Short-term Prognostic Indices of Acute Myocardial Infarction: Application in a Chinese Population

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This study was designed to determine the prognostic index which will best reflect short-term outcome of acute myocardial infarction(AMI) in Chinese patients. For this purpose, the predictive ability of 8 short-term prognostic indices for AMI were compared in 340 patients, using receiver-operator characteristic curve (ROC) analysis. It was found that there was no statistically significant difference between the Norris and Dubois indices, which were the two best performing ones. The Dubois index had the advantage of simpler computation and of being based on clinical variables that are routinely measured in most hospital settings.

The ability to objectively determine a patient's prognosis following acute myocardial infarction (AMI) is important for clinical management and for research purposes. For clinical management, it is necessary to know which patients are in most need of coronary care. For research purposes, it is important to have a reliable prognostic or severity index by which to classify patients. In retrospective studies, inadequate adjustment for differential baseline disease severity could bias the results. In prospective studies, it may be necessary to stratify patients according to disease severity to assess the efficacy of different methods of treatment.

Many prognostic indices for short-term mortality (death within 28 days or one month) after AMI have been proposed since the early 1960's[1-19], but we are not aware of any study that has systematically compared the performance of these indices. Further, most of these indices have been developed from studies based on Caucasian patients from developed countries in Western nations.[1-7, 9-19] In China, where mortality from cardiovascular disease is becoming an increasing public health issue, there has been a need to determine a prognostic index that is appropriate for the Chinese population. The aims of this study are twofold: (i) to qualitatively and quantitatively compare the performance of eight previously proposed short-term prognostic indices that are based on pre-infarction or early post-infarction variables and, (ii) to determine the predictive ability of the best of these indices in a Chinese population.

Methods

Data Collection

All patients admitted to the Hua Shan Hospital in Shanghai, China, between 1 January 1985 and 31 December 1995 with a discharge diagnosis of AMI (ICD9-CM 410) were potentially eligible. Hua Shan Hospital is a tertiary teaching hospital attached to the Shanghai Medical University and is one of the largest general hospitals in Shanghai.

For the purpose of this study, the diagnosis of AMI was based

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on the WHO criteria and was defined by the presence of at least two of the following three abnormalities: 1) Central anterior pain lasting for more than 15 minutes; 2) Characteristic electrocardiograph changes (pathological Q waves, ST-T elevation, or T wave inversion in the ECG with subsequent evolutionary changes); 3) An unequivocal rise in serum enzyme of LDH or CPK to more than twice the normal limit (normal level: LDH 50-150 U/L; CPK:60-134 U/L).

Three hundred and fifty-nine records of AMI admissions were found, with an average of 33 admissions each year. These included 7 patients who did not satisfy the WHO criteria and they were excluded from the study. Two patients were excluded because they died in the emergency room within 1 hour after arrival at the hospital and lacked information on enzymes and X-rays. There were 7 patients with multiple hospital admissions for AMI during 1985 to 1995. For these patients only the first admission was used. A total of 340 patients were included in this study.

The data variables for this study were obtained from medical records and included age, sex, history of ischaemic heart disease (cardiovascular disease, previous AMI, history of angina, hypertension), symptoms on onset (vomiting, faintness, diaphoresis), clinical findings on admission (blood pressure, pulse rate), ECG (infarction site, Q waves), serum enzymes (SGOT), urea on admission, and X-ray (cardiomegaly, pulmonary oedema). These data were extracted by 8 physicians who received training on data extraction from the principal investigator (Dr QW). All suspect data values and outliers were checked against the medical records by the principal investigator. All data were collected between April and May of 1996.

The primary outcome variable was 28-day mortality, defined as death within 28 days including the 28th day, after admission. The majority of patients (74 percent) either died in the hospital within 28 days or were still in the hospital 28 days after admission. Of the 87 patients discharged from the hospital before 28 days, 37 were regularly attending an outpatient department of Hua Shan Hospital, and their survival status at 28 days was clearly recorded in their cardiovascular physicians' records. The 28-day mortality status of the remaining 50 patients was determined by telephone or home interview. Data on reinfarction in the hospital and length of hospital stay were also collected.

Short-term Prognostic Indices

A literature search was performed in MEDLINE for the period 1985 to 1994 for prognostic indices of AMI for predicting survival status in the hospital or within 2 months after hospitalization. Keywords used were 'acute myocardial infarction', 'short-term prognostic index or score', and 'severity index or score'. Indices were not considered further if the variables and algorithm needed for computation of the index were not described in sufficient detail to replicate in our study. Some indices required data from non-routine examinations (e.g. echocardiography and nuclear scan.) These were also excluded because few patients in our study had had these examinations.[9-19]

Eight indices were selected for comparison in this study: Peel[1], Killip[2], Norris[3], Helmers[4], Dubois[5], Selker[6], Chapman[7] and Woo.[8] All these prognostic indices, except the Killip index, have the following format:

$$\text{index value} = w_1 s_1 + w_2 s_2 + \dots w_k s_k$$

A prognostic index formed from k variables is the sum of k terms where each term is the product of a weight, w_i, and a score, s_i. The format of the 8 prognostic indices are shown in the Appendix. All weights in the Peel and Chapman indices are equal to one. The Killip index differs from the others in that patients are simply classified into one of four categories.

In our data set of 340 patients, 22 did not have data on SGOT or urea, and 169 did not have chest x-rays. The Helmers, Chapman and Woo indices required data on SGOT or urea. Computation of these indices was therefore restricted to the 318 patients on whom these data were available. Data on chest x-rays were required by the Norris and Woo indices. The Norris index was computed according to the recommendation in Norris et al.[3]: patients with no data on chest x-rays were given a score of 0.5 for *heart size* and for *lung field*; patients with oedema on admission or full lung field rales were defined as pulmonary oedema (score 1); patients with the rales to scapular level were defined as interstitial oedema (score 0.6); and patients with basal rales and raised jugular venous pressure were defined as venous congestion (score 0.3). For the Woo index, all patients with no chest x-rays were assumed to have normal *heart size* and *lung fields* since most patients had normal x-rays.

Statistical Methods

Chi-square and t-tests were used to compare the proportion or means of the clinical variables between the 28-day survivors and non-survivors. Receiver operating characteristic (ROC) analysis[20] was used to compare the indices. The ROC curve is formed by combining the sensitivity and specificity over all possible cut-off points. If a prognostic index had no predictive power for survivors and non-survivors, the set of achievable sensitivities and specificity would track along the diagonal line connecting the points (0,0) and (1,1)[20]. The more clearly a prognostic index is able to distinguish between survivors and non-survivors, the further will its ROC curve deviate toward the left upper corner of the graph. ROC analysis enables the quantification of the performance of a test and, by extension, comparison of tests, by calculating the area under the ROC curve (AUC)

and its confidence interval.[21,22] In this study, the Vida ROC program[23] was used for ROC analysis. This program produces ROC curves, an estimate of the AUC, the standard error of the AUC and its confidence limits. A non-parametric method, the equivalent of the Mann-Whitney U-statistic, is used to estimate the empirical AUCs and their standard errors.[23,24] Pairwise comparisons were performed to test differences between the AUCs.

A Chi-square test for trend was used to test the association between 28-day mortality and AMI severity classified according to the Dubois index. Positive likelihood ratios (probability of positive test result in disease / Probability of positive test result in absence of disease) were calculated for different categories of the Dubois score.

Table 1 *The Variables Contributing to Prognostic Index*

Variable	Prognostic Index							
	Peel	**Killip**	**Norris**	**Helmers**	**Chapman**	**Dubois**	**Selker**	**Woo**
Age	?		?	+	+	?	?	?
Sex	?			+	+	+		
History of ischaemia	?		?	+		+		+
History of hypertension				+	+	+		+
History of diabetes				+	+	+		
Smoking				+	+	+		
Time between onset to admission				+	+	+		
SGOT level				?	?			+
Left ventricular function								
Cardiogenic shock	?	?		+	?			
Pulmonary oedema	?	?		+	+	?		
Chest X-ray: Heart size			?		+			?
Lung field			?		+			?
SBP on admission			?		+		?	?
Oliguria					?			
Respiratory rate				?				
Pulse rate							?	
Urea					+			?
ECG findings								
Q or T waves	?			+			?	?
	?			+	+			?
Site of infarction			?	+		?		?
Study sample size [a]	260/628	0/250	757/ -	559/ -	375/ -	477/536	719/226	644/ -
Study period	1958-61	1965	1966-67	1968-70	1970-73	1977-80	1979-81	1971-81
Country	UK	US	Auckland	Sweden	Australia	Belgium	US	HongKong
Patients source from CCU	No	Yes	No	Yes	No	Yes	No	No
Study design	Retrospective	Prospective	Prospective	Prospective	Prospective	Prospective	Prospective	Retrospective
Outcome [b]	28DM	H M	H M	H M	H M	15DM	H M?	28DM
Method [c]	Subjective	Subjective	D A	Linear R ?	Logistic R	Logistic R	Logistic R	D A

?: The variable contribute to the index; +: the variable had been considered but was excluded from the final proposed index
a: Sample size used to develop the index/ sample size used to test the index. '-' indicates the absence of a test sample.
b: H.M: Hospital mortality 28DM: 28-day mortality 15DM: 15-day mortality
c: Method of determining weights: DA: Discriminant analysis ; R:Regression

Results

Qualitative Comparison of Indices

Table 1 summarizes the variables needed for computation of and key features in the development of the eight indices. The Peel index was the first AMI prognostic index proposed. The variables and weights included in this index were defined initially from general clinical impressions of the authors, and the weights were subsequently amended, subjectively, through observation of a series of 260 cases. The Killip index was also defined subjectively but, because of its simplicity, remains widely used in clinical management. All the other indices were developed with the aid of statistical methods such as discriminant analysis and logistic regression. Ideally, a prognostic index should be developed in one patient sample and its performance tested in a separate sample. Reports of the performance of the Norris, Helmers, Chapman and Woo indices were not based on separate patient samples.

The number of variables comprising the indices varied considerably, between two for the Helmers index and eight for the Woo index. In the derivation of the Norris, Helmers, Chapman, Dubois and Woo indices, many more variables had been considered but were rejected from the final model because of lack of statistical association with the outcome variable.

The types of variables comprising the indices also varied. In general, among those indices in which variable selection was based on statistical methods, the included variables fell into three categories: patient age, variables that reflect left ventricular function (*cardiogenic shock; heart failure; pulmonary oedema; systolic blood pressure on admission* and the two variables from the x-ray report; *heart size* and *lung field*; and, to a smaller degree, *oliguria, respiratory rate, pulse rate* and *urea*) and variables based on ECG findings (*site of infarction, rhythm, Q-waves* and *T-waves change*). *Sex, history of ischaemia, hypertension or diabetes, smoking status,* and *time between symptom onset and hospital admission* did not appear to be important predictors of short-term mortality. The Helmers and Chapman indices included *SGOT levels*.

Patient Characteristics

The median age of the 340 patients was 68 years (range 17 to 93). The majority were males (79 percent) without previous AMI (92 percent) and no previous hospital admission due to cardiovascular disease (85 percent) (Table 2). The median length of hospital stay was 29 days. Forty-four patients (13 percent) had a re-infarction while in hospital and 83 (24 percent) died within 28 days.

Association with Mortality and Comparison with Prognostic Indices

Overall, the 28-day mortality rate was 24.4 percent. The 28-day mortality during 1990-95 was 22.2 percent, lower than the rate of 27.3 percent during 1985-89. However, the absolute difference in rates between these two periods was small and was not statistically significant. All variables included in any of the 8 prognostic indices were examined for association with 28-day mortality in our patient sample. Increasing age, history of angina, presentation with pulmonary oedema, cardiogenic shock, anterior infarction and x-ray showing pulmonary oedema were all significantly associated with increased risk of 28-day mortality (Table 2). In addition, the patients who died within 28 days also had significantly lower blood pressure on admission, higher pulse and respiratory rates, and higher SGOT and urea levels (Table 3).

Table 3 *The Relationship between AMI Mortality and Clinical Findings of Patients* (2)

	Dead		Alive		Difference		p
	n	Mean (SD)	n	Mean (SD)	Mean (SD)	95% CI	
SBP	83	117 (30)	257	128 (27)	11(3)	5-18	0.001
DBP	83	74 (20)	257	80 (15)	6(2)	6-11	0.002
Pulse rate	83	85 (21)	257	80 (15)	5(2)	1-9	0.024
Resp. rate	83	22 (5)	257	20 (3)	2(0.4)	1-3	0.000
SGOT	71	152 (172)	249	87 (86)	65(15)	35-94	0.000
Urea	71	7.8 (4.0)	247	6.5(4.1)	1.3(0.5)	0.3-2.3	0.021

Quantitative Comparison of Prognostic Indices

The test of equivalence in AUCs suggests that significant differences exist (Table 4). The Norris index had the highest AUC (0.75) and the Helmers index had the lowest (0.64). Statistically significant differences were found only between AUCs of the Norris and Helmers indices (difference=0.11, 95% CI: 0.013-0.21, p=0.03) and the Norris and Killip indices (difference=0.10, 95% CI: 0.009-0.200, p=0.03). Figure 1 shows ROC curves of the Norris and Helmers indices. The ROC curves of all the remaining 6 indices lay within the curves of the Norris index and had similar shapes, suggesting

Table 2 *The Relationship between AMI Mortality and Clinical Findings of Patients (1)*

		Total		Dead		Alive		
		No	%	No	%	No	%	p
Sex	Male	267	78.5	62	74.7	205	79.8	0.328
	Female	73	21.5	21	25.3	52	20.2	
Age	<50	17	5.0	2	2.4	15	5.8	0.001
	50-59	54	15.9	8	9.6	46	17.9	
	60-69	118	34.7	19	22.9	99	38.5	
	70-79	108	31.8	33	39.8	75	29.2	
	80	43	12.6	21	25.3	22	8.6	
History of disease	Angina:Yes	180	52.9	54	65.1	126	49.0	0.01
	No	160	47.1	29	34.9	131	51.0	
	Previous AMI: Yes	28	8.2	5	9.0	23	8.9	0.400
	No	312	91.8	78	94.0	234	91.1	
	Hypertension: Yes	203	59.7	49	59.0	154	59.9	0.880
	No	137	40.3	34	41.0	103	40.1	
	Diabetes: Yes	52	15.3	18	21.7	34	13.2	0.060
	No	288	84.7	65	78.3	223	86.8	
Pulmonary oedema	Yes	70	20.6	26	31.3	44	17.1	0.005
	No	270	79.4	57	68.7	213	82.9	
Cardiogenic shock	Yes	313	7.9	14	16.9	13	5.1	0.001
	No		92.1	69	83.1	244	94.9	
Arrhythmia	Yes	110	32.4	32	38.6	78	30.4	0.165
	No	230	67.6	51	61.4	179	69.6	
Q waves		279	82.1	71	85.5	208	80.9	0.341*
	Anterior	173	50.9	49	69.0	124	59.6	0.011**
	Inferior	100	29.4	18	25.4	82	39.4	
	Ante. + Infe.	6	2.2	4	5.6	2	1.0	
Non-Q waves		61	17.9	12	14.5	49	19.1	
	Anterior	25	7.4	1	8.3	24	49.0	0.008**
	Inferior	23	6.8	5	41.7	18	36.7	
	Endocardial	13	3.8	6	50.0	7	14.3	
Heart size (X-ray)	Normal	79	46.2	10	35.7	69	48.3	0.467
	Doubtful enlarged	14	8.2	3	10.7	11	7.7	
	Definitely enlarged	78	45.6	15	53.6	63	44.1	
Lung field (X-ray)	Normal	114	66.6	9	32.1	105	73.4	0.000
	Shadow	27	15.8	5	17.9	22	15.4	
	Doubt oedema	23	13.5	10	35.7	13	9.1	
	Definitely oedema	7	4.1	4	14.3	3	2.1	

* Comparison of Q wave with non-Q wave infarction, ** Comparison of various locations of infarction.

that the prognostic indices have similar properties in terms of sensitivity and specificity.

Table 4 *The AUCs of Each Index for 28-day Mortality*

Indices	AUC	SE (AUC)	95% CI for AUC	
Helmers Index	0.6360	0.0392	0.5591,	0.7129
Killip Class	0.6423	0.0372	0.5693,	0.7152
Chapman Index	0.6721	0.0396	0.5945,	0.7498
Peel Index	0.6891	0.0350	0.6240,	0.7578
Woo Index	0.6908	0.0369	0.6185,	0.7631
Selker Index	0.7087	0.0334	0.6431,	0.7742
Dubois Index	0.7221	0.0333	0.6568,	0.7873
Norris Index	0.7471	0.0315	0.6823,	0.8088

Figure 1 *ROC curves for predicting 28-day mortality of AMI*
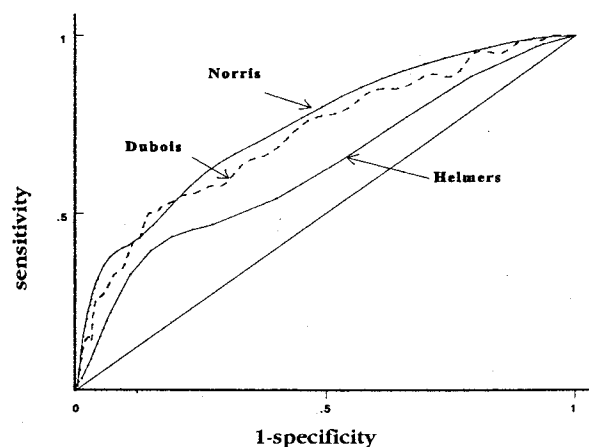
Performance of the Dubois Index

The 340 patients were divided into three groups based on the Dubois index using the cut-off points 1 (severe), 1-3 (moderate) and >3 (mild) as suggested in Dubois.[5] The mortality rate in the severe group was 54 percent compared to 22 percent and 11 percent respectively in the moderate and mild groups (Trend Chi-square = 38.7, p<0.001). The positive likelihood ratios in these three ranges were 3.6, 0.9, and 0.38 respectively.

Discussion

In China, the most commonly used prognostic index of AMI is the Killip index because it depends only on clinical findings and is easily determined by clinicians. Since cultural and racial differences between Western and Chinese AMI patients may be important for prognosis, it is unclear whether prognostic indices developed on Caucasian patients are applicable to Chinese patients. It is also unclear as to which index is the most appropriate. In this study we compared 8 indices for short-term prognosis of AMI patients. The larger AUC of the Norris index reflects the superior performance of that index in terms of ability to predict 28-day mortality. However, computation of this index required 6 variables and 2 variables derived from x-ray examinations that are seldom available from medical charts. These missing x-ray data can be estimated from clinical manifestations, but their effect on the prediction ability of the index is not known. In this study, the indices that needed the reports of chest x-ray examinations and blood tests (SGOT and Urea) all led to missing data. The 28-day mortality of patients without an x-ray report was 32.5 percent, compared to 16.4 percent in patients with x-ray. The difference was statistically significant. When calculating the indices, x-ray related variables for "no x-ray" patients were assumed to be "normal" or "doubtful". This might have led to some bias and underestimation of the scores of the non-survivors. The mortality of patients without SGOT record was 59.1 percent and was higher than that of the patients with SGOT. Among the 22 patients who did not have SGOT records, 10 died on the first day. Exclusion of these data, when computing the indices, clearly would affect the results. Hence, prognostic indices that do not depend upon the variables from x-ray reports or blood tests may be more appropriate in practice. The Dubois index requires only three variables, all of which are routinely measured in clinical practice. It also has the advantage of simplicity in its computation (Appendix). For these reasons, the Dubois index was our preferred index for the prediction of short-term prognosis after AMI.

We were able to identify four previous studies that have compared the performance of prognostic indicators of AMI. None of these studies included a comprehensive collection of AMI prognostic indices. Horwitz[25] compared the Norris index and Killip class and concluded that the Norris index was a better predictor of hospital mortality of AMI but had the disadvantage of requiring a chest x-ray to estimate the presence of pulmonary oedema and cardiac enlargement. Madsen[26] compared different statistical methods for deriving short-term prognostic indices in AMI and concluded that the choice of the prognostic indicator should consider other factors, such as ease of use. Morceau and Alemi[27-28] applied ROC analysis for comparing AMI severity indices. Morceau compared three generic severity indices and a coronary prognostic index as predictors of 96 hours mortality in 76 AMI patients. Alemi F compared seven severity indices as predictors of in-hospital survival in 775 AMI patients. Of the seven indices, only one was a severity score developed specifically for AMI prognosis. In both these studies, pairwise comparisons were performed to test differences between the AUCs of the indices as that used in our study.

The Killip, Norris, Helmers, Chapman and Selker indices used hospital mortality as the outcome factor. Since the lengths of hospital stay vary and patients may die after discharge, using hospital mortality as the outcome factor could result in bias, unless a survival analysis approach is used with patients discharged from hospital. Only Chapman's paper reported the average length of hospital stay, as 22.1 days. In this study, we chose to use 28-days mortality as the main outcome in our research because it is a commonly used end point in the assessment of AMI prognosis. Also, having tested the performance of 15-days mortality, using the Dubois index, we found the results to be very similar to those reported using 28-day mortality.

Apart from the Woo index, which was developed in Hong Kong, based on Chinese patients, all the other indices were not developed for patients of Chinese origin. The race difference had been suggested as an important factor in study design, but the results showed that Woo's index had a lower AUC.

This study considered only one hospital, with 340 patients, over a period of 10 years. The representativeness of the results for the rest of China is questionable. However, the hospital mortality and hospital stay for AMI reported is not dissimilar to that seen in other general hospitals in China. A 10-hospital survey of AMI in Shanghai reported a 26.6 percent hospital mortality[29]. In China, the hospital stay of AMI patients is typically more than 1 month, with only the mild patients discharged within a month.

The performance of indices depends on many factors, including the disease severity of the patients who survive to reach hospital, treatment of AMI and hospital management of AMI. Some of these factors in China are different from those in the developed countries (e.g. the length of hospital stay in China is longer than in other parts of the world.) However, our results have shown that the Dubois index, derived in a developed western nation, is applicable to a population in China. This suggests that this index could also be applicable in other non-western developing countries, but would need to be verified in those settings. While treatment of AMI may affect the mortality of patients, this should not affect comparison of the indices since all the indices were computed on the same study sample and were based on the demographic and clinical factors assessed before treatment. This study has the limitation of being a retrospective study. Nevertheless, several studies of prediction rules are based on retrospective cohorts, as for example, Woo's, Helmers', Peel's and Horwitz's.

Based on our study, we suggest that the Dubois index could be a useful prognostic index for Chinese patients admitted to hospital with AMI. Since the predictive power of all these eight indices has not been very satisfactory, the Dubois index could be used as a starting point to generate a new prognostic index on a large sample of Chinese patients.

Acknowledgment

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Appendix

(I). Peel prognostic index(PI) [1]

Score of Peel PI equals the sum of variable's score [1]

Variables	Score
Sex and Age :	
Males <54 years	0
55-59	1
60-64	2
>65	3
Females <64 years	2
>65 years	3
Previous History :	
Previous myocardial infarction	6
Other cardiovascular disease, or history	3
of extremities dyspnoea	
Angina only	1
No cardiovascular disease	0
Shock :	
Absent	0
Mild - transient at onset	1

Moderate present on admission but subsiding with rest and sedation	5
Severe - persisting despite rest and sedation	7
Cardiac Failure :	
Absent	0
A few basal rales only	1
More of any one or breathlessness, acute pulmonary oedema orthopnea, dyspnoea, gallop rhythm, liver enlargement, oedema, jugular venous distension	4
Electrocardiograph :	
Normal QRS, changes confined to RT segment or T waves	1
QR complexes	3
QS complexes or bundle branch block, or no ECG obtained	4
Rhythm :	
Sinus rhythm	0
Any one or more of: atrial fibrillation or flutter, paroxysmal tachycardia, persisting simple tachycardia (>110/min), frequent extra-systole, nodal rhythm or heat block	4

(II). Killip Classification [2]

I.	*No heart failure.*	No signs of cardiac decompensation
II.	*Heart failure.*	Diagnostic criteria include rales, S3 gallop and venous hypertension.
III.	*Severe heart failure*	Frank pulmonary oedema
IV.	*Cardiogenic shock*	Signs include hypotension (systolic blood pressure of 90 mm Hg or less) and evidence of peripheral vasoconstriction such as oliguria, cyanosis and diaphoresis. Heart failure often with pulmonary oedema, has also been present in a majority of these patients.

(III). Norris coronary prognostic index [3]

Score of PI = 3.9 Age+2.8 Location+10 SBP+1.5 Heart Size +3.3 Lung Field +0.4 Previous Ischaemia

Variables	Score
Age (Years) :	
< 50	0.2
50-59	0.4
60-69	0.6
70-79	0.8
80-89	1.0
Position of Infarction (ECG) :	
Anterior transmural	1.0
Left bundle branch block	1.0
Posterior transmural	0.7
Anterior sub-endocardial	0.3
Posterior sub-endocardial	0.3
Admission SBP (mm Hg)	
<55	1.0
55-64	0.7
65-74	0.6
75-84	0.5
85-94	0.4
95-104	0.3
105-114	0.2
115-124	0.1

>125	0.0

Heart Size (from chest radiograph)

Normal	0.0
Doubtful enlarged	0.5
Definitely enlarged	1.0

Lung Field (from chest radiograph)

Normal	0.0
Venous congestion	0.3
Interstitial oedema	0.6
Pulmonary oedema	1.0

Previous Ischameia :

No ischaemia	0
Previous angina or infarction	1

(IV) Helmers Index [4]

Score of PI = 0.61923 + 0.01668 RR + 0.00062 SGOT

RR : The maximum respiratory rate per minute during the first day

SGOT: (unit/liter) Maximum SGOT

(V) Dubois prognostic index [5]

Score of PI = 5.9019 - 0.8961 LVF - 0.5708 SITE -0.0369 Age

Variables	Score
Function : Left ventricular function on admission	
No pulmonary rales	0
Basilar rales	1
Rales up to scapular level	2
Acute pulmonary oedema	3
Cardiogenic shock	4
Site : Site of infarction	
Anterior	1
Others	0
Age	in years

(VI) Selker prognostic index [6]

Score of PI = [1+exp(5.6769-0.0733 AGE+0.0145 SBP-0.0347 SBPSQ- 0.6008 T WAVES - 0.6453 Q WAVES - 0.7683 HRT)]⁻¹

Score of PI = $[1+\exp(5.6769-0.0733\,AGE+0.0145\,SBP-0.0347\,SBPSQ-0.6008\,T\,WAVES-0.6453\,Q\,WAVES-0.7683\,HRT)]^{-1}$

Variables	Score
Age (Years)	
< 50	50
> 80	80
Otherwise	Patient's age
SBP (mm Hg)	
>175	175
Otherwise	Patient's SBP
SBP SQ (Squared SBP)	
SBP<80 mm Hg	36
SBP>140 mm Hg	0
Otherwise	$(140-SBP)^2/100$
T Waves	
Peaked T waves present	2
Inverted T waves present	1
Otherwise	0
Q Waves	
Anterior-lateral	2
Anterior-septal significant Q waves or Anterior Q	1
Otherwise	0
HRT (Initial pulse rate)	
Heart rate<110	0
SBP<=90	1

90<SBP<=110	(SBP-70)/20
110<SBP<=140	2
140<SBP<=155	(155-SBP)/7.5
SBP>155	

(VII) Chapman and Gray prognostic index [7]

Score of PI equals the sum over the 3 variables

Variables	Score
SGOT Level (U/ml)	
? 40	0
41-80	4
81-120	7
121-160	11
161-200	14
?201	18
Cardiogenic Shock	
Absent	0
Present	32
Oliguria	
Absent	0
Present	33

(VIII) Woo prognostic index [8]

Score of PI= 2.1 Age + 2.5 SBP + 0.1 Heart Size + 0.7 Lung Field + 2.5 Urea + 1.2 Arrhythmia + 3.8 Location

(VIII) Woo prognostic index [8]

Score of PI= 2.1 Age + 2.5 SBP + 0.1 Heart Size + 0.7 Lung Field + 2.5 Urea + 1.2 Arrhythmia + 3.8 Location

Variables	Score
Age (years)	
?59	0.3
60-69	0.5
?70	1
Systolic Blood Pressure (mmhg)	
? 90	0
< 90	1
Heart Size (chardiothoracic ratio)	?
55%	0
> 55%	1
Lung Field	
Normal	0
Congested/oedema	1
Urea (mmol/L)	
? 10	0
> 10	1
Urea (mmol/L)	
? 10	0
> 10	1
Arrhythmia	
Absent	0
Present	1
Infarct Position	
Non-Q waves	0.2
Posterior or Left bundle branch block	0.4
Anterior	0.6
Anterior and Right bundle branch block	1
Anterior and Posterior	1