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# NOSOLOGIC STRUCTURE OF ACUTE CORONARY EVENTS AT ADMISSION AND DISCHARGE FROM THE HOSPITAL, COMPLIANCE OF PATIENTS AND SHORT-TERM PROGNOSIS (DATA OF THE RACSMI-UZ REGISTER)

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**SUMMARY**

**Introduction.** Basing on the data of the "RACSMI-UZ" register, the article provides comparative analysis of the structure and transformation of diagnoses during acute coronary conditions in the dynamics (at admission and discharge), assesses patients' adherence to drug therapy depending on gender and also describes analysis of its effect on the short-term prognosis.

**Material and methods.** The study material included 449 patients with ACS/AMI hospitalized to relevant health care facilities of the experimental district of Tashkent. Two groups of patients were distinguished depending on the gender: group 1 included 243 male patients, and group 2 consisted of 206 female patients.

**Results.** The registration showed that ACS/AMI was more often observed in men than in women (54.1% vs. 45.9%, respectively). Male patients proved to be younger than female ones ($p < 0.05$); obesity of different degree prevailed in women (48.0% in women vs. 29.6% in men, $p < 0.05$). In the male population, AMI at admission was registered in 43 (17.7%) patients but the number of patients with this diagnosis increased at discharge (61 subjects, or 25.1%). Out of 243 men, 3.7% died and the largest number of deaths occurred in patients with initial diagnosis of unstable angina. In the female population, the incidence of AMI both with and without Q at admission was recorded 2 times less frequent than that at discharge from the hospital (8.7% of cases at admission and 17.5% of cases at discharge), which shows low vigilance of healthcare professionals in diagnostics of AMI in women. Mortality from ACS/AMI in women was 3.4% with the largest number of deaths being associated with the initial diagnosis of AMI without Q. Compliance in females was somewhat higher than in males; men were prone to taking more medications (Mc's), though there were no significant differences between men and women by the proportion of Mc's taken. The direct correlation was found between the patients' compliance level and the time interval: from admission to death of the respondent ($p > 0.05$).

**Conclusion.** ACS / AMI was more often recorded in men than in women, while the age of men was younger ($p<0.05$). Alertness of primary care physicians in ACS / AMI was low, especially for women. Compliance in women was higher than in men. Thus, the higher was the patient adherence to therapy, the more stable the body appeared to cardio stress.

**Keywords:** *register, acute myocardial infarction, acute coronary syndrome, men, women, compliance.*

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**List of abbreviations:**
ACE inhibitors – angiotensin-converting enzyme inhibitors
ACS – acute coronary syndrome
ACS with ST – acute coronary syndrome with ST-elevation
ACS without ST – acute coronary syndrome without ST-elevation
Amb – ambulance service
AMI – acute myocardial infarction
AMI with Q – acute myocardial infarction with a Q-wave
AMI without Q – acute myocardial infarction without Q- wave
ARA – angiotensin II receptor antagonists
ASA – acetylsalicylic acid
BAB – beta-adrenoblockers
BMI – body mass index
CA – calcium antagonists
CH – clinical hospital
CHD – coronary heart disease
CVD – cardiovascular diseases
Ds – diagnosis
ECG – electrocardiogram
Mc´s – medications
SEA – stable exertional angina
t – time interval (in this article – days)
Tf-MI – the transferred myocardial infarction
UA – unstable angina

## URGENCY

Recently it has become obvious that disease registers are the most reliable way to obtain data about actual clinical practice [1, 2]. This mainly concerns diseases which are characterized, on the one hand, by an unfavourable life prognosis, and on the other hand, for which there exist specific evident possibilities for life prognosis improvement. Acute myocardial infarction (AMI) is exactly one of these diseases. Various registers were implemented in many civilized countries. It is known that there are several Russian registers of acute coronary syndrome (ACS) including AMI [3-6], but these registers not always contain any information about patient compliance and related life prognosis.

ACS outcome prediction is an important component in management of the patients with signs of acute myocardial ischemia at early stages of hospital follow-up. Hospital risk models suggested for these purposes estimate probability of lethal events without taking into account the features of this condition development in males and females [7].

Appearance of medications (Mc's) such as beta-adrenoblockers (BAB), angiotensin-converting enzyme inhibitors (ACE inhibitors), angiotensin-II receptor antagonists (ARA), aspirin (ASA), statins, etc., significantly improved the life prognosis for patients with CHD (this is proven by results of controlled randomized studies). However, interest is still generated by the problem associated with the frequency and consistency of these Mc's use in the actual clinical practice and their influence on the further course of the disease and the patients' condition [8]. From this point of view the assessment of the actual therapy received by such patients in the health care practice in one of the districts of Tashkent is of considerable scientific and practical interest. The assessment of patient adherence to medical recommendations is not less interesting. Such registers were not previously carried out on the territory of Uzbekistan that is why this study is not only practically interesting and relevant but also is in demand.

**Objective:** to perform comparative analysis of the diagnoses structure and transformation in the patients with acute coronary conditions in the dynamics (at admission and discharge) as well as to assess patients' adherence to drug therapy depending on gender and its effect on the short-term prognosis.

## MATERIAL AND METHODS OF THE STUDY

A database of patients admitted to CH of Tashkent with diagnosis of ACS/AMI during one calendar (2015) year generated and processed in accordance with the developed register protocol served as the study material.

We used an alphabetical card register system containing numbered "Register Cards" for each subject with passport and objective data in order to form a search and reference apparatus.

When implementing the register, the analysis of the data for all patients with ACS/AMI implied observing the following conditions:

- patients must meet inclusion criteria;
- patient participation shall not affect the approaches to his (her) therapy;
- inclusion of the patient in the register must be accompanied by his (her) registration in the database of the register with filling in a "Register Card" for each patient.

*Inclusion criteria.* Register included patients aged from 18 to 70 years who presented to Emergency Service and were hospitalized to relevant hospitals because of ACS/AMI.

ACS and AMI were diagnosed basing on generally accepted criteria:

a) typical pain syndrome;
b) appearance of a new Q wave in ECG;
c) dynamics of ST segment and T wave in ECG;
d) myocardial damage markers changes over time (from analysis to analysis).

*Exclusion criteria:* age under 18 and above 70 years.

This article presents results of investigation of 449 patients with ACS/AMI hospitalized in appropriate health care facilities in the experimental district of Tashkent. Presented results concerning performed PCI (percutaneous coronary intervention) and ACB (aortocoronary bypass) or presence of diagnostically significant stenoses in the coronary arteries were obtained basing on the data from medical histories. This study fragment includes assessment of the conservative therapy (also according to the data from medical histories) and dynamics of diagnosis transformation in the patient sample. Two groups of patients were distinguished depending on the gender: group 1 included 243 male patients, and group 2 consisted of 206 female patients.

**Statistical analysis** was carried out using the "Statica-6,0" software. A method for testing statistical hypotheses on the extraction of samples from the same general population was used in order to assess homogeneity of the compared groups. Homogeneity by the qualitative characteristics was checked using descriptive statistics by assessment of normality distribution with the help of the Kolmogorov-Smirnov and Lilliefors test. Correlation coefficients (r and t) were calculated in order to establish a relationship between individual clinical signs. Significance of the differences between the quality characteristics of the samples of each category was found by determining the test $\chi 2$. Confidence of differences between the compared groups by a particular feature was assessed using Student's t-test (for a value of $p<0.05$). Values are given in the form: mean ± SD.

## RESULTS

The study found that males with ACS/AMI were younger than females. Age difference was determined by the fact that patients aged under 50 years prevailed among males. On the contrary, age categories of 51-60 years and 61+ proved to be priority for females ($p<0.05$).

**Table 1. Anthropometric characteristics of the compared patient groups**

| Parameter | Males (n=243) | Females (n=206) | p | $\chi 2$ |
|---|---|---|---|---|
| Age, years | 57,3±8,6 | 59,8±7,3 | 0,001 | |
| Weight, kg | 83,5±11,2 | 79,2±14,2 | 0,012 | |
| Height, cm | 171,7±5,2 | 162,9±6,1 | 0,000 | |
| BMI, kg/m$^2$ | 28,4±3,7 | 29,7±4,6 | 0,020 | |
| BMI measured, n (%) | 125 (51,4%) | 100 (48,5%) | | |
| Normal weight, n (%) | 22 (17,6% от 125) | 15 (15% от 100) | 0,732 | 0,117 |
| Overweight (BMI=25.1-30.0 kg/m$^2$), n (%) | 66 (52,8% от 125) | 37 (37% от 100) | 0,026 | 4,969 |
| Obesity, grade 1 (BMI=30.1-35.0 kg/m$^2$), n (%) | 33 (26,4% от 125) | 35 (35% от 100) | 0,211 | 1,562 |
| Obesity, grade 2 (BMI=35.1-40.0 kg/m$^2$), n (%) | 3 (2,4% от 125) | 10 (10% от 100) | 0,032 | 4,581 |
| Obesity, grade 3 (BMI≥40.1 kg/m$^2$), n (%) | 1 (0,8% от 125) | 3 (3% от 100) | 0,458 | 0,550 |

*Notes: n – quantity of the patients; p and $\chi 2$ – confidence of differences between groups; BMI – body mass index.*

BMI was calculated in total in 225 (50.1%) patients, 125 of whom were males and 100 females (Table 1). Analysis of BMI depending on the gender showed that normal weight was observed in 17.6% of males and in 15.0% of females. However, overweight, i.e. BMI values from 25 to 30 kg/m2, was found in males much more often than in females (52.8% vs. 37.0%, respectively, p<0.05).

According to the data from medical histories, previous cardiovascular catastrophes were more often observed in males, namely: previous myocardial infarction (PMI) was recorded 1.8 times more often in males than in females (p<0.001); history of ACE (acute coronary event) was present 1.7% more often in males than in the female group; total number of performed PCI and ACB in males was 11.5%, which was 3.3% more often than in females (Fig. 1). The average age of patients with PMI was 61.5 ± 7.8 years in females and 58.4 ± 8.4 years in males [**p = 0.041**; CI from 0.128 to 6.072]; on the contrary, the age of patients with history of ACE was 59.6 ± 9.5 years in females and 61.3 ± 7.1 years in males [p = 0.526; CI from -7.081 to 3.681].

The age of subjects with history of cardiac surgery did not depend on the gender: it was 57.7 ± 7.1 years in females and 58.6 ± 5.6 years in males [p = 0.639; CI from -2.945 to 4.745]. In spite of the fact that males with history of PMI were younger, nevertheless, they more often had stenoses with volume ≥50% [**p = 0.041**; $\chi 2$ = 4.190].

Assessment of the patients' nosologic structure at admission and discharge is presented as follows. At the time of hospitalization

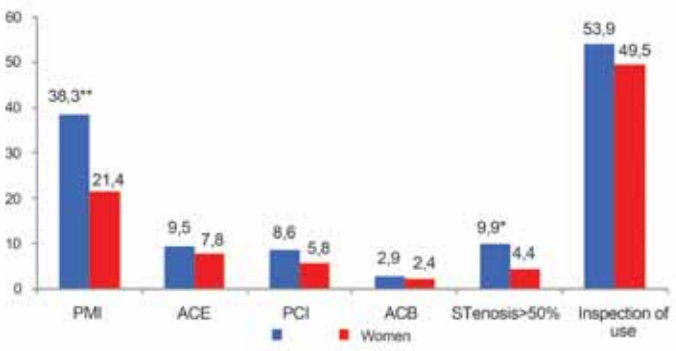


**Figure 1. Anamnestic characteristics of compared patient groups**
*Note: * – confidence of differences between groups at p<0.05; ** – confidence of differences between groups at p<0.001; PMI – previous myocardial infarction; ACE – acute coronary event; PCI – percutaneous coronary intervention; CAB – coronary artery bypass; presence of stenoses with volume ≥50%; patient awareness of the presence of a cardiovascular pathology; data is presented as percentage.*

AMI with Q was diagnosed in 27 cases (11.1%) in males and in 7 cases (3.4%) in females [**p = 0.004**; $\chi 2$ = 8.406]; AMI without Q in 16 (6.6%) and in 11 (5.3%); ACS in 21 (8.7%) and in 10 (4.9%) [p = 0.164; $\chi 2$ = 1.934]; ACS without S-T in 17 (7.0%) and in 20 (9.7%); unstable angina (UA) in 158 (65.0%) and in 147 (71.4%) in males and females, respectively. Four (1.7%) males and 11 (5.3%) females were hospitalized with other (non-cardiac) diagnoses. The above data shows that AMI with Q at the time of admission was diagnosed significantly more often in males than in females; ACS with S-T was also more often diagnosed in males, but in this case the difference did not reach the confidence level as compared to females.

At discharge the structure of diagnoses was as follows (Table 2): AMI with Q was diagnosed in 37 (15.2%) cases in males and in 14 (6.8%) cases in females; AMI without Q in 25 (10.3%) and in 22 (10.7%) cases; stable exertional angina (SEA) in 172 (70.8%) and in 165 (80.1%) cases in males and females, respectively. The diagnosis of CHD was ruled out in 9 males and 5 females (all p>0.05).

Diagnosis transformation in the male population was represented by the following pattern (Table 3):

- out of 27 males hospitalized with AMI with Q: the diagnosis was confirmed in 23 patients, 2 of them died; the diagnosis

**Table 2. Patients' diagnosis structure at admission and discharge depending on the gender**

| Diagnosis | at admission | | at discharge | |
|---|---|---|---|---|
| | 243 (males) | 206 (females) | 243 (males) | 206 (females) |
| AMI with Q | 27 (11,1%) | 7 (3,4%)* | 37 (15,2%) | 14 (6,8%) |
| AMI without Q | 16 (6,6%) | 11 (5,3%) | 25 (10,3%) | 22 (10,7%) |
| ACS with S-T | 21 (8,6%) | 10 (4,9%) | 0 | 0 |
| ACS without S-T | 17 (7,0%) | 20 (9,7%) | 0 | 0 |
| UA | 158 (65,0%) | 147 (71,4%) | 0 | 0 |
| SEA | - | - | 172 (70,8%) | 165 (80,1%) |
| Others | 4 (1,7%) | 11 (5,3%) | 9 (3,7%) | 5 (2,4%) |

transformed at discharge to AMI without Q in 1 case; to SEA in 2 patients and CHD was ruled out in 1 patient;
- out of 16 males with AMI without Q: the diagnosis was confirmed in 14 patients; it transformed to AMI with Q in 1 case and to SEA in 1 patient;
- out of 21 patients hospitalized with ACS with S-T: the diagnosis transformed to AMI with Q in 11 cases, 1 patient died; the diagnosis transformed in AMI without Q in 3 patients and to SEA in 7 cases;
- out of 17 patients hospitalized with ACS without S-T: the diagnosis transformed to AMI without Q in 4 patients, 2 of them died; the diagnosis transformed to SEA in 13 cases;
- out of 158 patients with UA: the diagnosis transformed to AMI with Q in 2 patients; to AMI without Q in 3 patients; to SEA in 145 patients, 4 of them died; the diagnosis of CHD was ruled out in 8 patients;
- SEA was diagnosed at discharge in 4 males initially hospitalized with other diagnoses.

Thus, out of 243 males 9 (3.7%) died; out of these, the largest number (4 subjects (44.4% of all deceased males)) had initial diagnosis of UA.

Investigation of diagnosis transformation in the female population revealed the following (Table 4):
- out of 7 females hospitalized with AMI with Q: the diagnosis was confirmed in 7 patients, 2 of them died;
- out of 11 females with AMI without Q: the diagnosis was confirmed in 10 patients, 1 of them died; the diagnosis transformed post-mortem to AMI with Q in 1 patient;
- out of 10 females hospitalized with ACS with S-T: the diagnosis transformed to AMI with Q in 2 patients, 1 of them died; the diagnosis transformed to AMI without Q in 3 patients and the diagnosis transformed to SEA in 5 cases;
- out of 20 patients hospitalized with ACS without S-T: the diagnosis transformed to AMI with Q in 2 cases; to AMI without Q in 3 patients, two of whom died; the diagnosis transformed to SEA in 15 cases;
- out of 147 patients with UA: the diagnosis transformed to AMI with Q in 2 patients; to AMI without Q in 5 cases, to SEA in 135 cases and the diagnosis of CHD was ruled out in 5 cases;
- out of 11 females hospitalized with other diagnoses 1 patient developed AMI without Q; SEA was diagnosed in 10 cases.

Thus, 7 (3.4%) deaths were observed among 206 females hospitalized with suspected acute coronary events, with 4 females (57.1% of all deceased females) having initial diagnosis of AMI and 3 females (42.9% of the all deceased females) having ACS.

Direct analysis of the time interval (t) from admission to death of patients with ACS/AMI showed that this parameter was shorter for males than for females (t = 0.67 ± 1.0 days for males and t = 2.57 ± 2.94 for females days; p>0.05). The age of the deceased males proved to be less than age of the deceased females (males: 59.2 ± 8.5 years, females: 66.4 ± 5.4 years; p = 0.077).

Compliance analysis depending on the gender revealed the following. Average number of medications taken per day was 2.2 ± 1.7 per person in males and 2.2 ± 1.6 per person in females, respectively (p>0.05). The composition of the conservative therapy is presented in Figure 2, which shows that both males and females had approximately the same proportions by the main groups of medications taken (all p>0.05).

However, calculation of the quantitative values showed that, in general, the female population proved to be more adherent to pharmacotherapy than the male population (quantity of compliant women was 166 (80.6%) vs. 184 men (75.7%), p = 0.261, and $\chi 2$ = 1.264). At the same time the female group prevailed in taking from 1 to 3 medications per day, the male group – from 4 or more pharmaceuticals per day, but the difference did not reach the confidence level (Table 5).

**Table 3. Detailed analysis of diagnosis transformation in males**

| Diagnosis at admission (n) | | SEA | AMI with Q | AMI without Q | ACS with S-T | ACS without S-T | Other |
|---|---|---|---|---|---|---|---|
| AMI with Q | 27 | 2 | 21+2(y) | 1 | 0 | 0 | 1 |
| AMI without Q | 16 | 1 | 1 | 14 | 0 | 0 | 0 |
| ACS with S-T | 21 | 7 | 10+1(y) | 3 | 0 | 0 | 0 |
| ACS without S-T | 17 | 13 | 0 | 2+2(y) | 0 | 0 | 0 |
| UA | 158 | 141+4(y) | 2 | 3 | 0 | 0 | 8 |
| Other | 4 | 4 | 0 | 0 | 0 | 0 | 0 |
| Diagnosis at discharge | 243 | 172 | 37 | 25 | 0 | 0 | 9 |

*Note: n – number of patients; UA – unstable angina; SEA – stable exertional angina; (d) – deceased*

**Table 4. Detailed analysis of the diagnosis transformation in females**

| Diagnosis at admission (n) | | SEA | AMI with Q | AMI without Q | ACS with S-T | ACS without S-T | Other |
|---|---|---|---|---|---|---|---|
| AMI with Q | 7 | 0 | 5+2(y) | 0 | 0 | 0 | 0 |
| AMI without Q | 11 | 0 | 1(y) | 9+1(y) | 0 | 0 | 0 |
| ACS with S-T | 10 | 5 | 1+1(y) | 3 | 0 | 0 | 0 |
| ACS without S-T | 20 | 15 | 2 | 1+2(y) | 0 | 0 | 0 |
| UA | 147 | 135 | 2 | 5 | 0 | 0 | 5 |
| Other | 11 | 10 | 0 | 1 | 0 | 0 | 0 |
| Diagnosis at discharge | 206 | 165 | 14 | 22 | 0 | 0 | 5 |

*Note: n – number of patients; UA – unstable angina; SEA – stable exertional angina; (d) – deceased*

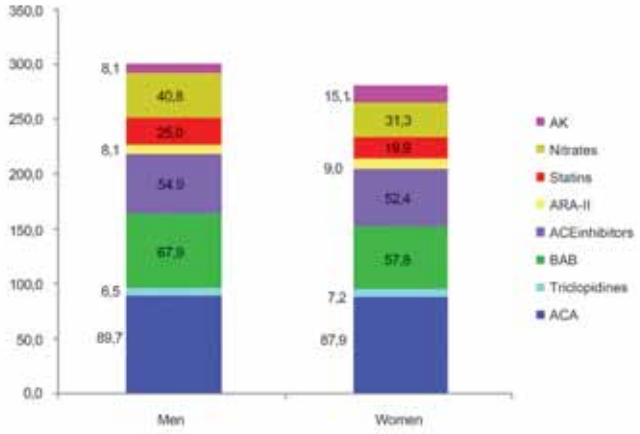


**Figure 2. Main groups of medications taken depending on the gender**
*Note: data is presented as percentage, all p>0.05.*

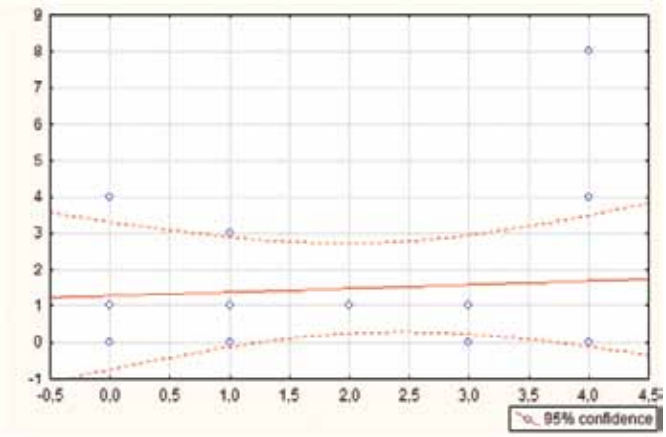


**Figure 3. Graph of correlation between compliance and time interval from admission to death among the deceased patients (n = 16)**
*Note: X axis shows the compliance level of deceased patients; Y axis shows time interval from admission to death; p = 0.772; t = 0.294; r = 0.078.*

Direct analysis of compliance among deceased patients revealed that females were more adherent to therapy than males, namely: the average number of medications taken per day among deceased females was 2.57 ± 1.81, and that among deceased males 1.88 ± 1.69 (p = 0.467).

A direct correlation was found between the patient compliance level (n = 16) and t from admission to death, but it was not significant (Fig. 2), i.e. the higher compliance level was, the higher the organism resistance to cardiologic stress, and, in this situation, to ACS/AMI was.

## DISCUSSION

Cardiovascular diseases (CVD) are the leading cause for death in females of industrialized countries. CVD account for 55% of female deaths and 43% of male deaths [9]. According to the American Heart Association, 32 million women suffer from coronary heart disease (compared with 30 million men) in the United States. Due to various reasons, mortality in females is higher than that in males. In the USA more than 0.5 million women die from CHD every year. Female lethality because of CHD in Russia is 7-8 times higher than that in France and Italy, exceeds all mortality rates from oncologic causes including breast cancer and cervical cancer [10]. In Russia every eighth woman aged 45–54 years has a clinical picture of CHD and clinical signs of CHD are already observed in 30% of women aged above 65 years [11]. According to our register, prevalence of ACS/AMI was lower in females than that in males (45.9% in females and 54.1% in males); females was older than males. Ratio of deceased males and females did not differ significantly (3.4% in females and 3.7% in males).

The course of ACS is characterized by high incidence of deaths and non-fatal complications, which develop both at the hospital and during post-hospital follow-up period [12, 13]. Frequency of these events in females can significantly exceed that in males, even in case of the relatively favourable structure of ACS [14, 15]. Risk of death associated with the female gender is largely determined by their relatively older age and age-associated factors [16], which also took place in our study.

The publication by Wang W. et al. [17] presents analysis of 382 elderly patients from 6 medical centres of Macau, China. The best adherence to therapy was observed in people aged above 65 years. A similar tendency is present in our register. As for the predominance of females in the group of adherent patients revealed by us in our work, this fact is confirmed by other researchers who show that females are more adherent to treatment than males [18-20].

Thus, the "RACSMI-UZ" register implemented by employees of the Department of CVD prevention at the clinic of the Republican Specialized Research and Practical Medical Center of Cardiology allowed to obtain objective data not only on the clinical characteristics of patients with acute coronary pathology but also to determine the features of the disease course and changes of nosologic components depending on the gender and also touch upon the problem of compliance in patients of this category. Nevertheless, obtained results revealed a number of issues which require further investigation.

## CONCLUSIONS

1. ACS/AMI were more often recorded in males with rate being 54.1%; prevalence of ACS/AMI in females was 45.9%. In the age-

**Table 5. Patient distribution by the daily ration of medications taken, depending on the gender**

| Quantity of the Mc's taken | Males (n=184) | Females (n=166) | p | $\chi^2$ |
|---|---|---|---|---|
| 1 Mc, n (%) | 32 (17,4%) | 34 (20,5%) | 0,548 | 0,362 |
| 2 Mc's, n (%) | 38 (20,6%) | 37 (22,3%) | 0,809 | 0,059 |
| 3 Mc's, n (%) | 48 (26,1%) | 49 (29,5%) | 0,551 | 0,356 |
| 4 Mc's, n (%) | 44 (23,9%) | 33 (19,9%) | 0,435 | 0,609 |
| 5 Mc's, n (%) | 18 (9,8%) | 11 (6,6%) | 0,381 | 0,766 |
| 6 and more Mc's, n (%) | 4 (2,2%) | 2 (1,2%) | 0,776 | 0,081 |

*Note: Mc – medication.*

related aspect, males with ACS/AMI proved to be younger than females ($p<0.05$), and obesity of varying severity prevailed in women in terms of weight characteristics (48.0% in females vs. 29.6% in males, $p<0.05$).

2. In the male population AMI at admission was diagnosed in 43 (17.7%) patients, however, the number of patients with this diagnosis increased at discharge from the hospital (61 subjects or 25.1%) and the diagnosis transformed to AMI from ACS with S-T in 66.7% of cases, from ACS without S-T in 23.5% and from UA in 3.2% of cases. Out of 243 males 3.7% died, largest number of deaths was observed in the patients with initial diagnosis of UA.

3. In the female population, the rate of AMI both with and without Q at admission was 2 times less than that at discharge from the hospital (8.7% of cases at admission and 17.5% of cases at discharge). In females diagnosis transformed to AMI from ACS with S-T in 50% of cases, from ACS without S-T in 25% of cases, from UA in 4.8% of cases and 9.1% had no suspicion of coronary heart disease and their diagnosis also transformed to AMI which shows low vigilance of healthcare professionals in diagnostics of AMI in females. Mortality from ACS/AMI in women was 3.4% with the largest number of deaths being associated with the initial diagnosis of AMI without Q.

4. Compliance in females was somewhat higher than in males; men were prone to taking more medications, though there were no significant differences between men and women by the proportion of medications taken. The direct correlation was found between the patients' compliance level and the time interval: from admission to death of the respondent ($p>0.05$).

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**CONFLICT OF INTEREST**

During the course of the "RACSMI-UZ" register there were no conflicts of interest.

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