

## **CHAPTER 5: OUTCOME**

### **5.1 IN-HOSPITAL OUTCOME**

### **5.2 OUTCOME AT DISCHARGE & AT 30-DAY FOLLOW UP**

Omar Ismail<sup>1</sup>

<sup>1</sup>Department of Cardiology, Penang Hospital

The in-hospital, all cause-mortality for the entire cohort was 1.1% (41 patients), of which only a few were in the elective cases (0.4%), and 0.7% in the non-elective ones. The majority (80%) was cardiac related and 20 % were due to other causes (infection, neurological, vascular).

Among those in the non-elective cases, (5%) were in urgent group, (11%) were in rescue group and (7%) were in the primary PCI in STEMI patients.

Mortality in the patients presenting with shock was high, i.e. 28%. Although this is lower than the cohort in the SHOCK trial, but the total number is too small for comparison. Those who developed shock during or post-PCI had a significantly higher mortality rate, 79 %.

There was a higher rate of mortality in patients with poor TIMI flow post-PCI (TIMI 0, 1 = 7.1% and TIMI 2 = 8.6%), as compared to those with TIMI 3 (0.7%). Only a very small number of patients (0.5%=18 patients) developed periprocedural Myocardial Infarct. This same small proportion (0.4%=17 patients) required emergency re-intervention/PCI and only one (0.025%) needed bail-out CABG.

Occurrences of other complications were low, including, cardiogenic shock (0.5%), arrhythmia (0.5%), stent thrombosis (0.2%), stroke (0.1%), heart failure (0.2%), impaired renal function (0.2%) and vascular/access related complications (1.3%). Although these appeared higher in elective cases, the overall total number was small and there was disproportionate numbers of non-elective vs. elective cases (387 vs. 3533).

Only few patients required readmission (3%), a majority of them were readmitted for staged/planned PCI (54%). Others were for recurrent angina (15%) and a few patients for other reasons (heart failure [2 patients], AMI [1 patient], CABG [2 patients] and unplanned PCI [2 patients]).

The 30-day mortality rate was 1.8 % (64 patients). However, only about 40% of the data were gathered on the 30-day follow-ups, the others were from National Death Registry.

## Summary

1. PCI is safe with low total mortality rates (1.1% in-hospital, 1.8% 30-day).
2. Occurrence of other complications were also low <0.5% (Peri-procedural MI, heart failure, stroke, re-intervention, bail-out CABG, vascular-access related and renal impairment).
3. Poor prognostic factors were Killip Class IV and poor TIMI flow post PCI (0-2). There was a non-significant trend of high mortality rate in Killip III patients, diabetics, elderly, rescue PCI, previous MI, hypertensive and female patients, in descending order.

## References:

1. Katritsis D.G., Meier B. Percutaneous coronary intervention for stable coronary artery disease. *Journal of American College of Cardiology*. 2008; 52: 889-893
2. Dzavik V., Sleeper L.A., Cocke T.P. & et al for the SHOCK Investigators. Early revascularization is associated with improved survival in elderly patients with acute myocardial infarction complicated by cardiogenic shock: a report from the SHOCK Trial Registry. *European Heart Journal*. 2003; 24 : 828-837
3. Jeger R.V., Radovanovic D., Hunziker P.R. & et al. Ten-year trends in the incidence and treatment of cardiogenic shock. *Ann Intern Med*. 2008; 149: 618-626

## 5.1 IN-HOSPITAL OUTCOME

**Table 5.1.1 Summary of in-hospital outcome for patients who underwent PCI, NCVD-PCI Registry, 2007**

	Total No. of Procedures=3920	
	n	%
Periprocedural MI, no. (%) (based on clinical diagnosis)		
Yes	18	0.5
No	3798	96.9
Not Available	104	2.7
Emergency Reintervention/PCI, no. (%)		
Yes	15	0.4
No	3799	96.9
Not Available	106	2.7
Bail-out CABG, no. (%)		
Yes	1	0
No	3818	97.4
Not Available	101	2.6
Other complications		
Cardiogenic shock (after procedure), no. (%)		
	19	0.5
Arrhythmia(VT/VF/Brady), no. (%)		
	18	0.5
TIA/Stroke, no. (%)		
	3	0.1
Tamponade, no. (%)		
	4	0.1
Contrast reaction, no. (%)		
	4	0.1
New onset/worsened heart failure, no. (%)		
	8	0.2
New renal impairment, no. (%)		
	8	0.2
Max post procedural rise in creatinine, no. (%)		
	21	0.5
Max post procedural rise in creatinine, micromol/L		
N	21	
Mean (SD)	401.14 (220.04)	
Median(min,max)	375 (86,880)	
Vascular complications		
Bleeding, no. (%)		
	36	0.9
Type of bleeding, no. (%)		
Major	3	8.3
Minor	4	11.1
Minimal	24	66.7
Not Available	5	13.9

	Total No. of Procedures=3920	
	n	%
Bleeding site, no. (%)		
Retroperitoneal	1	2.8
Percutaneous entry site	23	63.9
Others	5	13.9
Not Available	7	19.4
Access site occlusion, no. (%)	0	0
Loss distal pulse, no. (%)	0	0
Dissection, no. (%)	10	0.3
Pseudoaneurysm, no. (%)	4	0.1
Management of Pseudoaneurysm, no. (%)		
Ultrasound compression	0	0
Surgery	1	25
Others	1	25
Not Available	2	50

## 5.2 OUTCOME AT DISCHARGE & 30-DAY FOLLOW- UP

**Table 5.2.1a Overall outcome of patients who underwent PCI, NCVD-PCI Registry, 2007**

OUTCOME*	Overall outcome			
	Outcome at discharge		30-day**	
	n	%	n	%
Alive	3637	98.9	1457	41.3
Death	40	1.1	**64	1.8
Follow- Up Not Available	0	0	2006	56.9

*\*The outcome data has been derived based on data matching with National Death Register data*

*\*\* Including patients who died in hospital*

Figure 5.2.1a (i) Outcome at discharge of patients who underwent PCI, NCVD-PCI Registry, 2007

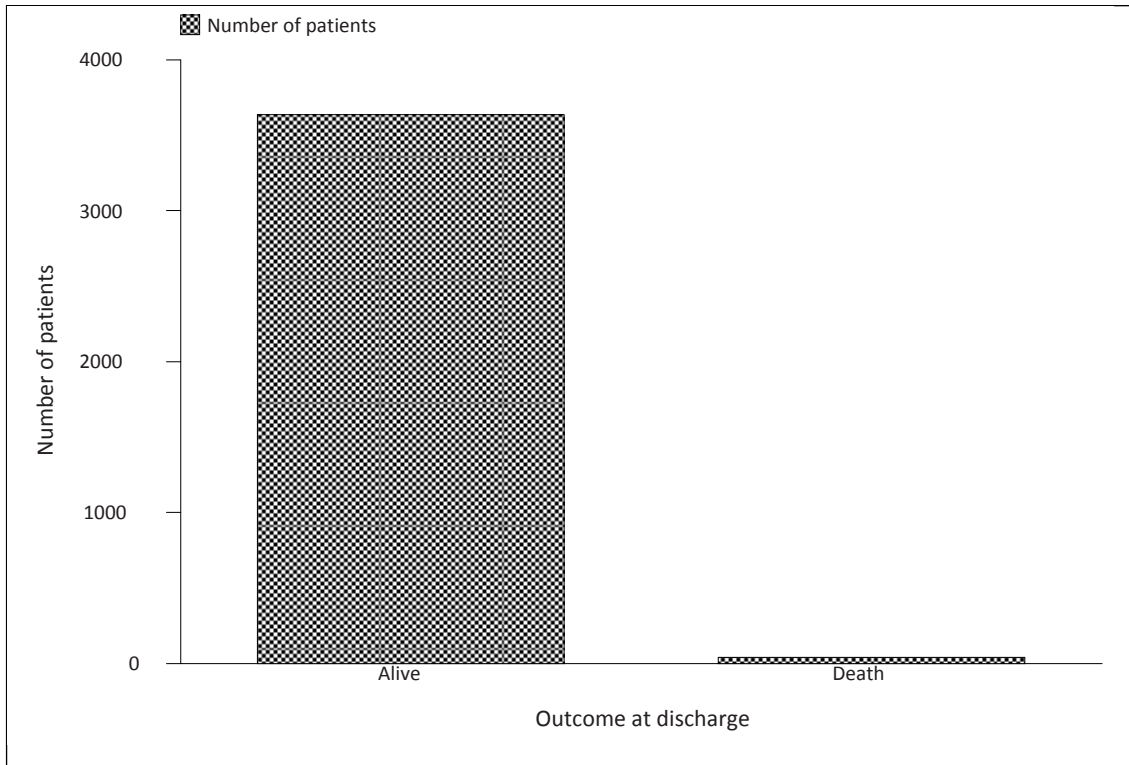


Figure 5.2.1a (ii) 30-day outcome of patients who underwent PCI, NCVD-PCI Registry, 2007

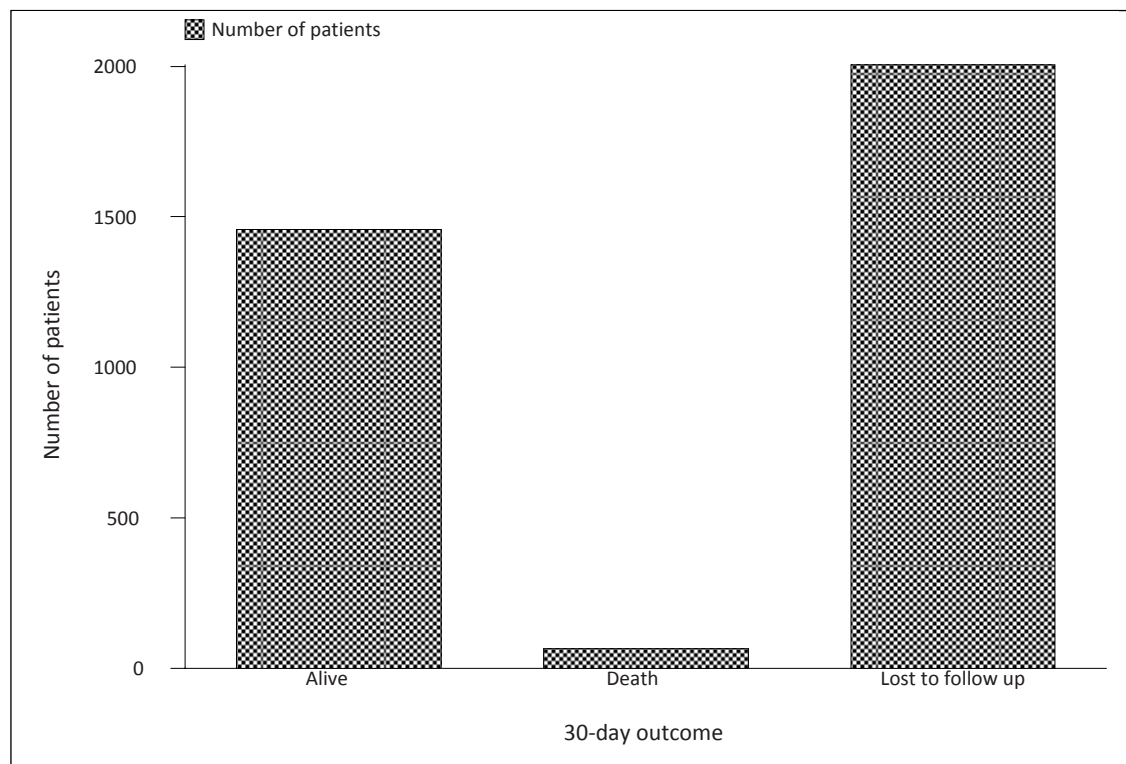


Table 5.2.1b Overall outcome for patients who underwent PCI, by age group (years), NCVD-PCI Registry, 2007

OUTCOME*	Outcome at discharge						30-day**					
	Young		Middle-aged		Elderly		Young		Middle-aged		Elderly	
	N	%	N	%	N	%	N	%	N	%	N	%
Alive	158	99.4	2065	99.3	1414	98.3	62	41.1	854	43.1	541	40
Death	1	0.6	15	0.7	24	1.7	2	1.3	25	1.3	37	2.7
Follow-Up Not Available	0	0	0	0	0	0	88	58.3	1119	56.4	799	59.1

\*The outcome data has been derived based on data matching with National Death Register data

\*\* Including patients who died in hospital

Young is defined as age from 20 to less than 40 years, middle-aged is defined as age between 40 to less than 60 years and elderly is defined as 60 years and above

Figure 5.2.1b (i) Outcome at discharge of patients who underwent PCI, by age group (years), NCVd-PCI Registry, 2007

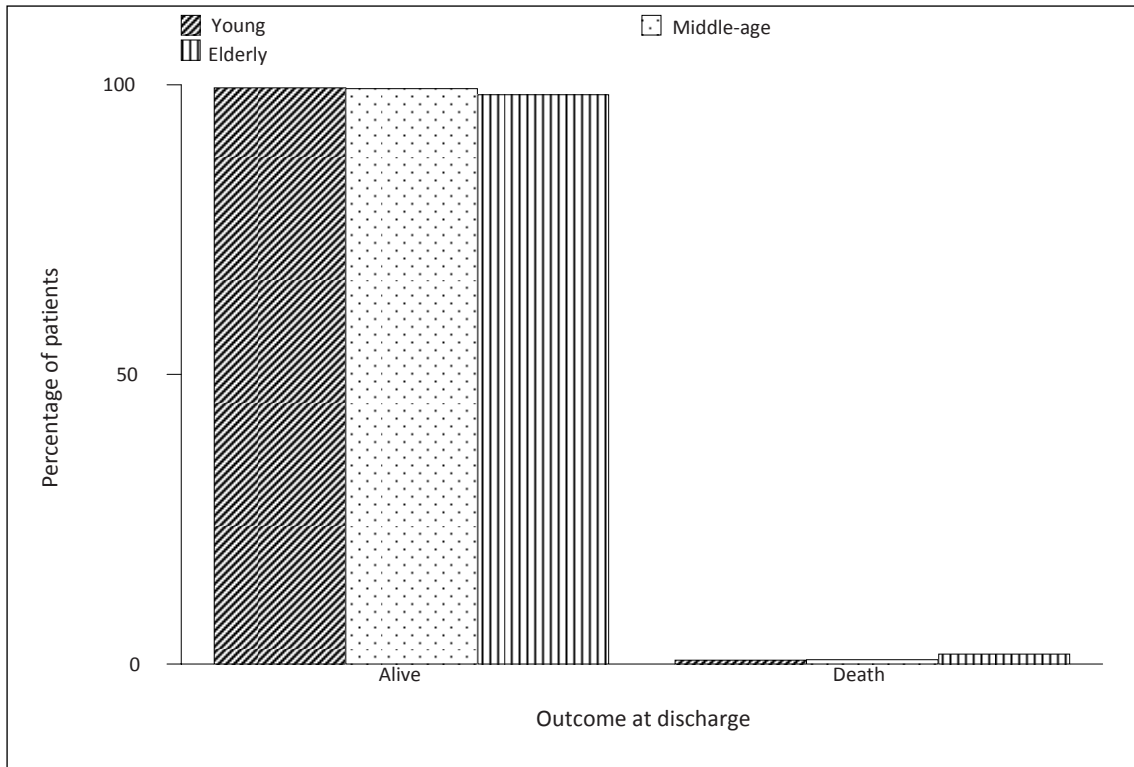
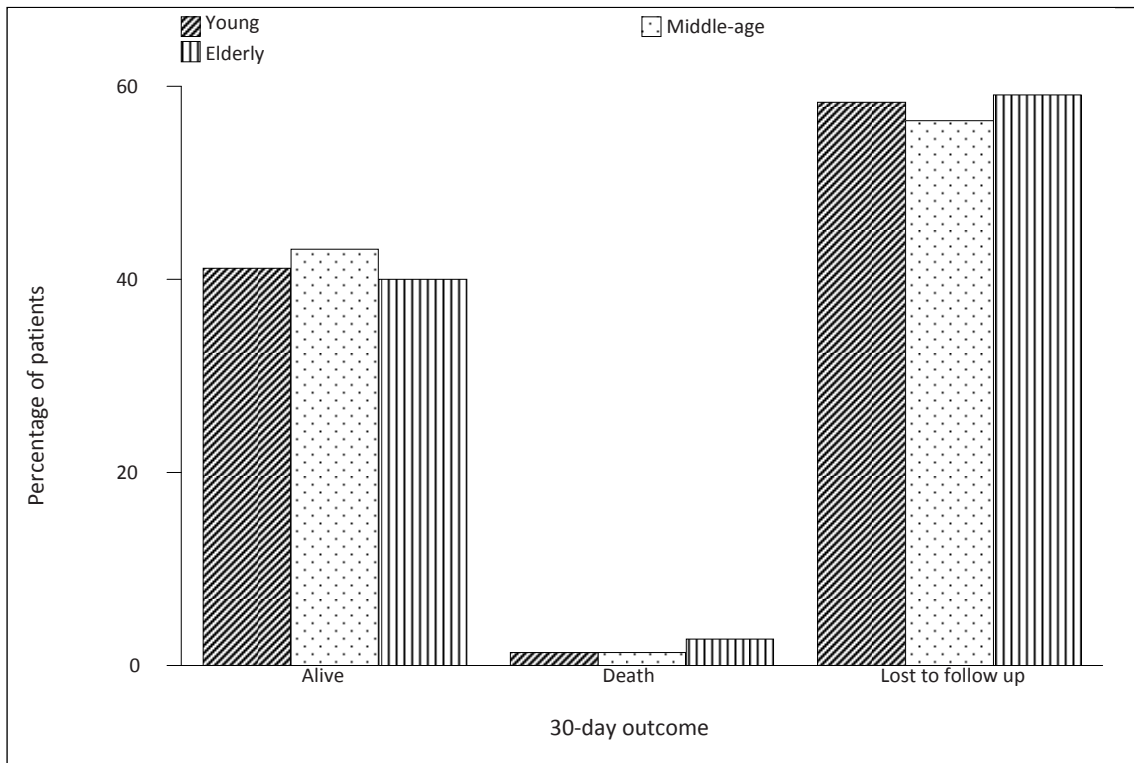


Figure 5.2.1b (ii) 30-day outcome of patients who underwent PCI, by age group (years), NCVd-PCI Registry, 2007





**Table 5.2.1c Overall outcome of patients who underwent PCI, by gender, NCVD-PCI Registry, 2007**

OUTCOME*	Outcome at discharge				30-day**			
	Male		Female		Male		Female	
	n	%	n	%	n	%	n	%
Alive	2957	99	680	98.4	1208	42.6	249	38.2
Death	29	1	11	1.6	49	1.7	15	2.3
Follow-Up Not Available	0	0	0	0	1607	56.7	399	61.2

\*The outcome data has been derived based on data matching with National Death Register data

\*\* Including patients who died in hospital

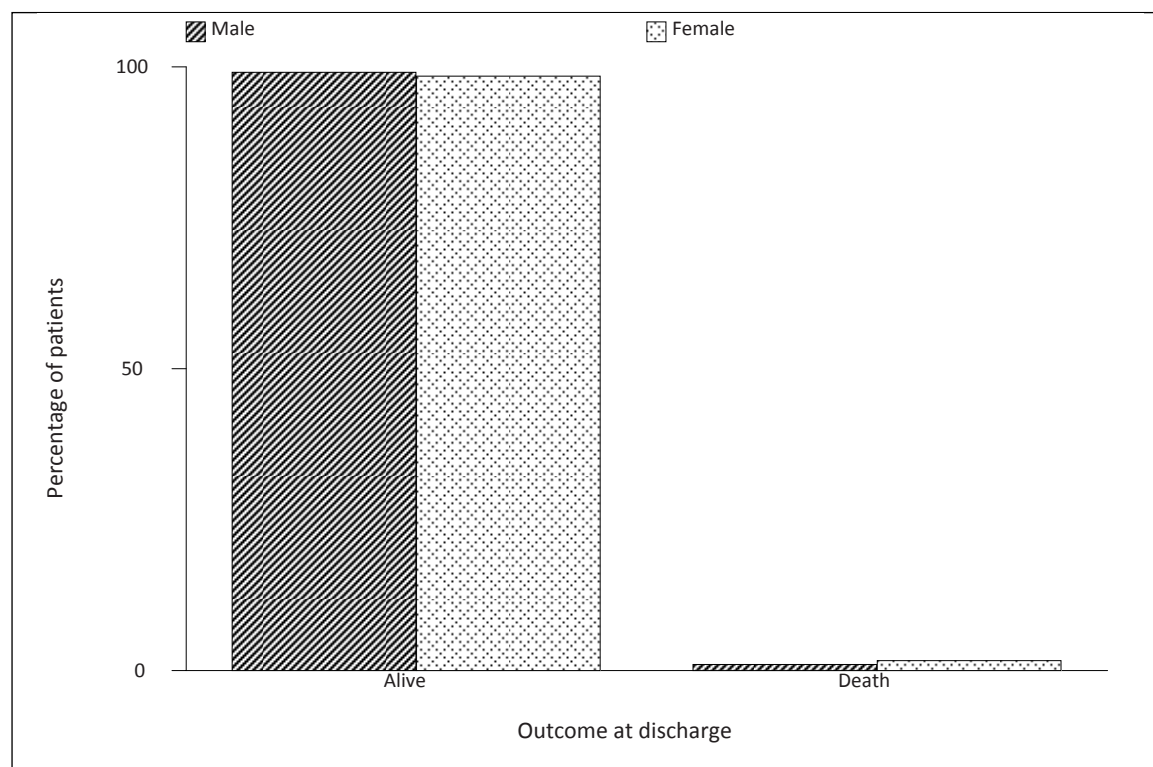
**Figure 5.2.1c (i) Outcome at discharge of patients who underwent PCI, by gender, NCVD-PCI Registry, 2007**

Figure 5.2.1c (ii) 30-day outcome of patients who underwent PCI, by gender, NCVD-PCI Registry, 2007

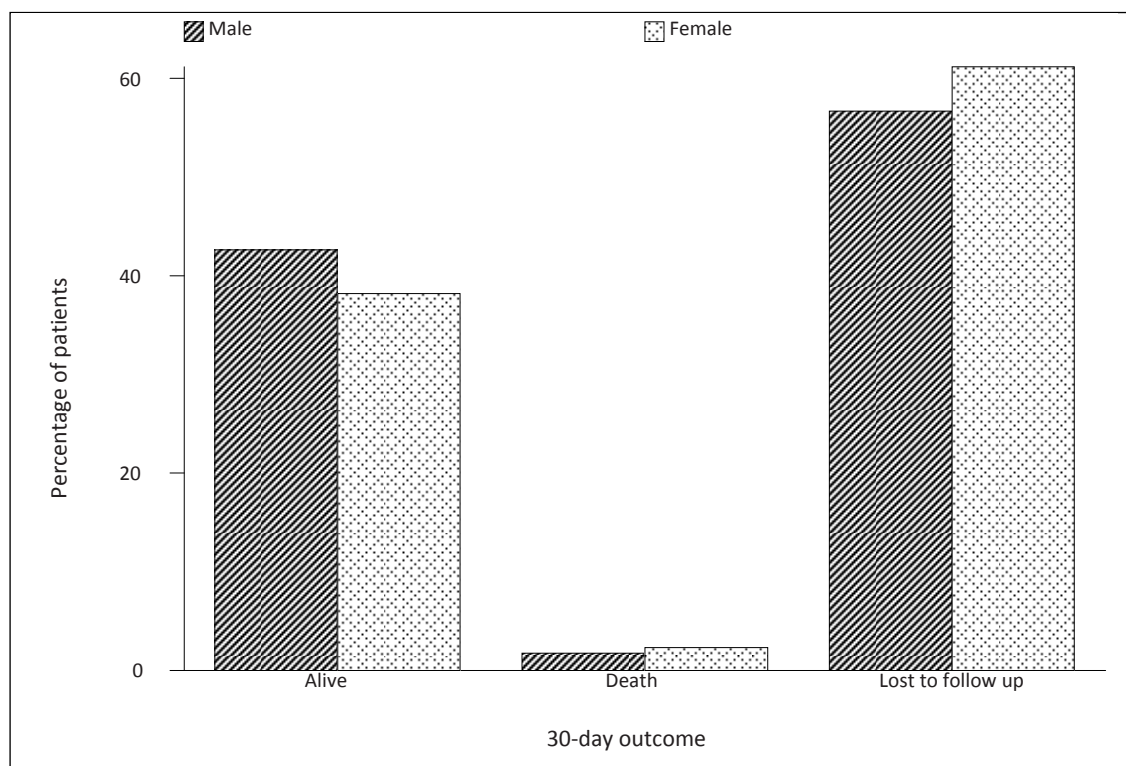


Table 5.2.1d Overall outcome of patients who underwent PCI, by pre-morbid diabetes, NCVD-PCI Registry, 2007

OUTCOME*	Outcome at discharge						30-day**					
	Diabetic		Non-diabetic		Not known		Diabetic		Non-diabetic		Not known	
	N	%	N	%	N	%	N	%	N	%	N	%
Alive	1653	98.6	1893	99.3	91	95.8	598	38	826	45.2	33	37.9
Death	23	1.4	13	0.7	4	4.2	36	2.3	23	1.2	5	5.5
Follow-Up Not Available	0	0	0	0	0	0	961	61.1	992	54.3	53	60.9

\*The outcome data has been derived based on data matching with National Death Register data

\*\* Including patients who died in hospital

Figure 5.2.1d (i) Outcome at discharge of patients who underwent PCI, by pre-morbid diabetes, NCDV-PCI Registry, 2007

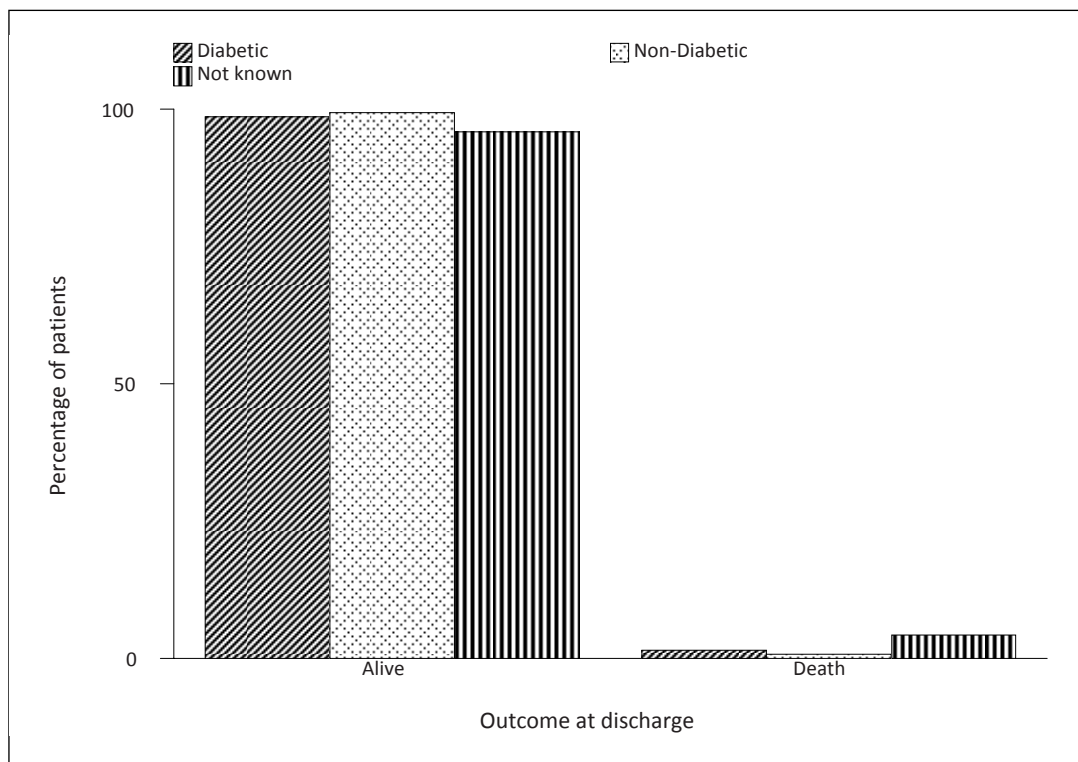


Figure 5.2.1d (ii) 30-day outcome of patients who underwent PCI, by pre-morbid diabetes, NCVd-PCI Registry, 2007

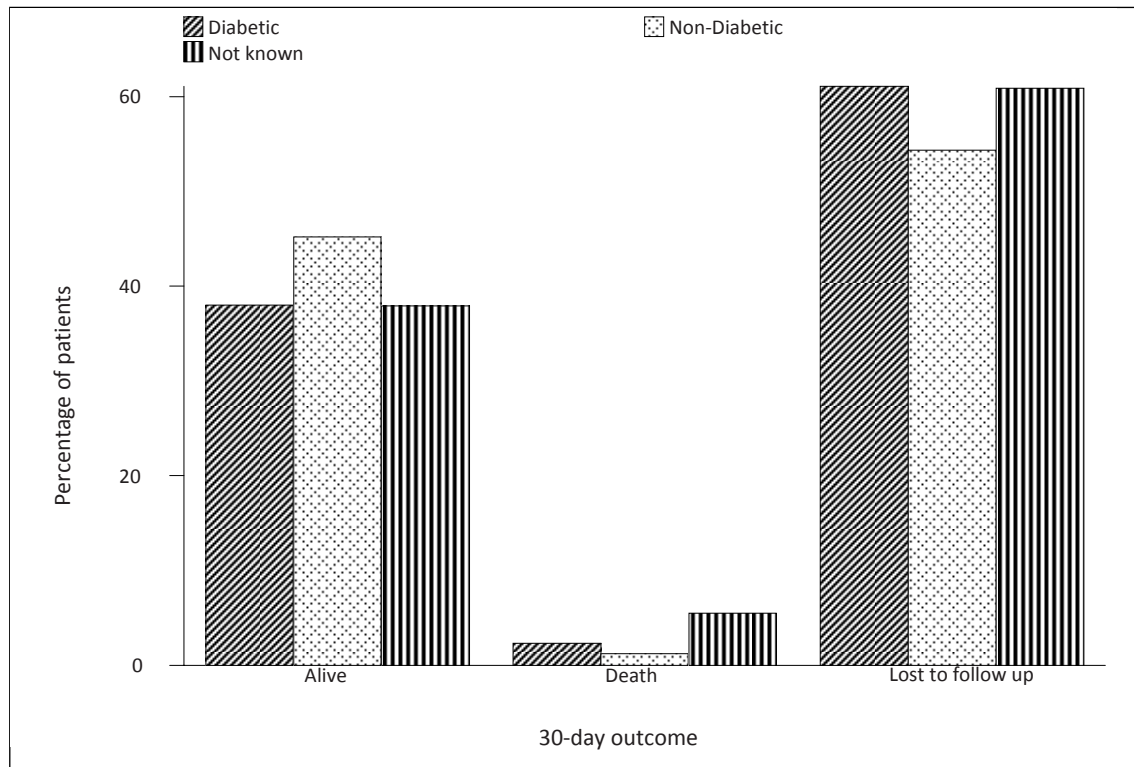


Table 5.2.1e Overall outcome of patients who underwent PCI, by pre-morbid hypertension, NCVd-PCI Registry, 2007

OUTCOME*	Outcome at discharge						30-day**					
	Hypertensive		Non-Hypertensive		Not known		Hypertensive		Non-Hypertensive		Not known	
	N	%	N	%	N	%	N	%	N	%	N	%
Alive	2698	98.8	865	99.3	74	97.4	1049	40.9	385	45.3	23	31.9
Death	32	1.2	6	0.7	2	2.6	53	2	8	0.9	3	4.1
Follow-Up Not Available	0	0	0	0	0	0	1495	58.3	463	54.5	48	66.7

\*The outcome data has been derived based on data matching with National Death Register data

\*\* Including patients who died in hospital

Figure 5.2.1e (i) Outcome at discharge of patients who underwent PCI, by pre-morbid hypertension, NCVD-PCI Registry, 2007

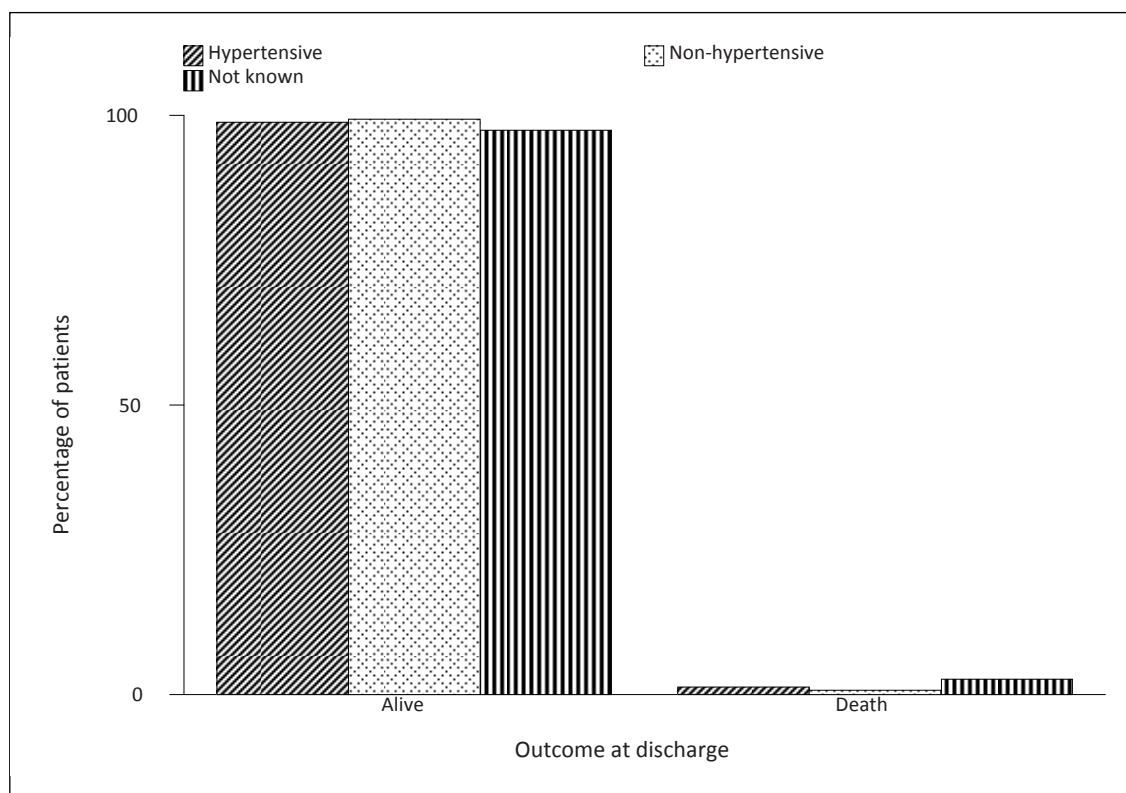


Figure 5.2.1e (ii) 30-day outcome of patients who underwent PCI, by pre-morbid hypertension, NCVD-PCI Registry, 2007

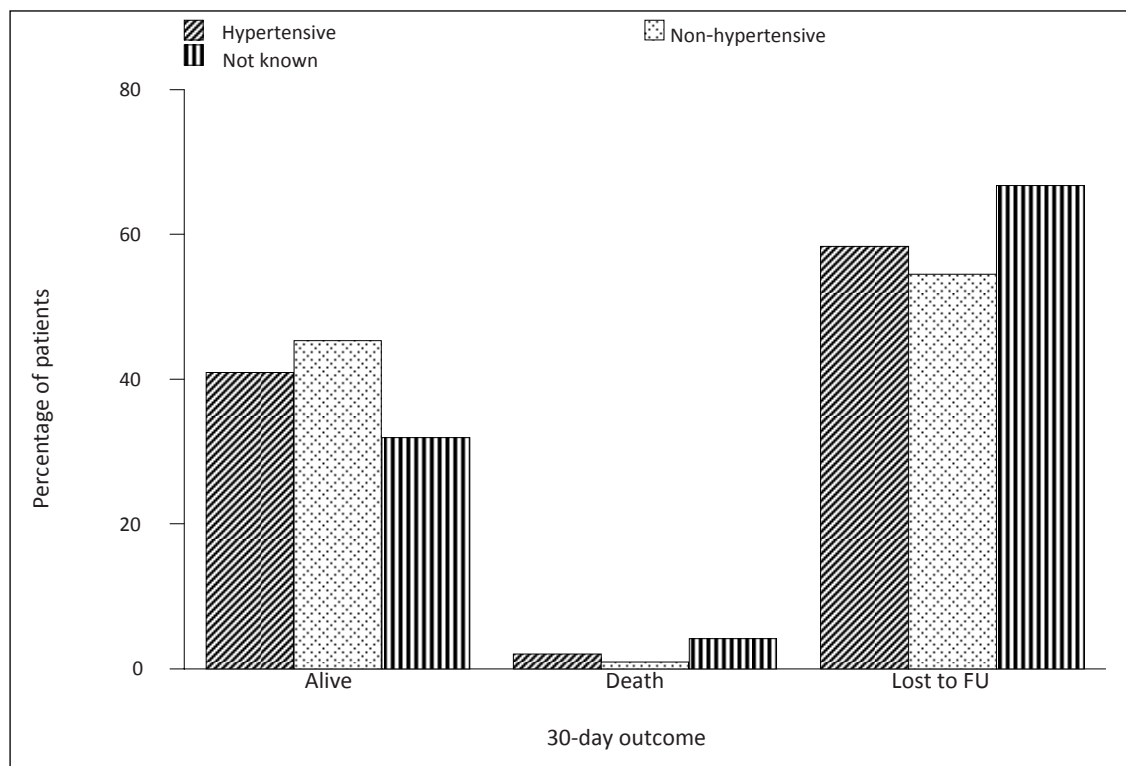


Table 5.2.1f Overall outcome of patients who underwent PCI, by pre-morbid dyslipidaemia, NCVD-PCI Registry, 2007

* OUTCOME	Outcome at discharge						30-day**					
	Dyslipidaemic		Non-dyslipidaemic		Not known		Dyslipidaemic		Non-dyslipidaemic		Not known	
	N	%	N	%	N	%	N	%	N	%	N	%
Alive	2746	99.1	651	98.8	240	96.8	1028	39.1	322	51.3	107	45.9
Death	24	0.9	8	1.2	8	3.2	42	1.6	12	1.9	10	4.1
Follow-Up Not Available	0	0	0	0	0	0	1580	60.2	302	48.1	124	53.2

\*The outcome data has been derived based on data matching with National Death Register data

\*\* Including patients who died in hospital

Figure 5.2.1f (i) Outcome at discharge of patients who underwent PCI, by pre-morbid dyslipidaemia, NCVD-PCI Registry, 2007

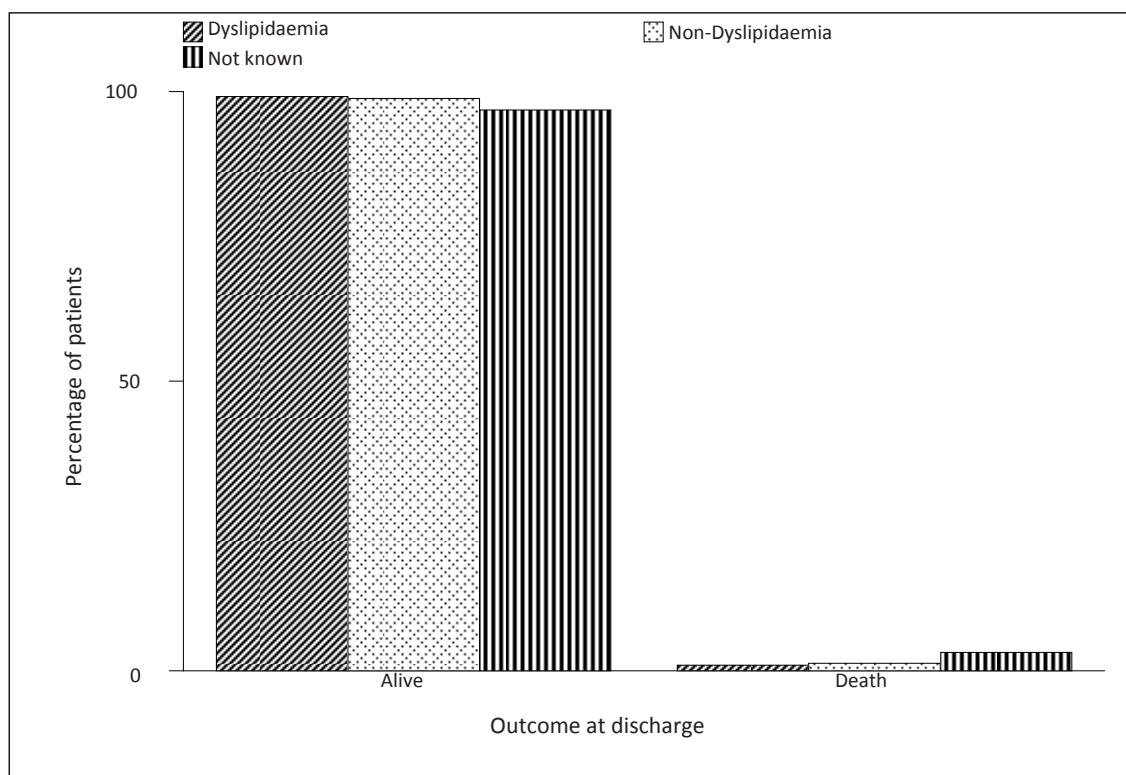


Figure 5.2.1f (ii) 30-day outcome of patients who underwent PCI, by pre-morbid dyslipidaemia, NCVD-PCI Registry, 2007

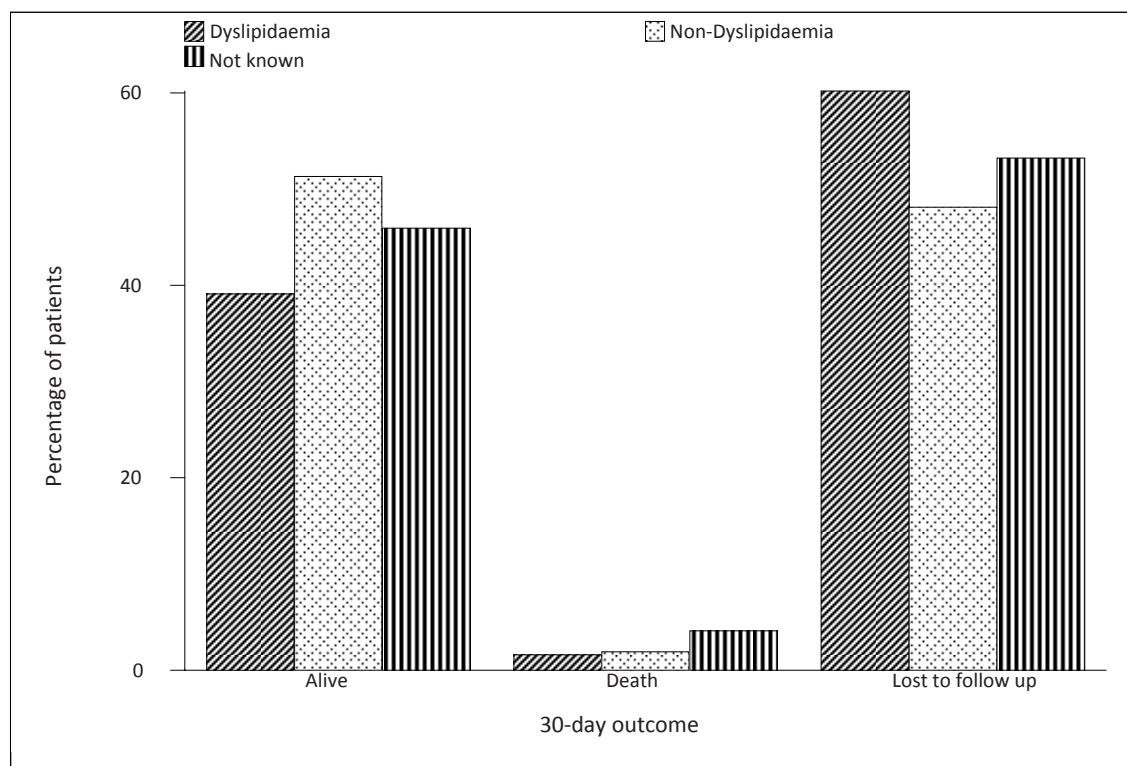


Table 5.2.2 Medication for patients who underwent PCI, NCVD-PCI Registry, 2007

*Medication	Outcome at discharge N=3637		30-day** N=1457	
	N	%	N	%
Aspirin	3362	92.4	1370	94
Clopidogrel	3434	94.4	1094	75.1
Ticlopidine	293	8.1	155	10.6
Dual antiplatelet (Aspirin + Clopidogrel/Ticlopidine)	3290	90.5	1062	72.9
Statin	3253	89.4		
Beta blocker	2521	69.3		
Ace inhibitor	1974	54.3		
ARB	476	13.1		
Warfarin	43	1.2		
Others	2280	62.7	1154	79.2
Not Available	56	1.5	18	1.2

\* Available for those who are alive



**Table 5.2.3 Cause of death of patients who underwent PCI, NCVD-PCI Registry, 2007**

Medication	Outcome at discharge*		30-day**	
	N	%	N	%
Cardiac	32	80	36	56.3
Non-cardiac <sup>+</sup>				
Renal	0	0	0	0
Infection	2	5	2	3.1
Neurological	1	2.5	1	1.6
Vascular	1	2.5	1	1.6
Pulmonary	1	2.5	1	1.6
Others	0	0	2	3.1
Not Available	3	7.5	21	32.7
TOTAL	40	100	64	100

\*The outcome data has been derived based on data matching with National Death Register data

\*\* Including patients who died in hospital

<sup>+</sup> Patients may have more than one condition that caused death

**Table 5.2.4 Location of death of patients who underwent PCI, NCVD-PCI Registry, 2007**

Location of death	In-hospital Mortality	
	N	%
In Lab	4	10
Out of Lab	33	82.5
Not Available	3	7.5

**Table 5.2.5 Outcome at discharge of patients who developed cardiogenic shock post-PCI, NCVD-PCI Registry, 2007 (n=3677)**

Outcome*	Cardiogenic Shock Post-Procedure					
	Yes		No		Missing	
	No	%	No	%	No	%
Death	15	78.9	22	0.6	3	3.1
Alive	4	21.1	3540	99.4	93	96.9

\*The outcome data has been derived based on data matching with National Death Register data

**Table 5.2.6 Outcome at discharge, by post PCI TIMI flow, NCVD-PCI Registry, 2007 (n=3677)**

Outcome*	Post PCI TIMI flow							
	0, 1		2		3		Not Available	
	No	%	No	%	No	%	No	%
Death	9	7.1	5	8.6	23	0.7	2	1.5
Alive	118	92.9	53	91.4	3334	99.3	133	98.5

*\*The outcome data has been derived based on data matching with National Death Register data*

**Table 5.2.7 Outcome at discharge, by contrast volume used, NCVD-PCI Registry, 2007 (n=3677)**

Contrast volume	Death*	Alive*
N	32	2986
Mean (SD)	190.31 (89.25)	178.96 (70.73)
Median (Min, max)	180 (25,380)	160 (25,500)
Not Available	8	651

*\*The outcome data has been derived based on data matching with National Death Register data*

**Table 5.2.8 Summary of 30-day readmission status of patients who underwent PCI, NCVD-PCI Registry, 2007 (N = total no. of procedures for 30-day follow-up, 3731)**

Readmission	N	%
Yes	114	3.1
No	1481	39.7
Not Available	2136	57.3
Readmission reason, no. %		
CHF	2	1.8
AMI	1	0.9
Recurrent angina	18	15.8
Arrhythmia	0	0
PCI-planned	58	50.9
PCI-unplanned	2	1.8
CABG	2	1.8
Others	17	14.9
Not Available	14	12.3

**Table 5.2.9 Procedural complications and clinical outcomes, according to PCI status, NCVD-PCI Registry, 2007**

Variable	Elective		Urgent		Emergency/ Rescue		Primary		Missing		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Death	15	37.5	8	20.0	8	20.0	8	20.0	1	2.5	10	100
Periprocedural MI	15	88.2	1	5.9	0	0	1	5.9	0	0	17	100
Non fatal MI (AMI)	0	0	1	100	0	0	0	0	0	0	1	100
Further PCI- (planned PCI)	22	91.7	2	8.3	0	0	0	0	0	0	24	100
Recurrent angina (CCS>1)	14	82.4	1	5.9	0	0	2	11.8	0	0	17	100
Repeat PCI - (Unplanned)	2	100	0	0	0	0	0	0	0	0	2	100
Procedural complications												
Stent thrombosis	7	87.5	0	0	1	12.5	0	0	0	0	8	100
Dissection	3	100	0	0	0	0	0	0	0	0	3	100
Perforation	0	0	0	0	0	0	0	0	0	0	0	0
Bail out CABG	1	100	0	0	0	0	0	0	0	0	1	100
Cardiogenic shock	7	36.8	3	15.8	3	15.8	6	31.6	0	0	19	100
Arrhythmia	10	55.6	4	22.2	1	5.6	2	11.1	1	5.6	18	100
TIA/stroke	1	33.3	2	66.7	0	0	0	0	0	0	3	100
Tamponade	3	75.0	0	0	1	25.0	0	0	0	0	4	100
Contrast reaction	2	50.0	0	0	0	0	2	50.0	0	0	4	100
New/worsened Heart Failure	4	50.0	1	12.5	0	0	3	37.5	0	0	8	100
New renal impairment	3	42.7	0	0	1	14.3	3	42.9	0	0	7	100
Bleeding	21	63.6	7	21.2	1	3.0	4	12.1	0	0	33	100
Access site occlusion	0	0	0	0	0	0	0	0	0	0	0	0
Loss distal pulse	0	0	0	0	0	0	0	0	0	0	0	0
Dissection	7	70	0	0	2	20	1	10	0	0	10	100
Pseudoaneurysm	4	100	0	0	0	0	0	0	0	0	4	100

**Table 5.2.10 Prognostic factors for in-hospital mortality among patients who underwent PCI, NCVD-PCI Registry, 2007**

Factor	N	Hazard ratio	95% CI	*P value
Age group				
20 - <60 (ref)	2239	1.00		
>= 60	1438	3.30	0.84, 12.93	0.087
Gender				
Male (ref)	2986	1.00		
Female	691	1.23	0.33, 4.60	0.755
PCI status				
Elective (ref)	3322	1.00		
Urgent	178	0.68	0.06, 7.81	0.755
Rescue	69	3.08	0.61, 15.61	0.175
Primary	94	1.39	0.19, 9.93	0.742
Diabetes mellitus				
No (ref)	1906	1.00		
Yes	1676	5.61	1.01, 31.17	0.049
Myocardial infarction history				
No (ref)	2167	1.00		
Yes	1280	0.39	0.10, 1.55	0.183
Hypertension				
No (ref)	871	1.00		
Yes	2730	3.02	0.34, 27.01	0.323
Killip class				
I (ref)	785	1.00		
II	190	2.61	0.40, 17.11	0.316
III	29	13.72	1.76, 107, 11	0.012
IV	32	31.35	4.51, 217.76	> 0.005

*\* using Cox regression with forward variable selection*