RELATIONSHIP OF EMERGENCY MEDICAL ASSISTANCE MANAGEMENT TO PATHOLOGICAL EVENTS IN THE RECUPERATION PERIOD AFTER ACUTE CORONARY ATTACK

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Abstract

Current management practice of emergency care for acute coronary events, its bad practice, or a pointless waste of time, is reflected in how the evolution of matter in the recovery period. In this study were included 350 adult patients with AMI or ACS. All of them called for emergency medical systems, received or not, the partial or whole immediate treatment „OANA-β" (oxygen, aspirin, nitro-glycerine, antalgic and β/blocker), at home, on the ambulances, into the first or the second hospital, received also the final treatment (FT, PCI or CABG), were admitted in the recuperation station and presented acute pathological events. The study is randomized, multi-centre, prospective and retrospective, during six years. In the recuperation period a series of patients presents some pathological events (recurrent angina, dysrhythmias, stroke, high blood pressure episode, re-infarction, cardio-respiratory arrest) and, we found that it is not very important what kind of target treatment (classic, ICP, fibrinolitic therapies or CABG) received the coronary patient by acute attack, but it's really important when and where received it!

Key words: *management of emergency care, recovery period, pathological events*

Starting from the practical clinical observation that, during the recuperation period after acute coronary attack (acute myocardial infarction, acute coronary syndrome), some patients presents a series of pathological events (recurrent angina, dysrhythmias, stroke, high blood pressure episode, re-infarction, cardio-respiratory arrest), we want to discover if there are a relationship between the management of emergency medical assistance, final treatment (classic, fibrinolitic therapy, PCI or CABG) and the recuperation algorithm. [4, 6]

The principal idea was that, the acute coronary syndrome (ACS) represents, in essence, hibernates myocardium, which can be recuperated if, the waste of time where the shortest possible (means, the „total ischemic time" where at minimum values). We have demonstrated (in another study) which are the lost of the time, thanks to the inadequate management of the emergency medical systems. [10, 15]

To diminish the coronary morbidity and the death rate through the coronary illness, in Rumania also, it mast be implemented a series of managerial modifications, and not only!

The previous studies [8] (ours too) recognized that, the major „help" in the case of the acute coronary syndrome or the acute myocardial infarction, to avoid the waste of the time, can be the **prehospital triage**. [3, 15] If we have the possibility:

1. to make a real and accurate diagnosis of a ACS or AMI,
2. to know about and to practice the right first therapeutic attitude (Oxygen, Aspirin, Nitrate, Antalgic, β- blockers – OANA- β),
3. to know the target therapeutic possibilities (fibrinolitic therapy, PCI or CABG),
4. to have the real educated medical human resources, and
5. to have the optimal material resources.

1. For an accurate diagnosis we have to do the following: to know all the ***subjective symptoms*** (targeted history) and the chest pain ***onset hour***, and to perform initial ***12-lead electrocardiography*** (ECG). [2, 9, 12, 19]

The most important symptom is of course, the chest pain. There is high, inter-mediate and low likelihood that the chest pain is of ischemic a etiology.

For the **high likelihood** plead the following: chief symptom is chest or left arm pain or discomfort that reproduces pain of prior documented angina pectoris, plus known coronary artery disease (including myocardial infarct). Physical exam can find hypotension, diaphoresis, pulmonary rales (even pulmonary oedema) or/and transient mitral regurgitation. On ECG we can see new or presumably new transient ST deviation (≥ 0,5 mm) or T-wave inversion (≥ 2 mm) with symptoms.

For the **intermediate likelihood** plead the following: the victim has no findings for high likelihood and presents any of the following: chief symptom is chest or left arm pain or discomfort, diabetes mellitus, male sex and age over 70 years. There are possible present extra cardiac vascular diseases. On ECG there are fixed Q-waves, an abnormal ST segments or/and T wave that are not new.

For the **low likelihood** plead the next: patient has no findings for high or intermediate likelihood but, may have any of the following: probable ischemic symptoms, chest discomfort is reproduced by palpation and ECG is normal or T-wave flattening in leads with dominant R-waves.

The **chest pain onset hour** is very important because we know that the major patients benefit is present if the ***total ischemic time is <u>shorter then two ours</u>***.

Standpoint the 12-lead ECG, after the first assess, we can find three situations: [14]

a. *ST elevation or new (or presumably new) left bundle branch block* (LBBB) – means strongly suspicious for ***myocardial injury*** (ST-elevation myocardial infarction – STEMI);

b. *ST depression or dynamic T-wave inversion* – means strongly suspicious for ***ischemia*** (high-risk unstable angina or non- ST-elevation myocardial infarction – NSTEMI);

c. *Normal or non-diagnostic changes in ST segment or T*-wave – means intermediate or low-risk unstable angina.

2. By all the chest pain suggestive of ischemia we have to perform the immediate general treatment: OANA-β.

For strongly suspicious for myocardial injury (1.a.) we have to perform the adjunctive treatment: β-adrenoceptor blockers IV, Nitro-glycerine IV, Heparin IV, ACE inhibitors (after six hours or, when stable patient). We have also to thing about a reperfusion strategy based on local resources: angiography, PCI (angioplasty ± stent), cardiothoracic surgery backup, if the time from onset of symptoms is less than 12 hours. [16] We can also think about fibrinolitic therapy with the goal: „door-to-drug time" must be less than 30 minutes. For the PCI, the goal must be: the time „door-to-balloon inflation" under 90 minutes.

If the time from onset of symptoms is more than 12 hours we have to assess the clinical status to define the high-risk patients. High-risk patients are defined by: persistent symptoms, recurrent ischemia, depressed left ventricular function, widespread ECG changes, and prior acute myocardial infarction, PCI or CABG. In that cases we have to think about cardiac catheterization and if the anatomy is suitable for revascularization. Now is indicated to bring the patient ***directly to the cardiac centre*** which has experienced operators, which is a high-volume centre and dispose for cardiac surgical capability. [9]

If the patient is clinical stable, we can bring them in an intermediate hospital to admit in a cardiac care unit on a monitored bed. It has to continue (or start) adjunctive treatments as indicated, serial cardiac markers, serial ECG; is also to consider imaging study (2D echocardio-graphy or radionuclide).

3. For use by emergency medical teams (or paramedics) to screen for acute coronary syndrome (ACS) and indications and contra-indications for **fibrinolitic therapy**, cheek each finding below. [2, 3, 5, 12]

Fibrinolitic requires that the first four items below be checked YES and that the ECG indicate ST elevation or new or presumably new-LBBB:

- ECG shows STEMI or new or presumably new-LBBB → **yes**
- ongoing chest discomfort (>20 minutes and <12 hours) → **yes**
- oriented and cooperated patient → **yes**
- age > 35 years (male) and > 40 years (female) → **yes**

Fibrinolitic requires also that all remaining items be checked NO and blood pressure must be ≤ 180/110 mmHg:

- history of stroke or transient ischemic attack → **no**
- active internal bleeding in past 2 to 4 weeks → **no**
- surgery or trauma in past 6 weeks; resuscitation > 10 minutes → **no**
- significant closed head/facial trauma previous 3 months → **no**
- terminal illness or pregnancy → **no**
- jaundice, hepatitis, kidney failure → **no**
- use of anticoagulants or bleeding problems → **no**

*N.B. If **any** of the following is present, consider transport to a hospital capable of angiography and revascularization:*
- *heart rate ≥ 100 bpm and systolic blood pressure ≤ 100 mmHg*
- *pulmonary oedema (rales)*
- *sings of shock (cool and clammy).* [14]

Prehospital fibrinolitic therapy is recommended only in special settings and has the greatest effect when they are routinely administered at least one hour before they would be administered in-hospital. Emergency medical systems assessment (12-lead ECG and chest pain checklist in field), triage, and pre arrival notification, reduce time to in-hospital fibrinolitic.

But, the fibrinolitic therapy has also contraindications. [17, 18]. This are:
- **a. absolute**
  - any prior intracranial hemorrhage
  - known structural cerebral vascular lesion
  - known malignant intracranial neoplasm
  - ischemic stroke within 3 months
    - EXCEPT acute ischemic stroke within 3 hours
  - suspected aortic dissection
  - active bleeding or bleeding diathesis (excluding menses)
  - significant closed head or facial trauma within 3 months
- **b. relative**
  - history of chronic, severe, poorly controlled hypertension
  - severe hypertension by presentation (>180/110 mmHg)
  - history of prior ischemic stroke greater then 3 months
  - prolonged resuscitation (more then 10 minutes)
  - major surgery (less then 3 months)
  - recent internal bleeding (within 2 to 4 weeks)
  - pregnancy, active peptic ulcer
  - current use of anticoagulants (higher INR – higher risk)

Percutane coronary intervention (PCI)**.** It can restore vessel potency flow, successfully in more than 90%, in experienced centres with work high-volume and experienced providers. [16] Primary PCI is more effective for the following:

o In cardiogen shock patients (< 75 ears old) if performed < 18 hours from onset of shock and < 36 hours from onset of ST-elevation infarction (class 1). However, up to 40% of shock patients require CABG for optimal management.
o In selected patients > 75 ears old with STEMI and cardiogen shock (class 2a)
o In patients with indications for reperfusion but with a contraindication to fibrinolitic therapy (class 1).

N.B. Best results achieved at PCI canters with these characteristics:
- *high-volume centres (> 200 PCI procedures/ ear; at least 36 are primary PCI)*
- *experienced operator with technical skill*
- *balloon dilatation < 90 minutes from initial medical contact or emergency department presentation*
- *achievement of normal flow rate (TIMI-3) in > 90% of cases without emergency CABG grafting, stroke, or death*
- *at least 50% resolution of maximal ST-segment elevation (micro vascular reperfusion).*

An invasive strategy is generally preferred if: [5]
- late presentation (symptom onset more than 3 hours ago)
- skilled PCI facility available with surgical backup:
  o medical contact to balloon or door-balloon < *90 minutes*
  o „door to balloon" minus „door to needle" is < *one hour*
- contraindications to fibrinolysis, including increased risk of bleeding and intracranial haemorrhage
- high risk for STEMI (chronic heart failure, Killip class is ≥ 3)
- diagnosis of STEMI is in doubt. [13]

The number of patients who need **coronary artery bypass grafting** (CABG) in the acute phase of myocardial infarction is limited. It may be indicated when PCI has failed, when there has been a sudden occlusion of a coronary artery during catheterization, if PCI is not feasible, in selected patients in cardiogen shock or in association with surgery for a ventricular septal defect or mitral regurgitation due to papillary muscle dysfunction and rupture. [1, 11, 16]

4. About the medical human resources, a prior our study [8] related that family doctors don't know very well the new guidelines for ACS immediate attitude and treatment – 78% (By a direct interrogation, one of three questioned practitioners recognized that he doesn't know the new guidelines for ACS) and, the same per cent (78%) of emergency care providers don't know the present guidelines for ACS. [7]

In this direction, we have to do a very hard work for medical education, first for the family doctors, for the emergency providers and, at last but not the list, for all patients with coronary disease or such predisposition (healthy male over 40 years old and female over 45 years old).

It should be a normal part of the care of patients with known ischemic heart disease to inform them and their partners of the symptoms of a heart attack and how to respond to it.

Normally, each of these ones patients, must have at home, so called „OANA-β pack" [2] and, also the possibility to request access to information on healthy lifestyle, prevention, and management of own cardiovascular disease.

5. The optimal material resources. We have to recognize that, in Romania, today, there are not yet an optimal endowment for the initial diagnosis and immediate therapy for acute coronary attack. There are too many ambulances which have only the 1-lead ECG possibility, that means the impossibility to recognizes promptly the acute coronary attack or, to risk to appreciate ACS or AMI, after only one-lead ECG (from the monitor of the defibrillator).

All of the interrogated subjects in our study (means 100%) recognized that the ambulance-cars are not yet enough endowed. And even more, not all of the ambulance-cars have the „OANA-β pack", means also the impossibility to practice the right initial treatment for heart attack.

76 per cent of our interrogated people (patients, emergency providers, cardiologist, etc.), consider that the ambulance services don't react promptly. From our study results that the mean time "call to victim", is over 35 minutes, that means a very important waste of the very valuable time.

We have to say, even more, that in our country, the cardiac experienced PCI centres are still very rare and can offer the PCI interventions only during the morning's hours. In the afternoon and by night, for our patients it's impossible to rich the target treatment if, this one is the PCI or cardiac surgery.

After an acute coronary attack and the right (goal) treatment reception, the saved victims must be included in a precocious recuperation period. In accordance with the recognized international guidelines, the recuperation period has seven mobilization steps (table below). One of the protocol [7, 8] gives for each step one or two days. It is also possible to eliminate one or two steps, in concordance with the patient evolution. We can also mix the exercises form one step to another, also in concordance with the patient evolution.

step	day	activity type
1	2	- passive movements of the extremities, in bed, in decubitus - active movements in bed with lover extremities - 2-3 rounds daily - semidecubitus position for 20-30 minutes - helped - self-alimentation, in sitting position
2	3-4	- activities from the first step, and: - 10-15 active movements of the extremities – twice daily - self-washing in bed and self-toilet - they can stand up, helped - they can leave the CCU
3	5-6	- activities from the first and the second steps - can sit down as long as they want - can walk in the room, with the stool - walk for 30-40 meters, once daily
4	7-8	- activities of the third step, plus: - self bath and toilet - walking in the room twice daily - walking in the hall - 60 meters, once daily
5	from day 9	- previous exercises three times daily, to the 3 METs intensity

		- walking in the room, in the hall, to the telephone, etc. - walking 200-250 meters, twice daily - take a shower after the walk
6	11-12	- previous exercises plus gun down one floor - walking 400 meters, twice daily - education for home exercises
7	13-14	- previous exercises plus gun up and down 1-2 floors - walking 500 meters, previous exercises plus - effort test before discharge

During this precocious recuperation period, we observed the appearance of a series of acute pathological events, during some of the patient's evolution, after acute coronary attack.

We'll present in this article some partial results about our observations.

From the entire group of patients the incidence of acute pathological events is approximate (without decimals) the next one:

- recurrent angina – 30%
- disrhythmias – 25%
- stroke – 8%
- high blood pressure episode – 29%
- reinfarction – 7%
- cardio-respiratory arrest – 1%.

Generally, this event is meaningful correlated with:

- „symptom-drug" time,
- initial treatment type,
- oxygen therapy (by OANA- β) and the „symptom-oxygen" time,
- „symptom-target therapy" time,
- steps (intensity) of the recuperation period, and
- prehospital triage.

The acute events appearance was generally independent from age, sex, rural or urban provenience of the patients, and target treatment type (ICP, fibrinolitic therapies or CABG).

The „incriminated" steps (and days), of the precocious recuperation period, were the third and the sixth, when the physical efforts were the new strongest suggestions, after acute coronary attack.

In conclusion:
We have to try to change the entire system of emergency medical assistance, in prehospital and hospital sectors, in the sense of time economy. That means changes in human resources instruction and changes in material resources too (endowment).

The coronarian patients are not enough educated for they self-health, for the first attitude and treatment immediately after the chest pain onset.

In our country is not yet possible to make the ACS patients triage in the prehospital emergency medical assistance, even the prehospital triage could be the best solution to avoid the time waste.

The precocious recuperation period steps must be very accurately adapted and correlated to the particular physical form and potency of each particular patient.

It is not very important **what** kind of target treatment (classic, ICP, fibrinolitic therapies or CABG) received the coronary patient by acute attack, but it's really important **when** and **where**!

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