокола предоставления экстренной медицинской помощи пациентам с NSTEMI только по пункту назначения ацетилсалициловой кислоты.

Ключевые слова: острый инфаркт миокарда, NSTEMI, экстренная медицинская помощь, первичная медико-санитарная помощь.

Despite significant advances in modern cardiology in improving the treatment of patients with coronary heart disease, its clinical form – acute myocardial infarction (AMI) is a potentially fatal event and cause of death among adults. Sudden coronary artery occlusion leads to ischemic death of cardiomyocytes, so the time from the beginning of clinical manifestations is important for the patient, and it further determines the treatment policy [1, 2].

An urgent problem is to provide the emergency medical care (EMC) to this category of patients, since the legal responsibility for medical decisions is one of the most difficult problems in the health care system. The high level of mortality with AMI stimulates to conduct the analysis of the quality of EMC at the prehospital stage, in order to prevent the occurrence of conflict situations, to improve the skills of medical staff, as well as to improve medical support during the treatment process. It is also important to identify the factors that influence the patients' decisions to seek medical care. A significant factor is the medical awareness of the population, that is, the ability to recognize the symptoms of the disease in time and seek help [3, 4].

The great need for evaluation of EMC encourages a comprehensive study of this problem. Firstly, it is necessary to analyze the causes of applying to the hospital of patients with AMI in the family outpatient clinic. Secondly, the quality of medical services provided by General practitioners is one of the criteria for the effectiveness of the implementation of patient management protocols, which requires systematic analysis and appropriate researches. Recent trends in the health care system of Ukraine determine the need to assess the quality of EMC provision to patients with AMI at the prehospital stage, which determined the purpose of this study [5].

The objective: to analyze the provision of emergency medical care for patients with NSTEMI when seeking medical services.

MATERIALS AND METHODS

The study is based on data obtained during a comprehensive examination and dynamic follow-up of 280 patients with stable ST segment elevation (STEMI) and 91 patients without ST segment elevation (NSTEMI). The sample of patients was carried out in the period from 2015 to February 2018. The patients were delivered by ambulance staff to the reception and diagnostic Department of the Municipal institution «Regional medical center of cardiovascular diseases» of Zaporizhzhia Regional Council. All the surveyed persons were comparable in age, social status and sex (the ratio of men and women was 4 to 1).

Screening and distribution of patients into groups. All patients with CHD were carefully examined for compliance with the inclusion/exclusion criteria:

Criteria for inclusion in the study:

- male and female patients from 46 to 75 years;
- for women postmenopausal period over 1 year;
- the presence of AMI in the first 12 hours from the onset of the disease;
- informed consent of the patient for follow-up after undergoing AMI.

Criteria for exclusion from the study:

- atrioventricular block of II-III degree;
- permanent form of atrial fibrillation;
- detection of congenital and acquired hemodynamically significant heart defects;
- stage III of chronic heart failure;
- discovered aneurysm of the left ventricle;
- decompensated comorbidity;

- acute inflammatory diseases or exacerbation of chronic;
- history of coronary artery bypass grafting;
- oncological disease.

STEMI and NSTEMI were verified on the basis of generally accepted diagnostic criteria [6]. The dividing of patients into groups was carried out after establishing the compliance of patients with the criteria for inclusion / exclusion of the study depending on the presence of persistent ST-segment elevation:

- the first group included 280 patients with CHD and STEMI (median age was 60.0 [53.0 ; 64.0] years);
- the second group consists of 91 patients with CHD and NSTEMI (median age was 61.0 [56.0 ; 66.0] years).

The algorithm of EMC

Assessment of the quality of emergency medical care for patients with STEMI at the prehospital stage was carried out according to the Protocol order No. 455 of the Ministry of Health of Ukraine dated 02 July, 2014 and NSTEMI according to the Protocol order No. 164 of the Ministry of Health of Ukraine dated 03 March, 2016. Assessment of treatment policy was carried out on the following points of the EMC Protocol:

- determination of blood saturation (SpO₂);
- provision of reliable venous access of catheters for intravenous puncture;
- appointment of nitroglycerin in aerosol (1–2 doses or 0,4–0,8 mg);
- use of acetylsalicylic acid (ASA) by chewing 160–325 mg;
- use of clopidogrel 300 mg orally;
- appointment of β -adrenoblocker;
- narcotic analgesic;
- anticoagulant.

Execution of the Protocol item +1 point, non-execution – 0 points.

Statistical processing of the obtained data was carried out on a personal electronic computer using the application software package PSPP (version 0.7.9, GNU GPL license). The data contains the number of patients (n) and the proportion of the total number of patients (%). When testing statistical hypotheses, the null hypothesis was rejected at a level of statistical significance (p) below 0.05. Statistical data processing was carried out using nonparametric criterion χ^2 .

RESEARCH RESULTS AND THEIR DISCUSSION

Clinical manifestations of AMI among examined STEMI and NSTEMI patients were evaluated retrospectively at the onset of the disease. There were complaints such as angina, weakness, palpitations, hyperhidrosis, shortness of breath, nausea, dizziness. The analysis of complaints in the examined patients is presented in table 1.

The incidence of major symptoms among STEMI patients was as follows:

- angina – 263 (93.9%),
- weakness – 90 (32.1%),
- palpitation – 6 (2.1%),
- hyperhidrosis – 44 (15.7%),
- shortness of breath – 21 (7.5%),
- nausea – 25 (13.9%),
- dizziness – 13 (4.6%).

In the group of patients with NSTEMI was the following distribution of symptoms:

Table 1

The main clinical manifestations among the examined patients, n=371

Symptom	STEMI, n=280		NSTEMI, n=91	
	Number of patients	%	Number of patients	%
Angina	263	93,9	76	83,5
P-value	$\chi^2, p=0,004$			
Weakness	90	32,1	23	25,3
P-value	$\chi^2, p=0,27$			
Palpitation	6	2,1	5	5,5
P-value	$\chi^2, p=0,20$			
Hyperhidrosis	44	15,7	8	8,8
P-value	$\chi^2, p=0,14$			
Shortness of breath	21	7,5	12	13,2
P-value	$\chi^2, p=0,15$			
Nausea	25	8,9	8	8,8
P-value	$\chi^2, p=0,86$			
Dizziness	13	4,6	6	6,6
P-value	$\chi^2, p=0,65$			

Table 2

Referral for hospitalization of patients with acute coronary syndrome

Referral	STEMI, n=280		NSTEMI, n=91	
	Number of patients	%	Number of patients	%
EMS	152	54,2	40	43,9
P-value	$\chi^2, p=0,11$			
AAS	106	37,9	24	26,4
P-value	$\chi^2, p=0,06$			
PHCC	22	7,9	27	29,7
P-value	$\chi^2, p<0,001$			

- angina – 76 (83.5%),
- weakness – 23 (25.3%),
- palpitations – 5 (5.5%),
- hyperhidrosis – 8 (8.8%),
- shortness of breath – 12 (13.2%),
- nausea – 8 (8.8%),
- dizziness – 6 (6.6%).

There were no significant differences in the frequency of clinical manifestations of AMI, such as weakness, palpitation, hyperhidrosis, shortness of breath, nausea, dizziness ($p>0.05$). The clinical feature of patients with STEMI was a more frequent complaint of anginal pain among 263 (93.9%) patients versus 76 (83.5%) ones in the NSTEMI group ($p<0.05$).

Referral for hospitalization of patients with AMI in a specialized hospital can occur in three ways:

- 1) when seeking to emergency medical services (EMS),
- 2) referring to a non-core medical institution, followed by a call to air ambulance service (AAS),
- 3) referring to the primary health care center (PHCC), which determined further subgroups for analysis.

Referral for hospitalization of patients is presented in table 2.

The proportion of patients in the STEMI group seeking EMS was as follows:

- to EMS – 152 (54.2%),
- referring to a non – core medical institution with subsequent use of AAS – 106 (37.9%),
- to PHCC – 22 (7.9%).

In the group of patients with NSTEMI there was the following distribution of referrals:

- to EMS – 40 (43.9%),

- referral to non-core medical with the subsequent involvement of AAS – 24 (26.4%),
- to PHCC – 27 (29.7%).

There were no significant differences between the STEMI and NSTEMI groups with the proportion of patients seeking treatment with EMS and non-core medical institution followed by AAS ($p>0.05$), while referring to PHCC was significantly more frequent in patients with NSTEMI ($p<0.05$).

The EMS Protocol scores were summed, and the proportion of appointments from the number of patients was calculated. The results are presented in table 3.

In the EMS subgroup, SpO₂ determination was performed in 33 (82.5%) patients and had no significant difference with the AAS subgroup in the number of studies of 23 (95.8%) patients ($p>0.05$). Whereas in the PHCC subgroup, the implementation of the Protocol under this item was only 15 (55.6%) cases and had a significant discrepancy, both against the EMS subgroup and the AAS subgroup ($p<0.05$).

Venous catheter insertion was significantly more frequent in the AAS subgroup of 15 (62.5%) compared to 5 (18.5%) cases in the PHCC subgroup ($p<0.05$), but did not achieve a statistical difference with the EMS subgroup of 18 (45.0%) people ($p>0.05$). Significantly more often this procedure was performed in the EMS subgroup than in the PHCC subgroup – 18 (45.0%) vs. 5 (18.5%), respectively ($p<0.05$).

The administration of nitroglycerin, ASA and β -adrenoblocker had no significant difference between the subgroups. Whereas the administration of clopidogrel was significantly more frequent in the AAS subgroup – 19 (79.2%), both against the PHCC – 15 (55.6%) and against the EMS subgroup in 19 (47.5%) cases

Provide the emergency medical care for patients with NSTEMI at the prehospital stage, n=91

Implementation of the Protocol	EMS (n = 40)		AAS (n = 24)		PHCC (n = 27)	
	1		2		3	
	n	%	n	%	n	%
Determination SpO ₂	33	82,5	23	95,8	15	55,6
P-value	$\chi^2, p_{1,2}=0,12$		$\chi^2, p_{2,3}<0,001$		$\chi^2, p_{1,3}=0,02$	
Venous access	18	45,0	15	62,5	5	18,5
P-value	$\chi^2, p_{1,2}=0,18$		$\chi^2, p_{2,3}<0,001$		$\chi^2, p_{1,3}=0,03$	
Nitroglycerin	29	72,5	17	70,8	18	66,7
P-value	$\chi^2, p_{1,2}=0,89$		$\chi^2, p_{2,3}=0,75$		$\chi^2, p_{1,3}=0,61$	
ASA	38	95,0	23	95,8	26	96,3
P-value	$\chi^2, p_{1,2}=0,88$		$\chi^2, p_{2,3}=0,93$		$\chi^2, p_{1,3}=0,80$	
Clopidogrel	19	47,5	19	79,2	15	55,6
P-value	$\chi^2, p_{1,2}=0,01$		$\chi^2, p_{2,3}=0,04$		$\chi^2, p_{1,3}=0,52$	
β -adrenoblocker	11	27,5	8	33,3	9	33,3
P-value	$\chi^2, p_{1,2}=0,65$		$\chi^2, p_{2,3}=0,92$		$\chi^2, p_{1,3}=0,61$	
Narcotic analgesic	31	77,5	19	79,2	11	40,7
P-value	$\chi^2, p_{1,2}=0,83$		$\chi^2, p_{2,3}=0,005$		$\chi^2, p_{1,3}=0,002$	
Anticoagulant	35	87,5	21	87,5	12	44,4
P-value	$\chi^2, p_{1,2}=1,0$		$\chi^2, p_{2,3}<0,001$		$\chi^2, p_{1,3}<0,001$	

(p<0.05), but there was no significant difference between the PHCC subgroup and the EMS (p>0.05).

Prescription of narcotic analgesic was less common in the PHCC subgroup in 11 (40.7%) patients, against both the EMS – 31 (77.5%) and the AAS subgroup – 19 (79.2%), p<0.05, which is most likely due to the clinical manifestation of AMI in the examined patients. The situation with the use of anticoagulant was similar.

Assessment of the quality of EMS is an important component of medical services. Competition for both public and private financial resources poses a challenge for medical institutions to ensure competitive advantage. The key mechanism for increasing the quality of EMS in modern conditions is the adaptation of the health care system in accordance with international standards [7].

It should be noted that the main strategic direction in improving the quality of EMS in the first place should be the provision of medicines and equipment for primary health care.

The constant improvement of approaches to the organization and implementation of treatment of patients with AMI, taking into account the socio-economic problems of the population are significant as well [8].

Thus, the development of a model for assessing the quality of EMS is an important area of scientific research. The obtained results can later be the basis for further research and development of an optimal model for assessing the quality of EMS for patients with AMI at the prehospital stage.

CONCLUSION

1. Referral to PHCC was significantly more frequent in patients with NSTEMI, due to the clinical course of the disease.
2. There is a reliably high-quality implementation of the Protocol of EMS to patients with NSTEMI at the stage of PHCC only at the destination of the ASA.

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