

NCVD-PCI Registry

***National Cardiovascular Disease Database (NCVD)
Percutaneous Coronary Intervention (PCI) Registry, MALAYSIA
c/o National Heart Association of Malaysia***





ANNUAL REPORT OF THE NCVD-PCI REGISTRY

MCH/S/CRC/01.09(AR)

National Cardiovascular Disease Database

ANNUAL REPORT OF THE NCVD - PCI REGISTRY *year 2007*



Editors:
Wan Azman Wan Ahmad
Sim Kul-Hian



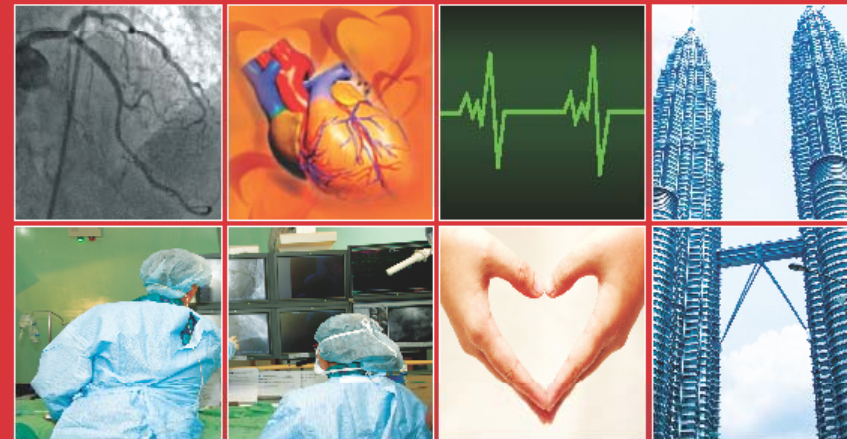
CRC
CENTRE FOR RESEARCH IN
CARDIOVASCULAR DISEASES
Pusat Penyelidikan Penyakit Kardiovaskular



MCH/S/CRC/20.11 (AR)

National Cardiovascular Disease Database

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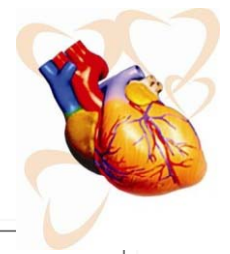




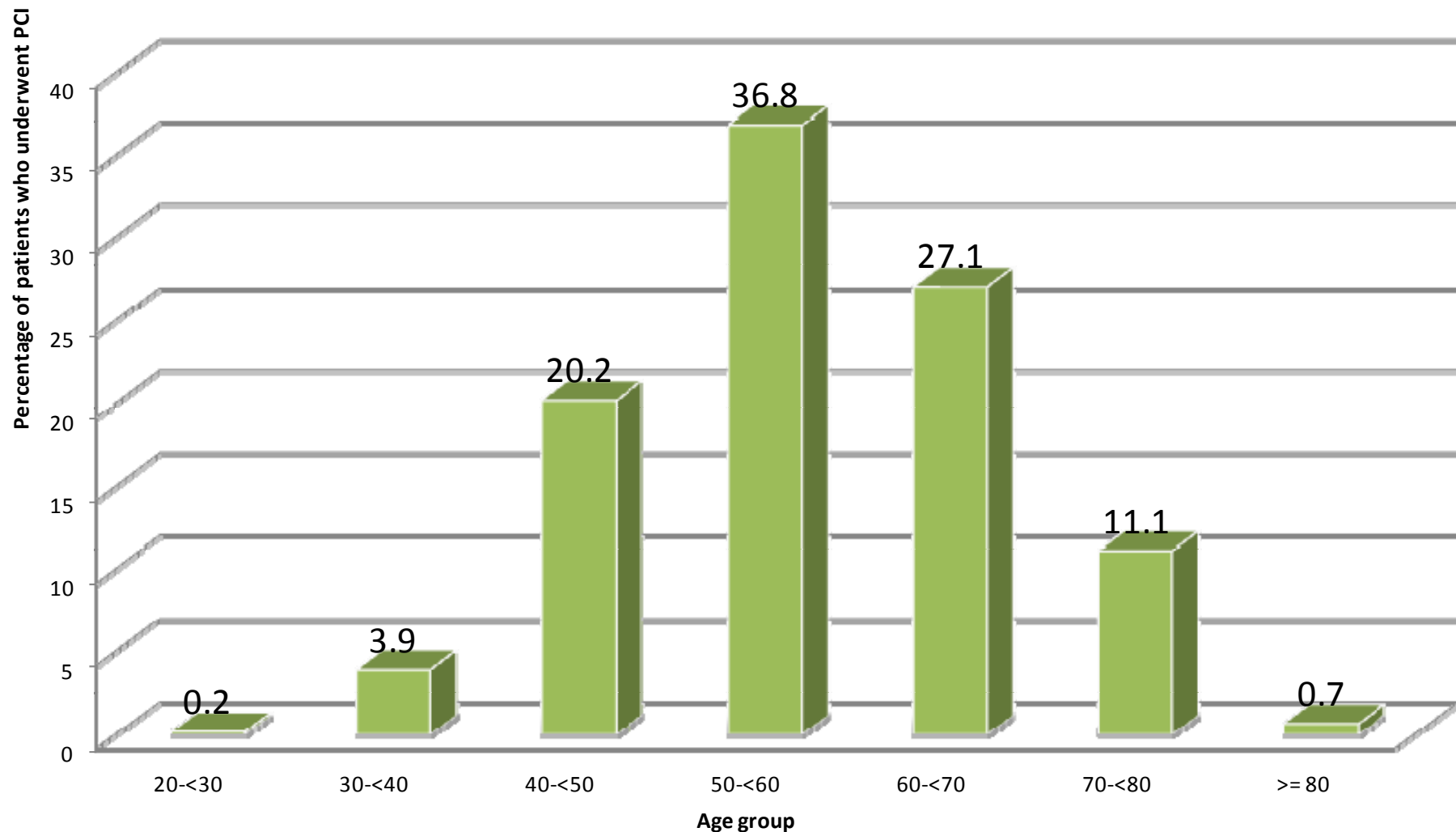
NCVD-PCI Registry, 2007-2012

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Total | |
|-------------------------------------------------|-------|-------|-------|-------|-------|-------|--------|---|
| Total number of patients | 3,618 | 3,374 | 3,610 | 4,106 | 4,293 | 4,895 | 23,896 | ↑ |
| Total number of PCI procedures performed | 3,928 | 3,654 | 3,916 | 4,405 | 4,679 | 5,299 | 25,881 | ↑ |
| Total number of lesions treated | 5,455 | 4,944 | 5,139 | 6,043 | 5,901 | 6,834 | 34,316 | ↑ |
| Total number of stents used | 6,462 | 5,767 | 5,887 | 6,828 | 6,692 | 7,611 | 39,247 | ↑ |

Age Group of Patients Who Underwent PCI, NCVD PCI Registry, 2007-2009



Age group of patients who underwent PCI, NCVD PCI Registry, 2007-2009

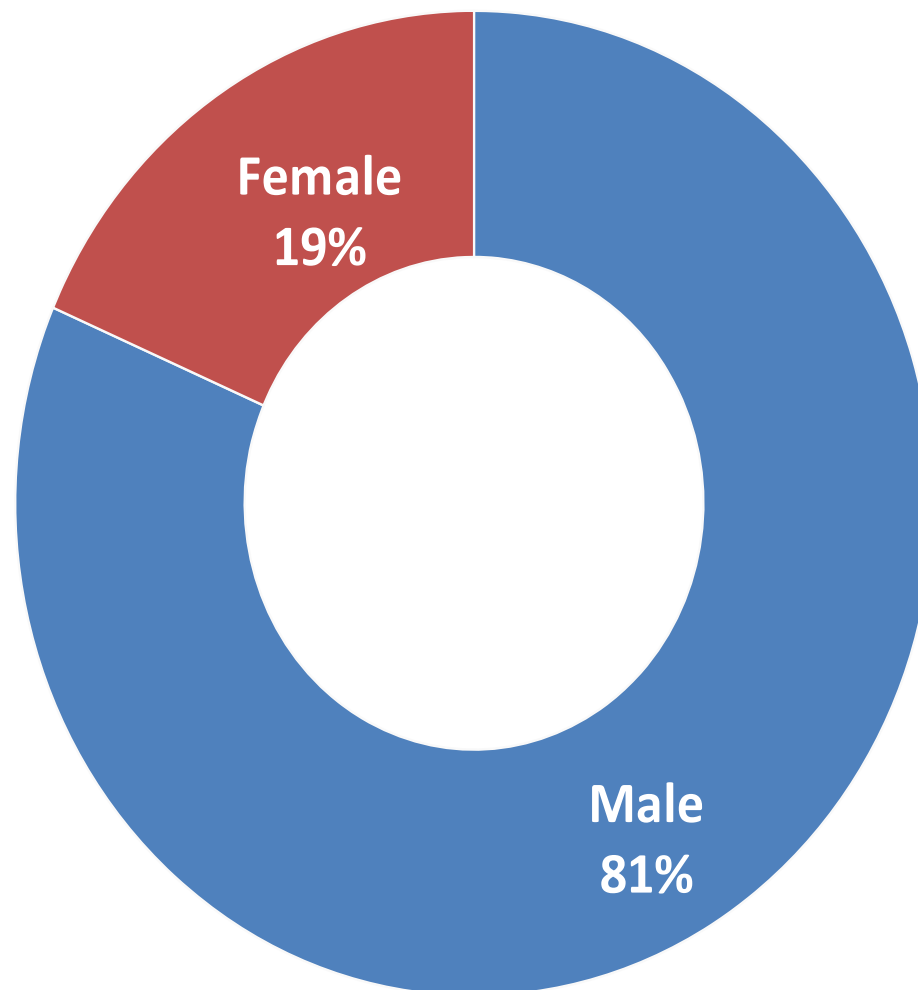


Mean (SD) of patients' age = 57 (10) years
Min, Max of age = 22, 95 years

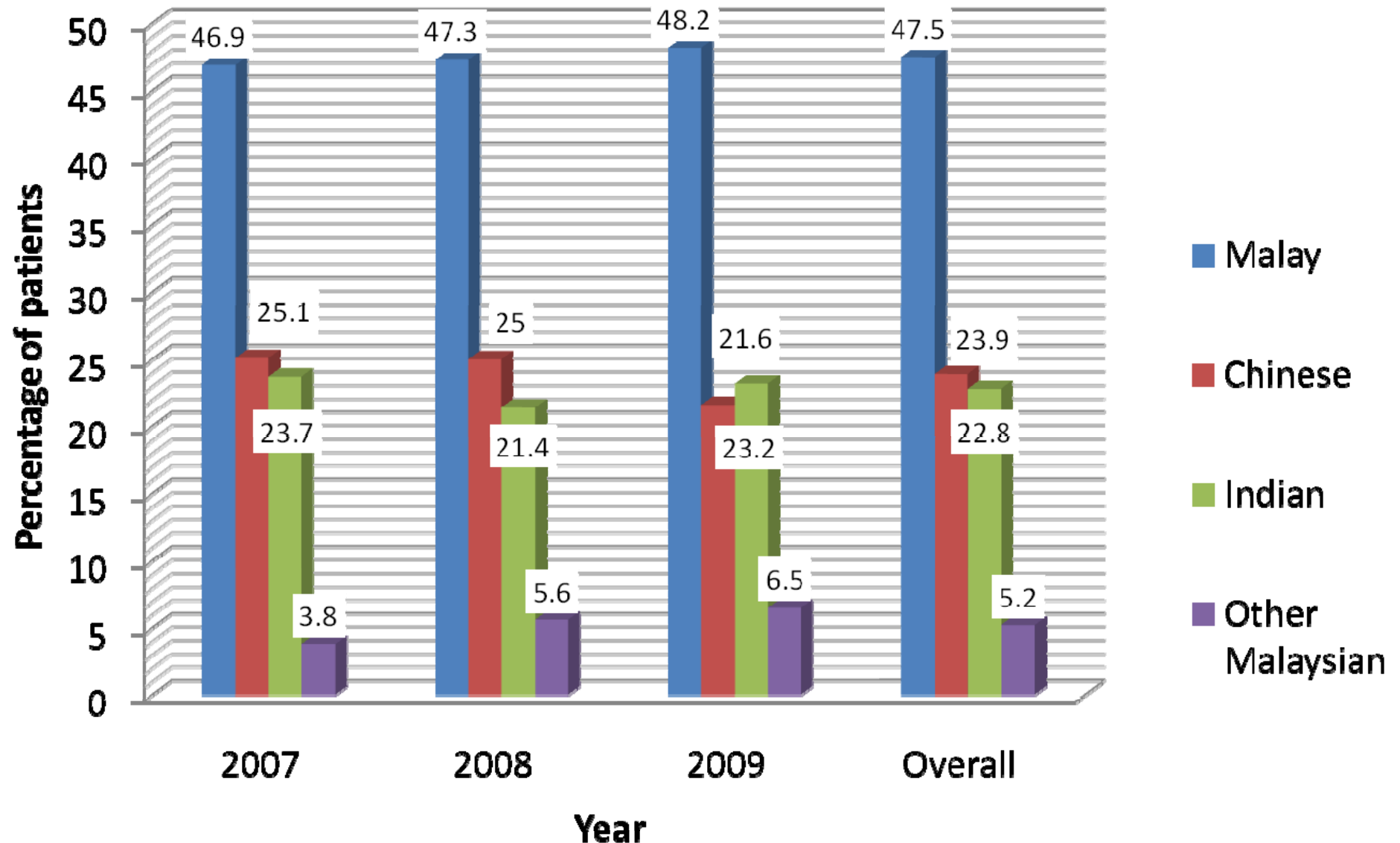
Percentage of patients who underwent PCI by Gender, NCVD PCI Registry, 2007-2009



Percentage of patients who underwent PCI by gender, NCVD PCI Registry, 2007-2009



Percentage of patients who underwent PCI by ethnic group, NCVD PCI Registry, 2007-2009



'Other Malaysian' includes Kadazan Dusun, Bidayuh, Bajau, Melanau, Murut, Iban & Punjabi



Previous Revascularization

| Previous revascularization (%) | 2007 (n=3618) | 2008 (n=3374) | 2009 (n=3610) | 2010 (n=4405) | 2011 (n=4679) | 2012 (n=5299) |
|--------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Previous PCI | 22.8 | 22.0 | 24.7 | 24.1 | 22.2 | 21.8 |
| Previous CABG | 3.6 | 4.7 | 3.9 | 4.9 | 3.5 | 3.7 |

Clinical Background and CV Risk Factors



| Medical history (%) | 2007 (n=3618) | 2008 (n=3374) | 2009 (n=3610) | 2010 (n=4405) | 2011 (n=4679) | 2012 (n=5299) |
|---------------------------------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Dyslipidaemia | 76.6 | 70.2 | 73.2 | 77.0 | 75.9 | 63.1 |
| Hypertension | 74.4 | 71.7 | 74.5 | 74.3 | 75.0 | 71.5 |
| Diabetes | 45.7 | 45.2 | 47.5 | 48.4 | 45.8 | 43.5 |
| Smoking status | | | | | | |
| Former (quit > 30 days) | 28.7 | 25.6 | 30.9 | 31.7 | 29.5 | 25.1 |
| Current (any tobacco use within last 30 days) | 15.9 | 20.2 | 19.8 | 20.2 | 22.1 | 24.4 |
| Family history of CVD | 16.4 | 15.1 | 25.4 | 19..1 | 15.5 | 12.8 |
| History of heart failure | 3.3 | 3.3 | 5.4 | 4.4 | 3.7 | 2.0 |
| Chronic renal failure (include all pts with creatinine >200micromol/l) | 5.9 | 6.2 | 7.7 | 6.9 | 5.5 | 4.2 |
| STEMI | - | - | - | 21.8 | 23.8 | 17.0 |

PCI status

| PCI status (%) | 2007 (n=3928) | 2008 (n=3654) | 2009 (n=3916) | 2010 (n=4405) | 2011 (n=4679) | 2012 (n=5299) |
|----------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Elective | 90.2 | 90.9 | 89.2 | 88.3 | 85.8 | 82.3 |
| NSTEMI/UA | 4.8 | 4.7 | 4.2 | 6.0 | 5.4 | 5.4 |
| AMI | 4.6 | 4.2 | 6.2 | 5.8 | 8.7 | 12.3 |
| Primary PCI | 4.6 | 4.2 | 6.2 | 2.6 | 2.1 | 3.5 |





Adjunctive Pharmacotherapy PCI

| Medication (%) | 2007 (n=3928) | 2008 (n=3654) | 2009 (n=3916) | 2010 (n=4405) | 2011 (n=4679) | 2012 (n=5299) | |
|-----------------------|------------------|------------------|------------------|------------------|------------------|------------------|---|
| Thrombolytics | 19.5 | 22.9 | 17.7 | 5.1 | 6.5 | 8.2 | ↓ |
| IIb/ IIIa Blockade | 6.0 | 6.0 | 6.0 | 3.4 | 4.1 | 3.7 | ↓ |
| Heparin | 90.0 | 89.0 | 96.0 | 98.6 | 97.7 | 97.7 | |
| LMWH | 5.0 | 4.0 | 4.0 | 2.3 | 2.5 | 2.8 | ↓ |
| Ticlopidine | 4.0 | 3.0 | 3.0 | 2.0 | 1.0 | 0.7 | ↓ |
| Aspirin | 95.0 | 97.0 | 98.0 | 96.3 | 98.5 | 98.3 | |
| Clopidogrel | 98.0 | 98.0 | 99.0 | 97.3 | 98.3 | 98.4 | |
| Fondaparinux | - | - | - | 2.2 | 3.4 | 4.9 | |



Percutaneous Entry

| Percutaneous entry (%) | 2007 (n=3928) | 2008 (n=3654) | 2009 (n=3916) | 2010 (n=4405) | 2011 (n=4679) | 2012 (n=5299) | |
|------------------------|------------------|------------------|------------------|------------------|------------------|------------------|---|
| Brachial | 1.0 | 1.0 | 1.0 | 0.5 | 0.4 | 0.5 | |
| Radial | 36.0 | 39.0 | 44.0 | 43.8 | 43.1 | 50.5 | ↑ |
| Femoral | 63.0 | 59.0 | 54.0 | 54.3 | 50.7 | 40.1 | |

Extent of Coronary Artery Disease

| Extent of coronary disease (%) | 2007 (n=3928) | 2008 (n=3654) | 2009 (n=3916) | 2010 (n=4405) | 2011 (n=4679) | 2012 (n=5299) |
|--------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Single vessel disease | 43.4 | 44.5 | 50.3 | 52.4 | 52.1 | 36.0 |
| Multiple vessel disease | 55.3 | 55.2 | 49.1 | 45.7 | 32.7 | 41.4 |
| Graft | 1.0 | 1.3 | 1.1 | 1.5 | 0.5 | 1.1 |



Lesion characteristics

| | 2007 (n=5455) | 2008 (n=4948) | 2009 (n=5139) | 2010 (n=6043) | 2011 (n=5901) | 2012 (n=6834) |
|--------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Lesion result (%) | | | | | | |
| Successful | 94 | 94 | 96 | 97 | 97 | 97 |
| Unsuccessful | 3 | 3 | 3 | 3 | 3 | 3 |
| Lesion type (%) | | | | | | |
| A | 11 | 12 | 14 | 11 | 10 | 9 |
| B1 | 23 | 26 | 31 | 28 | 26 | 22 |
| B2 | 19 | 21 | 27 | 26 | 29 | 20 |
| C | 45 | 36 | 26 | 35 | 29 | 47 |

67%



Lesion Description

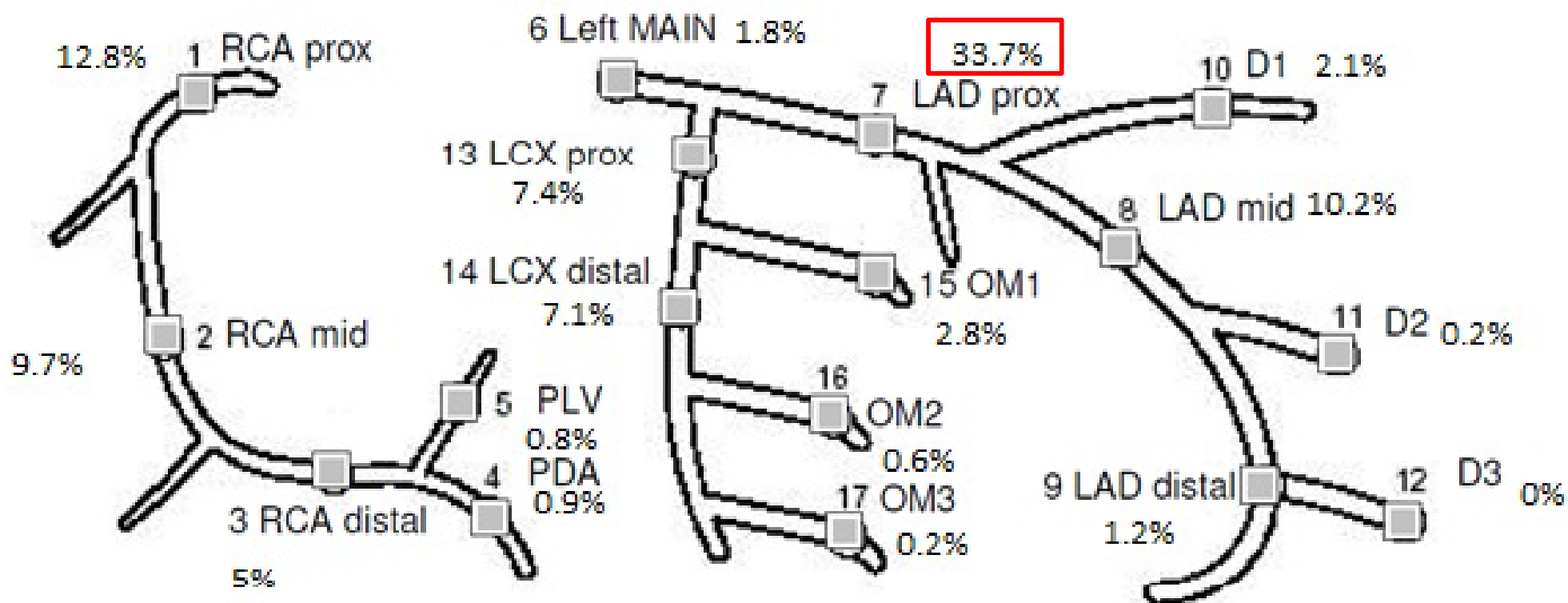
| Lesion description (%) | 2007 (n=5455) | 2008 (n=4948) | 2009 (n=5139) | 2010 (n=6043) | 2011 (n=5901) | 2012 (n=6834) |
|-------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Ostial | 7 | 6 | 8 | 8 | 7 | 5 |
| Bifurcation | 8 | 8 | 9 | 17 | 7 | 7 |
| Total occlusion (< 3 mo) | 3 | 3 | 2 | 6 | 7 | 6 |
| CTO > 3 mo | 8 | 7 | 7 | 8 | 9 | 6 |
| Thrombus | 3 | 3 | 4 | 3 | 3 | 3 |



Anatomical location of lesions, NCVD-PCI, 2007-2009

NATIVE

Coronary segment number, lesion codes 1-17



Summary of location of lesions treated with PCI, NCVD-PCI Registry, 2007-2012

| Location of lesion | 2007 (n=5455) | 2008 (n=4948) | 2009 (n=5139) | 2010 (n=6043) | 2011 (n=5901) | 2012 (n=6043) |
|--------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| LMS | 1.8 | 1.8 | 1.8 | 2.5 | 2.4 | 2.2 |
| LAD | 30.1 | 27.7 | 30.0 | 47.2 | 48.0 | 47.1 |
| RCA | 30.1 | 27.7 | 30.0 | 29.5 | 30.2 | 31.6 |
| LCx | 18.1 | 18.2 | 18.4 | 19.0 | 18.0 | 17.7 |
| Graft | 1.0 | 1.7 | 1.0 | 1.6 | 1.4 | 1.3 |



Intracoronary Devices Used

| Device (%) | 2007 (n=5455) | 2008 (n=4948) | 2009 (n=5139) | 2010 (n=6043) | 2011 (n=5901) | 2012 (n=6043) |
|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Balloon only | 8.0 | 8.0 | 8.0 | 8.0 | 6.0 | 5.0 |
| Drug Eluting Balloon | 0.05 | 1.0 | 2.0 | 6.0 | 6.0 | 7.0 |
| Cutting Balloon | 2.0 | 2.0 | 2.0 | 2.0 | 1.7 | 1.2 |
| IVUS | 2.0 | 5.0 | 4.0 | 4.0 | 3.3 | 2.5 |
| Rotablator | 1.0 | 1.0 | 1.0 | 1.1 | 0.9 | 0.7 |
| Drug Eluting Stent (DES) | 43.0 | 49.0 | 53.0 | 65.0 | 64.0 | 70.0 |
| Bare Metal Stent (BMS) | 43.0 | 35.0 | 33.0 | 21.0 | 21.0 | 17.0 |
| Distal Embolic Protection | 0.05 | 0.7 | 0.3 | 0.2 | 0.4 | 0.6 |

Procedure Characteristics

| | 2007 (n=5455) | 2008 (n=4948) | 2009 (n=5139) | 2010 (n=6043) | 2011 (n=5901) | 2012 (n=6043) |
|---------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Estimated lesion length (mm) | 24.4 (15.2) | 23.7 (14.4) | 22.4 (2.8) | 24.1 (15.7) | 23.9 (14.3) | 23.3 (14.0) |
| Stent length (mm) | 30.4 (17.6) | 29.2 (16.6) | 28.9 (16.7) | 23.2 (7.7) | 22.2 (7.7) | 22.8 (7.6) |
| Stent diameter (mm) | 3.1 (0.6) | 3.1 (0.6) | 3.1 (0.6) | 2.95 (0.5) | 2.95 (0.5) | 3.0 (1.6) |
| Maximum stent/balloon deploy pressure (atm) | 15.7 (3.7) | 15.8 (3.9) | 15.4 (4.0) | 15.7 (3.9) | 15.9 (4.2) | 15.7 (4.1) |
| Stents/ Lesion | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 |



Target vessel complications

| Type of complication (%) | 2007 (n=5455) | 2008 (n=4948) | 2009 (n=5139) | 2010 (n=6043) | 2011 (n=5901) | 2012 (n=6043) | |
|---------------------------|------------------|------------------|------------------|------------------|------------------|------------------|---|
| Acute closure | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.1 | ↓ |
| Dissection post-procedure | 4.0 | 4.0 | 5.0 | 4.0 | 1.6 | 1.0 | ↓ |
| Perforation | 0.3 | 0.3 | 0.4 | 0.4 | 0.2 | 0.1 | ↓ |
| Persistent no reflow | 1.0 | 1.0 | 1.0 | 0.9 | 0.8 | 0.1 | ↓ |

Procedural complications



| Complication (%) | 2007 (n=3928) | 2008 (n=3654) | 2009 (n=3916) | 2010 (n=4405) | 2011 (n=4679) | 2012 (n=5299) | |
|------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|---|
| Periprocedural major MI | 0.5 | 0.3 | 0.5 | 0.2 | 0.7 | 0.2 | ↓ |
| Emergency Re-intervention | 0.4 | 0.1 | 0.2 | 0.2 | 0.4 | 0.1 | ↓ |
| Bail-out CABG | 0.03 | 0.05 | 0.1 | - | - | - | ↓ |
| Cardiogenic shock (post procedure) | 0.5 | 0.7 | 0.5 | 0.2 | 0.3 | 0.3 | ↓ |
| Arrhythmia (VT/VF/Brady) | 0.5 | 0.8 | 0.4 | 0.4 | 0.4 | 0.6 | ↔ |
| TIA/ Stroke | 0.08 | 0.05 | 0.03 | - | - | 0.1 | ↔ |
| Tamponade | 0.1 | - | 0.05 | - | 0.1 | 0.2 | ↔ |
| Contrast reaction | 0.1 | 0.08 | 0.05 | - | - | 0.1 | ↔ |
| New renal impairment | 0.2 | 0.2 | 0.1 | - | 0.3 | 0.2 | ↔ |
| New onset/worsened heart failure | 0.2 | 0.03 | 0.08 | - | - | 0.1 | ↔ |

Patient Outcome



| Year | *Outcome (No., %) | Duration | | | |
|-----------------------------|--------------------------|-------------------|------------------|------------------|------------------|
| | | At discharge | 30-day** | 6-month** | 1 year** |
| 2007 (N=3618) | Death | 39 (1) | 46 (1) | 52 (1) | 61 (2) |
| | Alive | 3579 (99) | 1723 (48) | 1300 (36) | 1117 (31) |
| | Lost to Follow Up | - | 1849 (51) | 2266 (63) | 2440 (67) |
| 2008 (N=3374) | Death | 43 (1) | 53 (1) | 67 (2) | 76 (3) |
| | Alive | 3331 (99) | 2665 (79) | 1793 (53) | 1527 (45) |
| | Lost to Follow Up | - | 656 (20) | 1514 (45) | 1771 (52) |
| 2009+ (N=3610) | Death | 41 (1) | 57 (1) | 75 (3) | 84 (4) |
| | Alive | 3569 (99) | 3175 (88) | 2414 (67) | 1959 (55) |
| | Lost to Follow Up | - | 378 (11) | 1121 (31) | 1567 (43) |
| Overall (N=10602) | Death | 123 (1) | 156 (2) | 194 (2) | 221 (2) |
| | Alive | 10479 (99) | 7563 (71) | 5507 (52) | 4603 (43) |
| | Lost to Follow Up | - | 2883 (27) | 3781 (46) | 4212 (55) |

The outcome data is derived based on data matching with the National Death Register

** Including patients who died in hospital

+For year 2009, total for 6-month and 1-year follow up were based on cases registered in the database

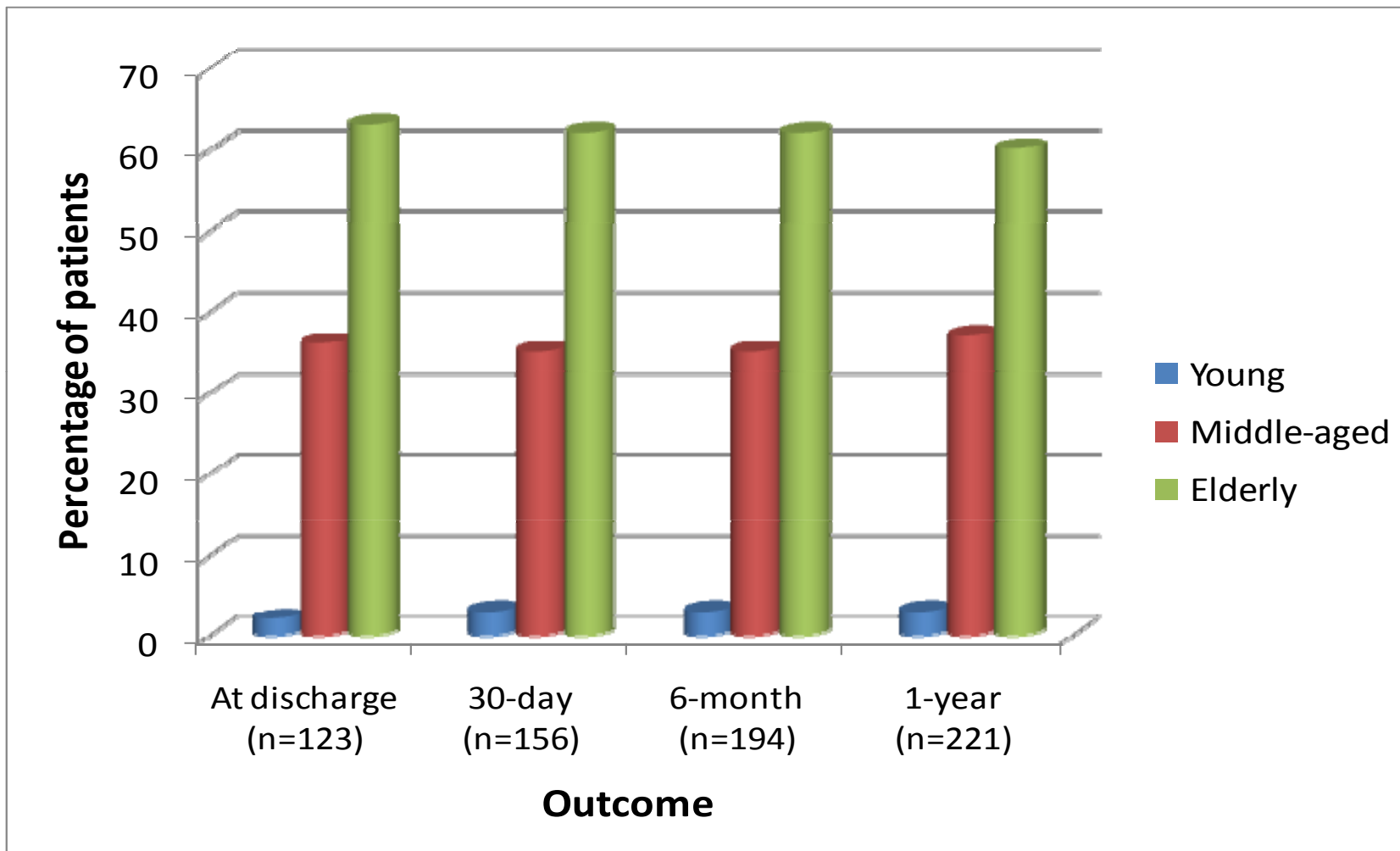
Patient Outcome

| Outcome at discharge, % | 2007* (n=3618) | 2008* (n=3374) | 2009* (n=3610) | 2010+ (n=4405) | 2011+ (n=4679) | 2012+ (n=5299) |
|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Alive | 99 | 99 | 99 | 99 | 97 | 97 |
| Death | 1 (n=39) | 1 (n=43) | 1 (n=41) | 1 (n=49) | 2 (n=92) | 2 (n=97) |

* Referred to the NCVD-PCI Registry Annual Report 2007-2009

* Based on real time data analysis

Percentage of death by age group, NCVD-PCI Registry, 2007-2009

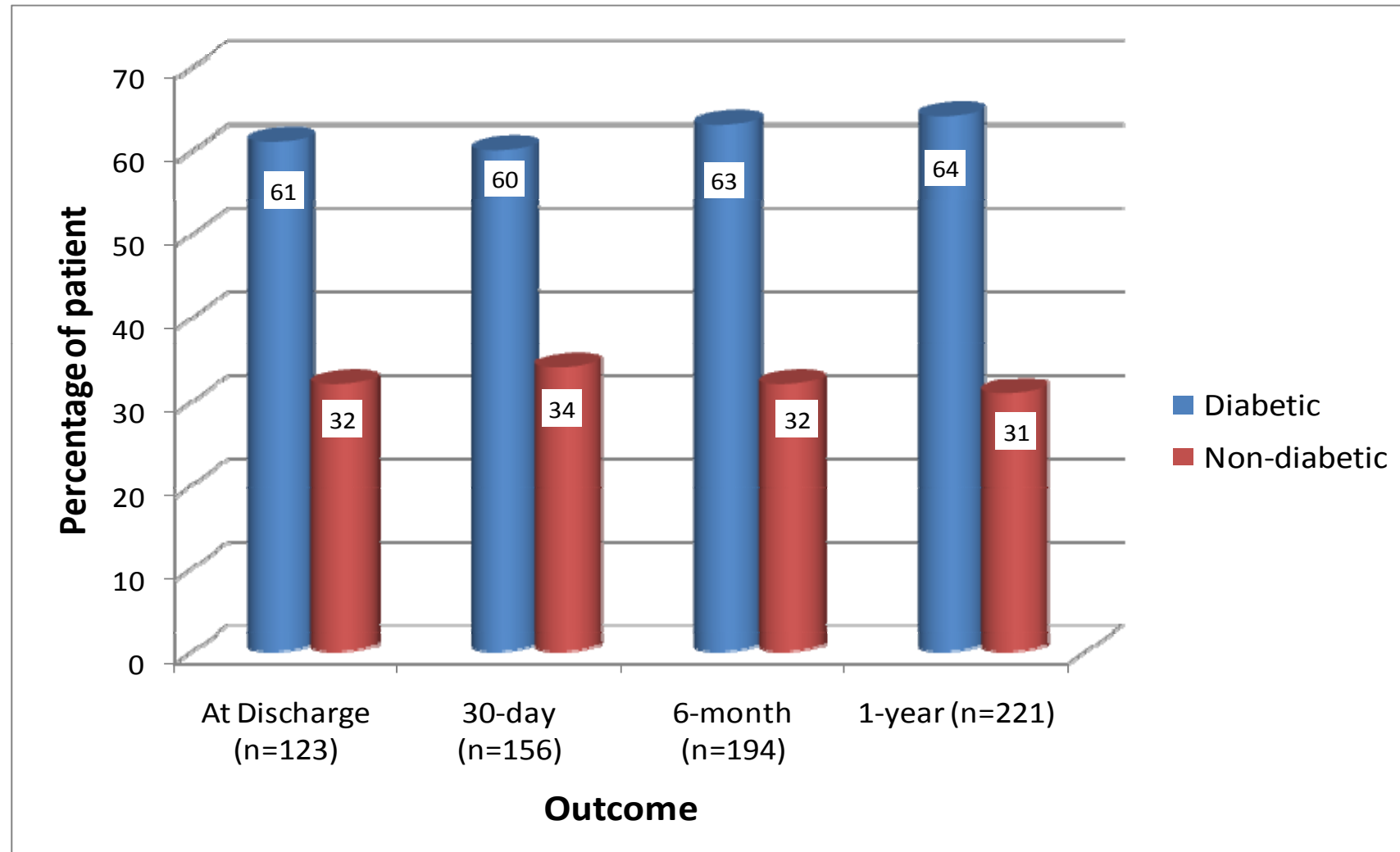


Note: The percentage of death reflect the cumulative deaths

Note: The outcome data has been derived based on data matching with National Death Register data

Note: 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

Percentage of death by diabetic status, NCVD-PCI Registry, 2007-2009



Note: The percentage of death reflect the cumulative deaths

Note: The outcome data has been derived based on data matching with National Death Register data

Gender difference,
NCVD-PCI 2007-2009

Differences in Mortality Following PCI, in Diabetics

| | Outcome, No. (%) | Outcome at discharge | | 30-day | | 6-month | | 12-months | |
|------|---------------------|----------------------|---------------|--------------|--------------|--------------|--------------|-------------|--------------|
| | | Diabetic | Non Diabetic | Diabetic | Non Diabetic | Diabetic | Non Diabetic | Diabetic | Non Diabetic |
| 2007 | Death | 22 (2) | 13 (1) | 26 (3) | 16 (2) | 30 (5) | 18 (2) | 35 (7) | 22 (3) |
| | Alive | 1632 (98) | 1878 (99) | 745 (96) | 944 (96) | 549 (93) | 721 (96) | 466 (91) | 628 (93) |
| | Lost to follow up | - | - | 24 (3) | 22 (2) | 10 (2) | 14 (2) | 12 (2) | 27 (4) |
| 2008 | Death | 22 (1) | 18 (1) | 27 (2) | 22 (1) | 38 (4) | 25 (2) | 44 (6) | 28 (3) |
| | Alive | 1502 (98) | 1764 (99) | 1192 (95) | 1423 (95) | 813 (90) | 943 (91) | 689 (90) | 801 (91) |
| | Lost to follow up | - | - | 38 (3) | 46 (4) | 51 (6) | 70 (7) | 45 (4) | 50 (6) |
| 2009 | Death | 31 (2) | 8 (0) | 40 (2) | 15 (1) | 54 (4) | 19 (1) | 63 (6) | 19 (2) |
| | Alive | 1685 (99) | 1806 (100) | 1527 (94) | 1597 (94) | 1172 (94) | 1224 (95) | 952 (92) | 1000 (95) |
| | Lost to follow up | - | - | 53 (4) | 93 (5) | 20 (2) | 44 (4) | 21 (2) | 39 (3) |

Higher in Diabetics