Complications of myocardial infarction: a database for testing recognition and prediction systems

S.E. Golovenkin, A.N. Gorban, E.M.Mirkes, V.A. Shulman, D.A. Rossiev, P.A. Shesternya, S.Yu. Nikulina, Yu.V. Orlova, and M.G. Dorrer

Presented database was collected in the Krasnoyarsk Interdistrict Clinical Hospital №20 named after I. S. Berzon (Russia) in 1992-1995.

Contents

Introduction

For the comparative test of various methods of data mining and pattern recognition it is necessary to have tasks of real-life complexity. It is desirable that the solutions to these problems have practical importance. Proposed database contains two such problems: prediction of complications based on patient information (i) at the time of admission and (ii) on the third day of the hospital period.

Myocardial infarction is one of the dangerous diseases. The wide spread of this disease over the past half century has made it one of the most acute problems of modern medicine. The incidence of myocardial infarction (MI) remains high in all countries. This is especially true of the urban population of highly developed countries, exposed to the chronic effects of stress factors, irregular and not always balanced nutrition. In the United States annually, more than million people become ill with myocardial infarction [1].

Even though the introduction of modern treatment and prophylactic measures has somewhat reduced mortality from heart attacks, it continues to be quite high. Every year in the United States 200-300 thousand people die from acute myocardial infarction before arriving at the hospital [1]. In the United States, every 29 seconds, one person becomes ill with MI, and every minute one patient with MI dies [1].

The course of the disease in patients with MI is different. MI can occur without complications or with complications that do not worsen the long-term prognosis. At the same time, about half of patients in the acute and subacute periods have complications leading to a worsening of the course of the disease and even death. Even an experienced specialist can not always foresee the development of these complications. In this regard, predicting the complications of myocardial infarction in order to timely carry out the necessary preventive measures seems to be an important task.

Problems to solve

In general columns 2-112 can be used as input data for prediction. Possible complications (outputs) are listed in columns 113-124.

There are four possible time moments for complication prediction: on base of the information known at

1. the time of admission to hospital: all input columns (2-112) except 93, 94, 95, 100, 101, 102, 103, 104, 105 can be used for prediction;
2. the end of the first day (24 hours after admission to the hospital): all input columns (2-112) except 94, 95, 101, 102, 104, 105 can be used for prediction;
3. the end of the second day (48 hours after admission to the hospital) all input columns (2-112) except 95, 102, 105 can be used for prediction;
4. the end of the third day (72 hours after admission to the hospital) all input columns (2-112) can be used for prediction.

Data description

List database columns and description their values. The column name abbreviations used in the database structure are given in parentheses.

1. Record ID (ID).
2. Age (AGE).
3. Gender (SEX):
    0 – female
    1 – male
4. Quantity of myocardial infarctions in the anamnesis (INF_ANAM):
    0 – zero
    1 – one
    2 – two
    3 – three and more
5. Exertional angina pectoris in the anamnesis (STENOK_AN):
    0 – never
    1 – during the last year
    2 – one year ago
    3 – two years ago
    4 – three years ago
    5 – 4-5 years ago
    6 – more than 5 years ago
6. Functional class (FC) of angina pectoris in the last year (FK_STENOK)[2]:
    0 – there is no angina pectoris
    1 – I FC
    2 – II FC
    3 – III FC.
    4 – IV FC
7. Coronary heart disease (CHD) in recent weeks, days before admission to hospital (IBS_POST):
    0 – there was no CHD
    1 – exertional angina pectoris
    2 – unstable angina pectoris
8. Heredity on CHD (IBS_NASL):
    0 – isn’t burdened
    1 – burdened
9. Presence of an essential hypertension (GB):
    0 – there is no essential hypertension
    1 – Stage 1
    2 – Stage 2
    3 – Stage 3
10. Symptomatic hypertension (SIM_GIPERT):

0 – no
1 – yes

11. Duration of arterial hypertension (DLIT_AG):
    0 – there was no arterial hypertension
    1 – one year
    2 – two years
    3 – three years
    4 – four years
    5 – five years
    6 – 6-10 years
    7 – more than 10 years
12. Presence of chronic Heart failure (HF) in the anamnesis (ZSN_A):
    0 – there is no chronic heart failure
    1 – I stage
    2 – IIA stage (heart failure due to right ventricular systolic dysfunction)
    3 – IIA stage (heart failure due to left ventricular systolic dysfunction)
    4 – IIB stage (heart failure due to left and right ventricular systolic dysfunction)
13. Observing of arrhythmia in the anamnesis (nr11):
    0 – no
    1 – yes
14. Premature atrial contractions in the anamnesis (nr01):
    0 – no
    1 – yes
15. Premature ventricular contractions in the anamnesis (nr02):
    0 – no
    1 – yes
16. Paroxysms of atrial fibrillation in the anamnesis (nr03):
    0 – no
    1 – yes
17. A persistent form of atrial fibrillation in the anamnesis (nr04):
    0 – no
    1 – yes
18. Ventricular fibrillation in the anamnesis (nr07):
    0 – no
    1 – yes
19. Ventricular paroxysmal tachycardia in the anamnesis (nr08):
    0 – no
    1 – yes
20. First-degree AV block in the anamnesis (np01):
    0 – no
    1 – yes
21. Third-degree AV block in the anamnesis (np04):
    0 – no
    1 – yes
22. LBBB (anterior branch) in the anamnesis (np05):
    0 – no
    1 – yes
23. Incomplete LBBB in the anamnesis (np07):
    0 – no
    1 – yes
24. Complete LBBB in the anamnesis (np08):
    0 – no

1 – yes

25. Incomplete RBBB in the anamnesis (np09):
    0 – no
    1 – yes
26. Complete RBBB in the anamnesis (np10):
    0 – no
    1 – yes
27. Diabetes mellitus in the anamnesis (endocr_01):
    0 – no
    1 – yes
28. Obesity in the anamnesis (endocr_02):
    0 – no
    1 – yes
29. Thyrotoxicosis in the anamnesis (endocr_03):
    0 – no
    1 – yes
30. Chronic bronchitis in the anamnesis (zab_leg_01):
    0 – no
    1 – yes
31. Obstructive chronic bronchitis in the anamnesis (zab_leg_02):
    0 – no
    1 – yes
32. Bronchial asthma in the anamnesis (zab_leg_03):
    0 – no
    1 – yes
33. Chronic pneumonia in the anamnesis (zab_leg_04):
    0 – no
    1 – yes
34. Pulmonary tuberculosis in the anamnesis (zab_leg_06):
    0 – no
    1 – yes
35. Systolic blood pressure according to Emergency Cardiology Team (S_AD_KBRIG) (mmHg).
36. Diastolic blood pressure according to Emergency Cardiology Team (D_AD_KBRIG) (mmHg).
37. Systolic blood pressure according to intensive care unit (S_AD_ORIT) (mmHg).
38. Diastolic blood pressure according to intensive care unit (D_AD_ORIT) (mmHg).
39. Pulmonary edema at the time of admission to intensive care unit (O_L_POST):
    0 – no
    1 – yes
40. Cardiogenic shock at the time of admission to intensive care unit (K_SH_POST):
    0 – no
    1 – yes
41. Paroxysms of atrial fibrillation at the time of admission to intensive care unit, (or at a pre-hospital stage) (MP_TP_POST):
    0 – no
    1 – yes
42. Paroxysms of supraventricular tachycardia at the time of admission to intensive care unit, (or at a pre-hospital stage) (SVT_POST):
    0 – no
    1 – yes

43. Paroxysms of ventricular tachycardia at the time of admission to intensive care unit, (or at a pre-hospital stage) (GT_POST):

0 – no
1 – yes

44. Ventricular fibrillation at the time of admission to intensive care unit, (or at a pre-hospital stage) (FIB_G_POST):

0 – no
1 – yes

45. Presence of an anterior myocardial infarction (left ventricular) (ECG changes in leads V_1 – V_4) (ant_im):

0 – there is no infarct in this location
1 – QRS has no changes
2 – QRS is like QR-complex
3 – QRS is like Qr-complex
4 – QRS is like QS-complex

46. Presence of a lateral myocardial infarction (left ventricular) (ECG changes in leads V_5 – V_6 , I, AVL) (lat_im):

0 – there is no infarct in this location
1 – QRS has no changes
2 – QRS is like QR-complex
3 – QRS is like Qr-complex
4 – QRS is like QS-complex

47. Presence of an inferior myocardial infarction (left ventricular) (ECG changes in leads III, AVF, II). (inf_im):

0 – there is no infarct in this location
1 – QRS has no changes
2 – QRS is like QR-complex
3 – QRS is like Qr-complex
4 – QRS is like QS-complex

48. Presence of a posterior myocardial infarction (left ventricular) (ECG changes in V_7 – V_9, reciprocity changes in leads V_1 – V_3) (post_im):

0 – there is no infarct in this location
1 – QRS has no changes
2 – QRS is like QR-complex
3 – QRS is like Qr-complex
4 – QRS is like QS-complex

49. Presence of a right ventricular myocardial infarction (IM_PG_P):

0 – no
1 – yes

50. ECG rhythm at the time of admission to hospital – sinus (with a heart rate 60-90) (ritm_ecg_p_01):

0 – no
1 – yes

51. ECG rhythm at the time of admission to hospital – atrial fibrillation (ritm_ecg_p_02):

0 – no
1 – yes

52. ECG rhythm at the time of admission to hospital – atrial (ritm_ecg_p_04):

0 – no
1 – yes

53. ECG rhythm at the time of admission to hospital – idioventricular (ritm_ecg_p_06):

0 – no
1 – yes

54. ECG rhythm at the time of admission to hospital – sinus with a heart rate above 90 (tachycardia) (ritm_ecg_p_07):

0 – no

1 – yes

55. ECG rhythm at the time of admission to hospital – sinus with a heart rate below 60 (bradycardia) (ritm_ecg_p_08):

0 – no

1 – yes

56. Premature atrial contractions on ECG at the time of admission to hospital (n_r_ecg_p_01):

0 – no

1 – yes

57. Frequent premature atrial contractions on ECG at the time of admission to hospital (n_r_ecg_p_02):

0 – no

1 – yes

58.Premature ventricular contractions on ECG at the time of admission to hospital (n_r_ecg_p_03):

0 – no

1 – yes

59. Frequent premature ventricular contractions on ECG at the time of admission to hospital (n_r_ecg_p_04):

0 – no

1 – yes

60. Paroxysms of atrial fibrillation on ECG at the time of admission to hospital (n_r_ecg_p_05):

0 – no

1 – yes

61. Persistent form of atrial fibrillation on ECG at the time of admission to hospital (n_r_ecg_p_06):

0 – no

1 – yes

62. Paroxysms of supraventricular tachycardia on ECG at the time of admission to hospital (n_r_ecg_p_08):

0 – no

1 – yes

63. Paroxysms of ventricular tachycardia on ECG at the time of admission to hospital (n_r_ecg_p_09):

0 – no

1 – yes

64. Ventricular fibrillation on ECG at the time of admission to hospital (n_r_ecg_p_10):

0 – no

1 – yes

65. Sinoatrial block on ECG at the time of admission to hospital (n_p_ecg_p_01):

0 – no

1 – yes

66. First-degree AV block on ECG at the time of admission to hospital (n_p_ecg_p_03):

0 – no

1 – yes

67. Type 1 Second-degree AV block (Mobitz I/Wenckebach) on ECG at the time of admission to hospital (n_p_ecg_p_04):

0 – no

1 – yes

68. Type 2 Second-degree AV block (Mobitz II/Hay) on ECG at the time of admission to hospital (n_p_ecg_p_05):
    0 – no
    1 – yes
69. Third-degree AV block on ECG at the time of admission to hospital (n_p_ecg_p_06):
    0 – no
    1 – yes
70. LBBB (anterior branch) on ECG at the time of admission to hospital (n_p_ecg_p_07):
    0 – no
    1 – yes
71. LBBB (posterior branch) on ECG at the time of admission to hospital (n_p_ecg_p_08):
    0 – no
    1 – yes
72. Incomplete LBBB on ECG at the time of admission to hospital (n_p_ecg_p_09):
    0 – no
    1 – yes
73. Complete LBBB on ECG at the time of admission to hospital (n_p_ecg_p_10):
    0 – no
    1 – yes
74. Incomplete RBBB on ECG at the time of admission to hospital (n_p_ecg_p_11):
    0 – no
    1 – yes
75. Complete RBBB on ECG at the time of admission to hospital (n_p_ecg_p_12):
    0 – no
    1 – yes
76. Fibrinolytic therapy by Celiasum 750k IU (fibr_ter_01):
    0 – no
    1 – yes
77. Fibrinolytic therapy by Celiasum 1m IU (fibr_ter_02):
    0 – no
    1 – yes
78. Fibrinolytic therapy by Celiasum 3m IU (fibr_ter_03):
    0 – no
    1 – yes
79. Fibrinolytic therapy by Streptase (fibr_ter_05):
    0 – no
    1 – yes
80. Fibrinolytic therapy by Celiasum 500k IU (fibr_ter_06):
    0 – no
    1 – yes
81. Fibrinolytic therapy by Celiasum 250k IU (fibr_ter_07):
    0 – no
    1 – yes
82. Fibrinolytic therapy by Streptodecase 1.5m IU (fibr_ter_08):
    0 – no
    1 – yes
83. Hypokalemia (< 4 mmol/L) (GIPO_K):
    0 – no
    1 – yes
84. Serum potassium content (K_BLOOD) (mmol/L).
85 Increase of sodium in serum (more than 150 mmol/L) (GIPER_Na):
    0 – no

1 – yes

86. Serum sodium content (Na_BLOOD) (mmol/L).
87. Serum AlAT content (ALT_BLOOD) (IU/L).
88. Serum AsAT content (AST_BLOOD) (IU/L).
89. Serum CPK content (KFK_BLOOD) (IU/L).
90. White blood cell count (billions per liter) (L_BLOOD).
91. ESR (Erythrocyte sedimentation rate) (ROE) (мм).
92. Time elapsed from the beginning of the attack of CHD to the hospital (TIME_B_S):
    1 – less than 2 hours
    2 – 2-4 hours
    3 – 4-6 hours
    4 – 6-8 hours
    5 – 8-12 hours
    6 – 12-24 hours
    7 – more than 1 days
    8 – more than 2 days
    9 – more than 3 days
93. Relapse of the pain in the first hours of the hospital period (R_AB_1_n):
    0 – there is no relapse
    1 – only one
    2 – 2 times
    3 – 3 or more times
94. Relapse of the pain in the second day of the hospital period (R_AB_2_n):
    0 – there is no relapse
    1 – only one
    2 – 2 times
    3 – 3 or more times
95. Relapse of the pain in the third day of the hospital period (R_AB_3_n):
    0 – there is no relapse
    1 – only one
    2 – 2 times
    3 – 3 or more times
96. Use of opioid drugs by the Emergency Cardiology Team (NA_KB):
    0 – no
    1 – yes
97. Use of NSAIDs by the Emergency Cardiology Team (NOT_NA_KB):
    0 – no
    1 – yes
98. Use of lidocaine by the Emergency Cardiology Team (LID_KB):
    0 – no
    1 – yes
99. Use of liquid nitrates in the ICU (NITR_S):
    0 – no
    1 – yes
100. Use of opioid drugs in the ICU in the first hours of the hospital period (NA_R_1_n):
    0 – no
    1 – once
    2 – twice
    3 – three times
    4 – four times
101. Use of opioid drugs in the ICU in the second day of the hospital period (NA_R_2_n):
    0 – no

1 – once
2 – twice
3 – three times

102. Use of opioid drugs in the ICU in the third day of the hospital period (NA_R_3_n):
0 – no
1 – once
2 – twice
103. Use of NSAIDs in the ICU in the first hours of the hospital period (NOT_NA_1_n):
0 – no
1 – once
2 – twice
3 – three times
4 – four or more times
104. Use of NSAIDs in the ICU in the second day of the hospital period (NOT_NA_2_n):
0 – no
1 – once
2 – twice
3 – three times
105. Use of NSAIDs in the ICU in the third day of the hospital period (NOT_NA_3_n):
0 – no
1 – once
2 – twice
106. Use of lidocaine in the ICU (LID_S_n):
0 – no
1 – yes
107. Use of beta-blockers in the ICU (B_BLOK_S_n):
0 – no
1 – yes
108. Use of calcium channel blockers in the ICU (ANT_CA_S_n):
0 – no
1 – yes
109. Use of a anticoagulants (heparin) in the ICU (GEPAR_S_n):
0 – no
1 – yes
110. Use of acetylsalicylic acid in the ICU (ASP_S_n):
0 – no
1 – yes
111. Use of Ticlid in the ICU (TIKL_S_n):
0 – no
1 – yes
112. Use of Trental in the ICU (TRENT_S_n):
0 – no
1 – yes

Complications and outcomes of myocardial infarction:

113. Atrial fibrillation (FIBR_PREDS):
0 – no
1 – yes
114. Supraventricular tachycardia (PREDS_TAH):
0 – no
1 – yes

115. Ventricular tachycardia (JELUD_TAH):
    0 – no
    1 – yes
116. Ventricular fibrillation (FIBR_JELUD):
    0 – no
    1 – yes
117. Third-degree AV block (A_V_BLOK):
    0 – no
    1 – yes
118. Pulmonary edema (OTEK_LANC):
    0 – no
    1 – yes
119. Myocardial rupture (RAZRIV):
    0 – no
    1 – yes
120. Dressler syndrome (DRESSLER):
    0 – no
    1 – yes
121. Chronic heart failure (ZSN):
    0 – no
    1 – yes
122. Relapse of the myocardial infarction (REC_IM):
    0 – no
    1 – yes
123. Post-infarction angina (P_IM_STEN):
    0 – no
    1 – yes
124. Lethal outcome (cause) (LET_IS):
    0 – unknown
    1 – cardiogenic shock
    2 – pulmonary edema
    3 – myocardial rupture
    4 – progress of congestive heart failure
    5 – thromboembolism
    6 – asystole
    7 – ventricular fibrillation

Table of abbreviations

FC is the functional class of angina pectoris in the last year according to [2].
CHD is coronary heart disease.
HF is heart failure.
ECG is electrocardiogram.
AV is atrioventricular block.
LBBB is left bundle branch block.
RBBB is right bundle branch block.
QRS is QRS complex in ECG
IU is international unit.
ICU is intensive care unit.
ESR is erythrocyte sedimentation rate.
NSAID is non-steroidal anti-inflammatory drugs.

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