ANNUAL REPORT OF THE NCVD - PCI REGISTRY YEAR 2019 -2020

Editor : Dr. Wan Azman Wan Ahmad

MINISTRY OF HEALTH MALAYSIA

NATIONAL HEART ASSOCIATION OF MALAYSIA

NATIONAL CARDIOVASCULAR DISEASE DATABASE

(NCVD)

Annual Report of the Percutaneous Coronary Intervention (PCI) Registry

2019 – 2020

Editor:
Wan Azman Wan Ahmad

A publication of the
National Heart Association of Malaysia (NHAM) and the Ministry of Health Malaysia

June 2023

Publisher:
National Heart Association of Malaysia (NHAM)

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Suggested citation: W.A Wan Ahmad (Ed). Annual Report of the NCVD-PCI Registry, Year 2019-2020. Kuala Lumpur, Malaysia: National Cardiovascular Disease Database, 2023

Electronic version

The electronic version of this report may be downloaded at *www.malaysianheart.org*

Funding

The National Cardiovascular Disease Database (NCVD)-Percutaneous Coronary Intervention (PCI) Registry is funded with grants from the National Heart Association of Malaysia (NHAM) and the Ministry of Health Malaysia (MOH)

ISSN Number: ISSN 1394-0635

ACKNOWLEDGEMENTS

The National Cardiovascular Disease Database (NCVD)-Percutaneous Coronary Intervention (PCI) Registry would like to extend its grateful appreciation to everyone who had helped to make this report possible.

We would especially like to thank the following:

- National Heart Association of Malaysia (NHAM)
- NCVD-PCI Participating Hospitals
- Mr Ridwan Sanaudi, Biostatistics & Data Repository Sector, Office of NIH Manager, National Institute of Health
- National Registration Department (JPN)
- The members of the NCVD-PCI Writing committee

PREFACE

This is the 7th installment of the National Cardiovascular Disease, Percutaneous Coronary Intervention (NCVD-PCI) Report since the establishment of the Registry. This Report is unique as it was produced from data garnered over the COVID-19 pandemic. Written by a steadfast team led by Chief Editor, Prof Dr Wan Azman Wan Ahmad, we are privileged to have this Report finally see the light of day.

An increase in source data provider applicants for this NCVD-PCI Registry reflects both the utility and durability of this project. Since its conception in 2007, and with 15 years of data capture, the NCVD-PCI Registry provides much insight into the world of PCI in Malaysia. This Report not only focused on the 2019 and 2020 data, but also discussed the trends of the variables collected. The Registry has provided us with a wealth of knowledge, which I am sure will be presented in greater detail in each chapter of this Report.

On behalf of the Governance Board, I would like to thank all the contributors to this Registry, the doctors and allied health professionals who worked tirelessly for more than a decade, so we can continue to learn more about the practice of PCI and the evolution of care of our patients who had received PCI.

Finally, I would like to commend the tireless effort by the Writing Committee of this edition of the NCVD-PCI Registry, and the Steering Committee led by Dr Liew Houng Bang, for keeping this Registry going.

Thank you.

Dr. Alan Fong Yean Yip
Chairman,
NCVD Governance Board

FOREWORD

Greetings and Salam!

Seventeen years ago, on 9th August 2006, we started the national multicentre NCVD PCI registry. Today, we are proud to see this registry grown and continue to bear fruits!

The first three reports accumulated data of our PCI experience from 2007 to 2014; it included 38,595 patients, 41,997 procedures and 54,202 coronary lesions. From 2015–2016, we had 19,494 patients who underwent procedures and 14,815 (76%) patients with coronary lesions. In 2017–2018 report, it included 21,618 patients who underwent procedures, with 15,144 (70.1%) with coronary lesions.

This latest report (2019-2020) included 24,309 patients who underwent procedures, with 19,007 (78.2%) with coronary lesions.

We hope the registry provides a "real-world" database of contemporary PCI practice in Malaysia. The registry is a guide to evaluate PCI outcomes based on selected performance measures; to determine the cost-effectiveness of PCI, and to determine the level of adherence to practice guidelines. The registry is also a platform to stimulate research; to facilitate quality improvement activities; to act as a reference for future studies; to facilitate research and development; and to benchmark with other national/regional PCI registries such as ASPECT, ASEAN.

With commitment and teamwork, much has been achieved. However, much remains to be done. The way forward is to go beyond "output" to "outcome", and beyond "quantity" to "quality". With the sizeable number of cases reported, we may now embark on more analysis on trends and subgroups, to determine the factors that contribute to procedural success and long-term patient-centred outcomes. To this end, we may embark in appraising our practice by referring to both clinical practice guidelines and appropriateness use criteria.

Beyond its value in improving healthcare service, our registry has proven to be a platform for registry-based randomised controlled trials and post-marketing surveillance as required by the recent regulations for medical devices. This is integral in the ever-changing field of interventional cardiology.

The way forward for the coming decades will depend on the continuous commitment and support in leadership and funding from NHAM. The machinery of the NCVD registry lies with each of us. The NCVD-PCI registry will continue to be a voluntary collaborative group, with shared ownership. Participating sites will continue to have free access to their 'own' institutional database to facilitate local quality-assurance activities.

We will continue to uphold the 'code of honor': Together, everyone achieves more.

Happy Reading. We welcome feedback and comments.

Dr Liew Houng Bang
Chairman,
NCVD-Percutaneous Coronary Intervention (PCI) Registry

NOTE FROM THE WRITING COMMITTEE CHAIRMAN

The National Cardiovascular Disease Database (NCVD): Annual report of the NCVD-Percutaneous Coronary Intervention (PCI) registry year 2019–2020 is the registry's 7th report. For this report, we had 25 source data providers (SDPs), which was an increase of five SDPs from the 2017–2018 report. Of all the 25 source data providers, 12 were from private hospitals, ten were from the Ministry of Health hospitals and three were from the ministry of Higher Education hospitals. Currently, we have 14 years of analysed data from 104,016 patients, and 114,231 PCI procedures.

There has been an increase in the number of patients undergoing PCIs for the years 2019 and 2020 (n = 24,309), compared to 2017–2018 (n = 21,618). The following are the highlights from the findings of this report:

- Our patients who underwent PCI were young with a mean age of 57.8 years (SD 10.9 years), similar to the previous cohort.

- The number of females undergoing PCI remained relatively low (17.4% vs. 82.6%).

- Conventional risk factors remained highly prevalent. Of these, 82.5% of patients were overweight/obese (BMI >23 kg/m^2), 66.3% had hypertension, 54.8% had dyslipidaemia, 48.0% were current or former smoker, and 44.0% had diabetes.

- About 1.0% of patients undergoing PCI had concomitant atrial fibrillation which was much lower compared to other registries.

- Only 13.7% of patients had functional ischaemic testing with either treadmill test or myocardial perfusion scan prior to PCI.

- The mean glomerular filtration rate (GFR) was 75.7 mL/min/1.73m^2 (SD 26.3 mL/min/1.73m^2). About 10.9% of patients who underwent PCI had GFR < 45 ml/min/1.73m^2.

- There was a reduction of 12.5% of primary PCI for STEMI compared to the 2017–2018 cohort; this was attributed to the COVID-19 pandemic that limited the accessibility to primary PCI and therefore more thrombolysis were used.

- For transferred patients from non-PCI centres, only 36.2% of them were able to achieve first door-to-balloon (DTB) time <120 minutes, which was lower than the 2017–2018 cohort (45.8%).

- For patients presenting to the PCI centre, 60.2% of them were able to achieve DTB time <90 minutes, which was also lower than the 2017–2018 cohort (64.4%).

- There were increased numbers in delayed routine PCIs, rescue PCIs and pharmaco-invasive PCIs in the 2019–2020 compared to the 2017–2018 cohort.

- There were further increases in PCI via trans-radial approach compared to the previous cohort (78.3% vs. 77.8%) irrespective of the type of PCI – elective or in response to an ACS event.

- There was an increase of 10.4% in the use of ticagrelor as an alternative P2Y12-receptor inhibitor.

- De novo lesions (95.0 %) were the major lesion treated and complex lesion (type B2 and C) were 57.6% of all PCI cases, almost similar to the previous cohort.

- Drug eluting stent (DES) used in 75.5% of cases remained the mainstay of treatment. There was significantly increased use of drug coated balloon (DCB), 21.3% vs. 14.3% which was reported in the previous cohort.

- Only 4.2% of lesions were in-stent restenosis (ISR). Most of the ISR lesions were treated with DCB (72.1%).

- Left main stem (LMS) intervention continued to increase compared to the previous cohort (N=1,631 vs. 1,205) with high procedural success rate (97.7%).

- Graft PCI was uncommon (0.4%). Vein grafts remained the most commonly treated lesion (82.9%).

- PCI to chronic total occlusion (CTO) >3 months constituted 6.0% of all lesions treated with a success rate of 78.3%.

- Overall, the use of intracoronary imaging such as IVUS and OCT were still low at 4.9% and 0.5%, respectively.

- Despite more complex PCI being performed, peri-procedural complications were low (0.0-0.5%).

- In-hospital, 30 days, 6 months and one year mortality rates were 1.4%, 2.4%, 4.6% and 6.6%, respectively. Mortality rates were almost similar to the previous cohort (2017–2018).

- Prognostic factors for in-hospital mortality were STEMI PCI, Killip III/IV, low ejection fraction and serum creatinine >200 umol/L. Age, diabetes mellitus status, Killip III/IV, serum creatinine >200 umol/L, heart rate ≥80 beats/min and left ventricular ejection fraction ≤ 50 were prognostic factors at 6 months and 1 year. Killip III/IV and serum creatinine >200 umol/L were prognostic factors at 30 days and 6 months. Heart rate >100 beats/min had significant impact on outcome at 30 days, 6 months and 1 year.

As the registry spans over a period of 16 years, we need new champions to bring the NCVD-PCI registry to the next level for it to continue to be relevant in guiding our clinical practice. I would like to thank all the writing committee members for their commitment and contribution in producing this report.

Last but not least, I would like to thank all the Principal Investigators (PIs), Co-PIs, as well as study coordinators for your perseverance and support all these years. Special gratitude and appreciation to Miss Gunavathy Selvaraj, Mr Liu Kien Ting (statistician) and Miss Noor Amirah Muhamad, for making this report possible.

Yours sincerely,

Prof Dr Wan Azman Wan Ahmad
Chairman,
NCVD Writing Committee

ABBREVIATIONS

ACE	Angiotensin Converting Enzyme
ACS	Acute Coronary Syndrome
BMI	Body Mass Index
CABG	Coronary Artery Bypass Graft
CAD	Coronary Artery Disease
CCU	Coronary Care Unit
CK	Creatinine Kinase
CK-MB	Creatinine Kinase, MB Isoenzyme
CRC	Clinical Research Centre
CRF	Case Report Form
CVD	Cardiovascular Disease
DBMS	Database Management System
EDC	Electronic Data Capture
GP	Glycoprotein
HDL	High Density Lipoprotein
HDU	High Dependency Unit
HIC	Health Informatics Centre
ICT	Information and Communication Technology
ICU	Intensive Care Unit
IJN	Institut Jantung Negara
IT/IS	Information Technology and Information System
JPN	Jabatan Pendaftaran Negara
LDL	Low Density Lipoprotein
LVEF	Left Ventricular Ejection Fraction
MOH	Ministry of Health
NCVD	National Cardiovascular Disease Database
NHAM	National Heart Association of Malaysia
NSTEMI	Non ST- Elevation Myocardial Infarction
PMP	Per Million Population
RCC	Registry Coordinating Centre
SAP	Statistical Analysis Plan
SD	Standard Deviation
SDP	Source Data Provider
STEMI	ST– Elevation Myocardial Infarction
TIMI	Thrombolysis In Myocardial Infarction
TnI	Troponin I
TnT	Troponin T
TT	Transfer Time
UA	Unstable Angina

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PATIENT CHARACTERISTICS

Koh Keng Tat, Alan Fong Yean Yip and Ong Tiong Kiam
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Summary:

1. There has been a progressive increase in angioplasty cases throughout the years despite the COVID-19 pandemic.

2. Mean age of patients were 57.8 years; similar to the previous cohort.

3. Female gender was 17.4% of the total angioplasty cohort; similar to the previous cohort and remained under-represented.

4. Obesity was present in 82.5% of the patients and was the most prevalent cardiovascular risk factor.

This chapter summarises the demographics, risk factors, and other characteristics of patients who underwent PCI from 2019–2020.

There was an increase in the number of patients undergoing PCI for the years 2019 and 2020 (n=24,309) [Table 1.1]; with data captured from 25 source data providers (SDPs) for 2019–2020, compared to 20 for 2017–2018. [Table 1.3.1] Of all the 25 source data providers, 12 were from private hospitals, ten were from the Ministry of Health public hospitals and three were from the Ministry of Education hospitals and institutions. Majority (90.1%) of patients had one procedure done with the rest having two or more, bringing the total number of procedures to 26,967 in 2019–2020. [Table 1.2] Of all the 26,967 reported procedures, 67.5% were done in the Ministry of Health (MOH) public hospitals, 21.9% in the private hospitals, and 10.7% in the Ministry of Education hospitals and institutions. [Table 1.3.2]

The mean age of patients undergoing PCI in 2019–2020 was 57.8 years (SD 10.9 years), with 82.6% of them being male. Approximately 24.1% of them were under the age of 50 years, with the largest group being in the 50–60 years age group. [Table 1.1] Majority of females undergoing PCI were from the 60–70 years age group. [Table 1.4.1] These were similar to the previous cohort (2017–2018). Amongst males, 30.0% of Malays, 16.7% of Chinese and 24.5% of Indians were below 50 years of age; whilst among the females, 16.4% Malays, 7.8% Chinese and 13.4 % Indians were less than 50 years of age. [Table 1.4.2] These rates were comparable to the previous cohort.

The main ethnic groups undergoing PCI during 2019–2020 were Malays (49.9%), Chinese (23.2%), Indian (18.6%), Iban (2.7%) and Kadazan Dusun (1.1%). [Table 1.1]

The prevalence of cardiovascular risk factors was similar to the previous years with 96.3% of patients having at least one risk factors. [Table 1.5.1] However, there were more patients (33.6%) having ≥3 risk factors compared to 2017–2018 (30.9%). [Table 1.5.1] The mean body mass index was 27.0 kg/m^2 (SD 4.7 kg/m^2), similar to the previous cohort. The prevalence of pre-morbid established cardiovascular risk factors was similar between the 2017–2018 period and the 2019–2020 period. Of these, 82.5% was overweight/obese (BMI ≥23 kg/m^2), 66.3% had hypertension, 54.8% had dyslipidaemia, 50.1% was current or former smoker, 44.0% had diabetes and 12.8% had family history of premature cardiovascular disease. [Table 1.1]

There was an increase in the incident of documented coronary artery disease (45.8%) in 2019–2020 compared to the previous cohort (38.7%). There were more patients presented with new onset angina (37.4%) compared to the period of 2017–2018 (31.4%). The incident of history of myocardial infarction (38.1%), congestive heart failure

(4.7%), cerebrovascular disease (2.1%), peripheral vascular disease (0.5%), chronic renal failure (5.4%), previous PCI (21.2%) and previous CABG (1.7%) were similar between the period of 2019–2020 and 2017–2018. [Table 1.1]

Discussion

Despite the outbreak of COVID-19 pandemic in the late 2019, the number of patients and reported angioplasty cases increased progressively in the 2019–2020 period compared to the previous years. This was probably attributed to the increase in the number of reporting centres (5 new private hospitals) and patient load and angioplasty volume in the MOH public hospitals. [Table 1.2] The Japanese Nationwide PCI (J-PCI) Registry reported a slight decrease in patients from 257,492 patients in 2018 to 253,228 patients in 2019.[1]

The mean age of the NCVD-PCI cohort was 57.6 years, younger than the J-PCI Registry in 2019 (71.0 years).[1]

Ischaemic heart diseases remained as the principal causes of death, 17.0% of the 109,155 medically certified deaths in 2020 and 15.0% in 2019.[2] Ischaemic heart diseases remained as the principal causes of death for males at 19.3% of the 65,918 medically certified deaths in 2020. For females, ischaemic heart diseases became the principal causes of death at 13.4% of the 43,237 medical certified deaths in 2020. Ischaemic heart diseases as cause of death was higher in males (male:female ratio of 1.5:1). The 2019–2020 NCVD-PCI reported a 17.2% of female patients in the total angioplasty cohort, unchanged since 2013. The disproportionately lower number of female patients in the NCVD-PCI cohort highlight the observation that female patients remained underrepresented in the NCVD-PCI registry.

The National Health and Morbidity Survey (NHMS) 2019 found that the prevalence of current smoker was 21.3% with the use of e-cigarettes at 4.9%. The prevalence of overall raised glucose in Malaysia in 2019 was 18.3%, with varying rates according to states, from 9.8% to 33.2%. Most importantly, 50.1% of adults in Malaysia were overweight or obese.[3] The prevalence of adults who are physically inactive was 25.1%. Malaysia has the highest number of obese populations in Southeast Asia.[4] The NCVD-PCI 2019–2020 registry showed that obesity was present in 82.3% of the patients and was the most prevalent cardiovascular risk factor.

More patients (33.6%) having ≥3 risk factors compared to 2017–2018 (30.9%) despite public health measures to combat non-communicable diseases in Malaysia.[5]

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Table 1.1 Characteristics of patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
Demographics				
Age, Years				
N	21,618	12,885	11,424	24,309
Mean (SD)	57.8 (10.7)	57.8 (10.9)	57.7 (11.0)	57.8 (10.9)
Median (Min, Max)	58.0 (20.9, 97.9)	58.2 (20.3, 94.1)	58.1 (20.8, 100.4)	58.2 (20.3, 100.4)
Age group, No. (%)				
20–<30	115 (0.5)	72 (0.6)	60 (0.5)	132 (0.5)
30–<40	1,131 (5.2)	683 (5.3)	666 (5.8)	1,349 (5.6)
40–<50	3,722 (17.2)	2,323 (18.0)	2,056 (18.0)	4,379 (18.0)
50–<60	7,454 (34.5)	4,239 (32.9)	3,712 (32.5)	7,951 (32.7)
60–<70	6,523 (30.2)	3,848 (29.9)	3,428 (30.0)	7,276 (29.9)
70–<80	2,375 (11.0)	1,521 (11.8)	1,324 (11.6)	2,845 (11.7)
≥80	298 (1.4)	199 (1.5)	178 (1.6)	377 (1.6)
Gender, No. (%)				
Male	17,933 (83.0)	10,634 (82.5)	9,443 (82.7)	20,077 (82.6)
Female	3,685 (17.1)	2,251 (17.5)	1,981 (17.3)	4,232 (17.4)
Ethnic group, No. (%)				
Malay	11,165 (51.7)	6,342 (49.2)	5,791 (50.7)	12,133 (49.9)
Chinese	4,504 (20.8)	3,037 (23.6)	2,593 (22.7)	5,630 (23.2)
Indian	4,085 (18.9)	2,370 (18.4)	2,150 (18.8)	4,520 (18.6)
Iban	467 (2.2)	317 (2.5)	328 (2.9)	645 (2.7)
Kadazan Dusun	283 (1.3)	160 (1.2)	106 (0.9)	266 (1.1)
Orang Asli	11 (0.1)	8 (0.1)	8 (0.1)	16 (0.1)
Melanau	21 (0.1)	18 (0.1)	8 (0.1)	26 (0.1)
Murut	35 (0.2)	20 (0.2)	15 (0.1)	35 (0.1)
Bajau	189 (0.9)	104 (0.8)	64 (0.6)	168 (0.7)
Bidayuh	111 (0.5)	80 (0.6)	79 (0.7)	159 (0.7)
Punjabi	97 (0.5)	50 (0.4)	44 (0.4)	94 (0.4)
Other Malaysian	437 (2)	220 (1.7)	143 91.3)	363 (1.5)
Foreigner	213 (1)	159 (1.2)	95 (0.8)	254 (1.0)
Other coronary risk factors				
Smoking, No. (%)				
Never	6,746 (31.2)	4,486 (34.8)	4,061 (35.6)	8,547 (35.2)
Former (quit>30 days)	4,707 (21.8)	2,701 (21.0)	2,675 (23.4)	5,376 (22.1)
Current (any tobacco uses within last 30 days)	5,487 (25.4)	3,240 (25.2)	3,050 (26.7)	6,290 (25.9)
Not available	4,678 (21.6)	2,458 (19.1)	1,638 (14.3)	4,096 (16.9)

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
Family history of premature cardiovascular disease, No. (%)				
Yes	2,402 (11.1)	1,573 (12.2)	1,540 (13.5)	3,113 (12.8)
No	16,674 (77.1)	9,562 (74.2)	8,193 (71.7)	17,755 (73.0)
Not known	2,542 (11.8)	1,750 (13.6)	1,691 (14.8)	3,441 (14.2)
Body mass index (BMI), kgm^{-2}				
N	16,406	9,181	8,963	18,144
Mean (SD)	26.9 (4.6)	27.0 (4.6)	27.1 (4.7)	27.0 (4.7)
Median (min, max)	26.4 (14.3, 49.9)	26.4 (14.3, 49.9)	26.5 (14.5, 49.9)	26.4 (14.3, 49.9)
Not available, No. (%)	1,923 (8.9)	2,167 (16.8)	1,393 (12.2)	3,560 (14.6)
Missing, No. (%)	3,289 (15.2)	1,537 (11.9)	1,068 (9.4)	2,605 (10.7)
BMI, kg/m^2, No. (%)				
<18.5	253 (1.5)	139 (1.5)	117 (1.3)	256 (1.4)
18.5–23	2,718 (16.6)	1,503 (16.4)	1,426 (15.9)	2,929 (16.1)
>23–<25	3,103 (18.9)	1,699 (18.5)	1,659 (18.5)	3,358 (18.5)
25–<30	6,775 (41.3)	3,777 (41.1)	3,688 (41.2)	7,465 (41.1)
30–<35	2,691 (16.4)	1,543 (16.8)	1,553 (17.3)	3,096 (17.1)
35–<40	673 (4.1)	400 (4.4)	392 (4.4)	792 (4.4)
≥40	193 (1.2)	120 (1.3)	128 (1.4)	248 (1.4)
Not available	1,923	2,167	1,393	3,560
Missing	3,289	1,537	1,068	2,605
Co-morbidities				
Dyslipidaemia, No. (%)				
Yes	10,546 (48.8)	6,685 (51.9)	6,628 (58.0)	13,313 (54.8)
No	9,632 (44.6)	5,339 (41.4)	3,987 (34.9)	9,326 (38.3)
Not known	1,440 (6.7)	861 (6.7)	809 (7.1)	1,670 (6.9)
Hypertension, No. (%)				
Yes	13,766 (63.7)	8,418 (65.3)	7,707 (67.5)	16,125 (66.3)
No	6,872 (31.8)	3,850 (29.9)	3,167 (27.7)	7,017 (28.9)
Not known	980 (4.5)	617 (4.8)	550 (4.8)	1,167 (4.8)
Diabetes, No. (%)				
Yes	9,323 (43.1)	5,658 (43.9)	5,045 (44.2)	10,703 (44.0)
No	11,143 (51.6)	6,526 (50.7)	5,686 (49.8)	12,212 (50.2)
Not known	1,152 (5.3)	701 (5.4)	693 (6.1)	1,394 (5.7)

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
Type of diabetes treatment, No. (%)				
Total no. of patients who had diabetes, N	N=9,323	N=5,658	N=5,045	N=10,703
OHA	4,665 (65.9)	2,897 (66.7)	2,858 (70.5)	5,755 (68.5)
Insulin	1,033 (14.6)	614 (14.1)	520 (12.8)	1,134 (13.5)
OHA + Insulin	911 (12.9)	546 (12.6)	453 (11.2)	999 (11.9)
Non-pharmacology therapy	468 (6.6)	288 (6.6)	221 (5.5)	509 (6.1)
Missing	2,246	1,313	993	2,306
Myocardial infarction history, No. (%)				
Yes	7,781 (36.0)	4,762 (37.0)	4,488 (39.3)	9,250 (38.1)
No	12,785 (59.1)	7,607 (59.0)	6,315 (55.3)	13,922 (57.3)
Not known	1,052 (4.9)	516 (4.0)	621 (5.4)	1,137 (4.7)
Documented coronary artery disease, No. (%)				
Yes	8,375 (38.7)	5,678 (44.1)	5,445 (47.7)	11,123 (45.8)
No	12,293 (56.9)	6,720 (52.2)	5,529 (48.4)	12,249 (50.4)
Not known	950 (4.4)	487 (3.8)	450 (3.9)	937 (3.9)
New onset angina (<2 weeks), No. (%)				
Yes	6,785 (31.4)	4,602 (35.7)	4,477 (39.2)	9,079 (37.4)
No	14,081 (65.1)	7,832 (60.8)	6,510 (57.0)	14,342 (59.0)
Not known	752 (3.5)	451 (3.5)	437 (3.8)	888 (3.7)
Congestive heart failure (2 weeks prior), No. (%)				
Yes	866 (4.0)	505 (3.9)	638 (5.6)	1,143 (4.7)
No	19,829 (91.7)	11,852 (92.0)	10,241 (89.6)	22,093 (90.9)
Not known	923 (4.3)	528 (4.1)	545 (4.8)	1,073 (4.4)
Cerebrovascular disease, No. (%)				
Yes	469 (2.2)	280 (2.2)	222 (1.9)	502 (2.1)
No	20,263 (93.7)	12,075 (93.7)	10,658 (93.3)	22,733 (93.5)
Not known	886 (4.1)	530 (4.1)	544 (4.8)	1,073 (4.4)
Peripheral vascular disease, No. (%)				
Yes	83 (0.4)	57 (0.4)	56 (0.5)	113 (0.5)
No	20,646 (95.5)	12,296 (95.4)	10,820 (94.7)	23,116 (95.1)
Not known	889 (4.1)	532 (4.1)	548 (4.8)	1,080 (4.4)
Chronic renal failure (>200 micromol), No. (%)				
Yes	1,042 (4.8)	669 (5.2)	648 (5.7)	1,317 (5.4)
No	19,694 (91.1)	11,721 (91.0)	10,276 (90.0)	21,997 (90.5)
Not known	882 (4.1)	495 (3.8)	500 (4.4)	995 (4.1)

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
Dialysis	N=1,042	N=669	N=648	N=1,317
Yes	566 (54.4)	388 (58.0)	379 (58.5)	767 (58.2)
No	475 (45.6)	281 (42.0)	269 (41.5)	550 (41.8)
Missing	1	0	0	0
*Coronary artery disease, No. (%)				
Yes	15,144 (70.1)	9,771 (75.8)	9,236 (80.9)	19,007 (78.2)
No	5,778 (26.7)	2,792 (21.7)	1,812 (15.9)	4,604 (18.9)
Not known	696 (3.2)	322 (2.5)	376 (3.3)	698 (2.9)
Baseline investigation				
Baseline creatinine, mmol/L				
N	17,860	9,855	9,374	19,229
Mean (SD)	117.1 (125.0)	118.2 (127.8)	120.0 (133.3)	119.1 (130.5)
Median (min, max)	90.0 (44.0, 1,791.0)	90.0 (44.0, 1,638.0)	91.0 (44.0, 1,768.0)	91.0 (44.0, 1,768.0)
Not available, No. (%)	1,897 (8.8)	1,470 (11.4)	892 (7.8)	2,362 (9.7)
Missing, No. (%)	1,861 (8.6)	1,560 (12.1)	1,158 (10.1)	2,718 (11.2)
Baseline creatinine, mmol/L, No. (%)				
<100	11,687 (65.4)	6,421 (65.2)	6,027 (64.3)	12,448 (64.7)
100–199	5,209 (29.2)	2,907 (29.5)	2,845 (30.4)	5,752 (29.9)
≥200	964 (5.4)	527 (5.4)	502 (5.4)	1,029 (5.4)
Not available	1,897	1,470	892	2,362
Missing	1,861	1,560	1,158	2,718
**Glomerular filtration rate (GFR), MDRD				
N	15,817	9,891	9,394	19,285
Mean (SD)	77.0 (26.5)	76.3 (26.4)	75.5 (26.0)	75.9 (26.2)
Median (min, max)	78.4 (2.4, 193.5)	77.8 (2.9, 198.9)	77.0 (2.7, 197.2)	77.4 (2.7, 198.9)
Missing, No. (%)	5,801 (26.8)	2,994 (23.2)	2,030 (17.8)	5,024 (20.7)
**Glomerular filtration rate (GFR), MDRD, No. (%)				
<15	565 (3.6)	377 (3.8)	362 (3.9)	739 (3.8)
15–<30	287 (1.8)	180 (1.8)	158 (1.7)	338 (1.8)
30–<45	737 (4.7)	498 (5.0)	472 (5.0)	970 (5.0)
45–<60	1,878 (11.9)	1,149 (11.6)	1,149 (12.2)	2,298 (11.9)
≥60	12,350 (78.1)	7,687 (77.7)	7,253 (77.2)	14,940 (77.5)
Missing	5,801	2,994	2,030	5,024

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
***Total cholesterol, mmol/L				
Total no. of patients who had documented coronary artery disease	3,576	2,342	2,520	4,862
N	4.4 (1.4)	4.4 (1.4)	4.5 (1.4)	4.4 (1.4)
Mean (SD)	4.2 (2.0, 17.5)	4.1 (2.0, 14.5)	4.2 (2.1, 14.3)	4.2 (2.0, 14.5)
Median (min, max)	2,799 (33.4)	1,880 (33.1)	1,558 (28.6)	3,438 (30.9)
Not available, No. (%)	2,000 (23.9)	1,456 (25.6)	1,367 (25.1)	2,823 (25.4)
Missing, No. (%)	3,576	2,342	2,520	4,862
***LDL levels, mmol/L				
Total no. of patients who had documented coronary artery disease	3,413	2,171	2,366	4,537
N	2.6 (1.2)	2.5 (1.3)	2.6 (1.2)	2.6 (1.3)
Mean (SD)	2.4 (0.7, 19.0)	2.2 (0.7, 20.0)	2.3 (0.8, 20.0)	2.3 (0.7, 20.0)
Median (min, max)	2,818 (33.4)	1,947 (34.3)	1,609 (29.6)	3,556 (32.0)
Not available, No. (%)	2,144 (25.6)	1,560 (27.5)	1,470 (27.0)	3,030 (27.2)
Missing, No. (%)	3,413	2,171	2,366	4,537
Previous intervention				
Previous PCI, No. (%)				
Yes	3,830 (17.7)	2,509 (19.5)	2,644 (23.1)	5,153 (21.2)
No	17,788 (82.3)	10,376 (80.5)	8,780 (76.9)	19,156 (78.8)
Previous CABG, No. (%)				
Yes	407 (1.9)	222 (1.7)	189 (1.7)	411 (1.7)
No	21,211 (98.1)	12,663 (98.3)	11,235 (98.4)	23,898 (98.3)

**Coronary artery disease was defined as "Yes" on any of the following co-morbidities: 1) History of myocardial infarction, 2) Documented CAD >50% stenosis, 3) New onset angina (less than 2 weeks)*
***Glomerular filtration rate was calculated based on MDRD formula*
****Mean (SD) of Total Cholesterol, mmol/L and LDL levels, mmol/L is of the patients who had documented coronary artery disease*
Note: Not known in coronary artery disease includes patients who do not know their co-morbidities as well as missing data

Table 1.2 Distribution of patients by number of procedures, NCVD-PCI Registry, 2019–2020

No. of procedures	Total no. of patients from 2017–2018	No. of patients in 2019	No. of patients in 2020	Total no. of patients from 2019–2020
	No. (%)	No. (%)	No. (%)	No. (%)
1	21,618 (91.1)	12,885 (90.0)	11,424 (90.3)	24,309 (90.1)
2	1,993 (8.4)	1,354 (9.5)	1,152 (9.1)	2,506 (9.3)
3	109 (0.5)	76 (0.5)	67 (0.5)	143 (0.5)
4	7 (0.0)	6 (0.0)	3 (0.0)	9 (0.0)
5	2 (0.0)	0 (0)	0 (0)	0 (0)
Total	**23,729 (100.00)**	**14,321 (100.00)**	**12,646 (100.00)**	**26,967 (100.00)**

Table 1.3.1 Distribution of patients who underwent PCI, by SDP, NCVD-PCI Registry, 2019–2022

No.	Source data provider (SDP)*	2017–2018 Total no. of patients = 21618	2019 Total no. of patients = 12885	2020 Total no. of patients = 11424	2019–2020 Total no. of patients = 24309
		No. (%)	No. (%)	No. (%)	No. (%)
1	Pusat Perubatan Universiti Malaya, Kuala Lumpur	1,546 (7.2)	833 (6.5)	595 (5.2)	1,428 (5.9)
2	Institut Jantung Negara, Kuala Lumpur	5,898 (27.3)	1,915 (14.9)	684 (6.0)	2,599 (10.7)
3	Hospital Pulau Pinang, Pulau Pinang	1,262 (5.8)	833 (6.5)	847 (7.4)	1,680 (6.9)
4	Pusat Jantung Sarawak, Sarawak	1,779 (8.2)	1,220 (9.5)	1,161 (10.2)	2,381 (9.8)
5	Hospital Sultanah Aminah, Johor	651 (3.0)	570 (4.4)	458 (4.0)	1,028 (4.2)
6	Hospital Sultanah Bahiyah, Kedah	1,024 (4.7)	633 (4.9)	694 (6.1)	1,327 (5.5)
7	Hospital Sultan Idris Shah, Selangor	4,026 (18.6)	3,049 (23.7)	2,499 (21.9)	5,548 (22.8)
8	Hospital Canselor Tuanku Muhriz UKM, Kuala Lumpur	459 (2.1)	214 (1.7)	306 (2.7)	520 (22.8)
9	Hospital Sultanah Nur Zahirah, Terengganu	389 (1.8)	255 (2.0)	306 (2.7)	561 (2.3)
10	Hospital Tengku Ampuan Afzan, Pahang	857 (4.0)	410 (3.2)	422 (3.7)	832 (3.4)
11	Subang Jaya Medical Centre, Selangor	NA	46 (0.4)	39 (0.3)	85 (0.4)
12	Hospital Queen Elizabeth II, Sabah	1,284 (5.9)	682 (5.3)	433 (3.8)	1,115 (4.6)
13	Hospital Pantai Ipoh, Perak	40 (0.2)	NA	NA	NA
14	Hospital Raja Permaisuri Bainun, Perak	945 (4.4)	420 (3.3)	811 (7.1)	1,231 (5.1)
15	Hospital Raja Perempuan Zainab II, Kelantan	379 (1.8)	329 (2.6)	337 (3.0)	666 (2.7)
16	Pusat Perubatan UiTM Sg Buloh, Selangor	726 (3.4)	288 (2.2)	344 (3.0)	632 (2.6)
17	Oriental Melaka Straits Medical Centre, Melaka	147 (0.7)	90 (0.7)	112 (1.0)	202 (0.8)
18	KPJ Tawakkal Specialist Hospital, Kuala Lumpur	109 (0.5)	16 (0.1)	0 (0)	16 (0.1)
19	KPJ Penang Specialist Hospital, Pulau Pinang	42 (0.2)	138 (1.1)	126 (1.1)	264 (1.1)
20	KPJ Klang Specialist Hospital, Selangor	34 (0.2)	51 (0.4)	59 (0.5)	110 (0.5)
21	Cardiac Vascular Sentral Kuala Lumpur (CVSKL), Kuala Lumpur	21 (0.1)	718 (5.6)	665 (5.8)	1,383 (5.7)
22	Hospital Pantai Penang, Pulau Pinang	NA	136 (1.1)	115 (1.0)	251 (1.0)
23	Gleneagles Penang, Pulau Pinang	NA	12 (0.1)	8 (0.1)	20 (0.1)
24	Gleneagles Medini, Johor	NA	0 (0)	137 (0.2)	137 (0.6)
25	Gleneagles Kota Kinabalu, Sabah	NA	0 (0)	98 (0.9)	98 (0.4)
26	KPJ Seremban Specialist Hospital, Negeri Sembilan	NA	27 (0.2)	168 (1.5)	195 (0.8)
Total		**21,618**	**12,885**	**11,424**	**24,309**

**Each SDP started to contribute data at different time period*

Table 1.3.2 Distribution of PCI procedures performed by Source Data Providers (SDPs), NCVD-PCI Registry, 2019–2020

No.	Source data provider*	2017–2018 Total no. of procedures = 23,729	2019 Total no. of procedures = 14,321	2020 Total no. of procedures = 12,646	2019–2020 Total no. of procedures = 25,967
		No. (%)	No. (%)	No. (%)	No. (%)
1	Pusat Perubatan Universiti Malaya, Kuala Lumpur	1,824 (7.7)	963 (6.7)	671 (5.3)	1,634 (6.1)
2	Institut Jantung Negara, Kuala Lumpur	6,513 (27.5)	2,172 (15.7)	802 (6.3)	2,974 (11.0)
3	Hospital Pulau Pinang, Pulau Pinang	1,402 (5.9)	941 (6.6)	963 (7.6)	1,904 (7.1)
4	Pusat Jantung Sarawak, Sarawak	1,913 (8.1)	1,357 (9.5)	1,258 (10.0)	2,615 (9.7)
5	Hospital Sultanah Aminah, Johor	692 (2.9)	640 (4.5)	495 (3.9)	1,135 (4.2)
6	Hospital Sultanah Bahiyah, Kedah	1,086 (4.6)	686 (4.8)	736 (5.8)	1,422 (5.3)
7	Hospital Sultan Idris Shah, Selangor	4,479 (18.9)	3,476 (24.3)	2,913 (23.0)	6,389 (23.7)
8	Hospital Canselor Tuanku Muhriz UKM, Kuala Lumpur	495 (2.1)	228 (1.6)	338 (2.7)	566 (2.1)
9	Hospital Sultanah Nur Zahirah, Terengganu	446 (1.9)	275 (1.9)	340 (2.7)	615 (2.3)
10	Hospital Tengku Ampuan Afzan, Pahang	919 (3.9)	434 (3.0)	468 (3.7)	902 (3.3)
11	Subang Jaya Medical Centre, Selangor	NA	47 (0.3)	39 (0.3)	86 (0.3)
12	Hospital Queen Elizabeth II, Sabah	1,395 (5.9)	733 (5.1)	451 (3.6)	1,184 (4.4)
13	Hospital Pantai Ipoh, Perak	44 (0.2)	NA	NA	NA
14	Hospital Raja Permaisuri Bainun, Perak	998 (4.2)	441 (3.1)	892 (7.1)	1,333 (4.9)
15	Hospital Raja Perempuan Zainab II, Kelantan	398 (1.7)	349 (2.4)	346 (2.7)	695 (2.6)
16	Pusat Perubatan UiTM Sg Buloh, Selangor	764 (3.2)	311 (2.2)	364 (2.9)	675 (2.5)
17	Oriental Melaka Straits Medical Centre, Melaka	147 (0.6)	93 (0.7)	115 (0.9)	208 (0.8)
18	KPJ Tawakkal Specialist Hospital, Kuala Lumpur	114 (0.5)	16 (0.1)	0 (0)	16 (0.1)
19	KPJ Penang Specialist Hospital, Pulau Pinang	45 (0.2)	152 (1.1)	137 (1.1)	289 (1.1)
20	KPJ Klang Specialist Hospital, Selangor	34 (0.1)	56 (0.4)	61 (0.5)	117 (0.4)
21	Cardiac Vascular Sentral Kuala Lumpur (CVSKL), Kuala Lumpur	21 (0.1)	770 (5.4)	698 (5.5)	1,468 (5.4)
22	Hospital Pantai Penang, Pulau Pinang	NA	142 (1.1)	123 (1.0)	265 (1.0)
23	Gleneagles Penang, Pulau Pinang	NA	12 (0.9)	8 (0.1)	20 (0.1)
24	Gleneagles Medini, Johor	NA	0 (0)	142 (1.1)	142 (0.5)
25	Gleneagles Kota Kinabalu, Sabah	NA	0 (0)	104 (0.8)	104 (0.4)
26	KPJ Seremban Specialist Hospital, Negeri Sembilan	NA	27 (0.2)	182 (1.4)	209 (0.8)
Total		**23,729**	**14,321**	**12,646**	**26,967**

**Each SDP started to contribute data at different time period*

Table 1.4.1 Age-gender distribution of patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Age group	2017–2018		2019		2020		2019–2020	
	Total no. of patients = 21,618		Total no. of patients = 12,885		Total no. of patients = 11,424		Total no. of patients = 24,309	
	Male	Female	Male	Female	Male	Female	Male	Female
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
20–<30	102 (0.6)	13 (0.4)	60 (0.6)	12 (0.5)	54 (0.6)	6 (0.3)	114 (0.6)	18 (0.4)
30–<40	1,055 (5.9)	76 (2.1)	638 (6.0)	45 (2.0)	605 (6.4)	61 (3.1)	1,243 (6.2)	106 (2.5)
40–<50	3,362 (18.8)	360 (9.8)	2,075 (19.5)	248 (11.0)	1,843 (19.5)	213 (10.8)	3,918 (19.5)	461 (10.9)
50–<60	6,419 (35.8)	1,035 (28.1)	3,621 (34.1)	618 (27.5)	3,202 (33.9)	510 (25.7)	6,823 (34.0)	1,128 (26.7)
60–<70	5,093 (28.4)	1,430 (38.8)	2,994 (28.2)	854 (37.9)	2,687 (28.5)	741 (37.4)	5,681 (28.3)	1,595 (37.7)
70–<80	1,706 (9.5)	669 (18.2)	1,115 (10.5)	406 (18.0)	938 (9.9)	386 (19.5)	2,053 (10.2)	792 (18.7)
≥80	196 (1.1)	102 (2.8)	131 (1.2)	68 (3.0)	114 (1.2)	64 (3.2)	245 (1.2)	132 (3.1)
Total	**17,933 (100.0)**	**3,685 (100.0)**	**10,634 (100.0)**	**2,251 (100.0)**	**9,443 (100.0)**	**1,981 (100.0)**	**20,077 (100.0)**	**4,232 (100.0)**

Table 1.4.2 Age-gender distribution of patients who underwent PCI, by ethnic group, NCVD-PCI Registry, 2019–2020

Gender	Age group	2019				2020			
		Total no. of patients = 12,885				Total no. of patients = 11,424			
		Malay	Chinese	Indian	*Others	Malay	Chinese	Indian	*Others
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	37 (0.7)	3 (0.1)	14 (0.8)	6 (0.6)	28 (0.6)	5 (0.2)	9 (0.5)	12 (1.6)
	30–<40	393 (7.4)	58 (2.3)	105 (5.7)	82 (8.3)	396 (8.2)	67 (3.1)	81 (4.8)	61 (8.0)
	40–<50	1,156 (21.8)	346 (13.7)	326 (17.8)	247 (25.1)	1,030 (21.3)	297 (13.9)	329 (19.3)	187 (24.4)
	50–<60	1,838 (34.7)	774 (30.7)	685 (37.4)	324 (32.9)	1,668 (34.5)	649 (30.3)	625 (36.7)	260 (33.9)
	60–<70	1,389 (26.2)	862 (34.2)	506 (27.6)	237 (24.1)	1,298 (26.9)	713 (33.3)	490 (28.8)	186 (24.3)
	70–<80	439 (8.3)	427 (16.9)	173 (9.5)	76 (7.7)	375 (7.8)	350 (16.3)	156 (9.2)	57 (7.4)
	≥80	44 (0.8)	52 (2.1)	22 (1.2)	13 (1.3)	38 (0.8)	62 (2.9)	11 (0.7)	3 (0.4)
	Total	**5,296 (100.0)**	**2,522 (100.0)**	**1,831 (100.0)**	**985 (100.0)**	**4,833 (100.0)**	**2,143 (100.0)**	**1,701 (100.0)**	**766 (100.0)**
Female	20–<30	9 (0.9)	1 (0.2)	1 (0.2)	1 (0.7)	4 (0.4)	1 (0.2)	0 (0)	1 (0.8)
	30 –<40	26 (2.5)	9 (1.8)	10 (1.9)	0 (0)	36 (3.8)	8 (1.8)	12 (2.7)	5 (4.0)
	40–<50	130 (12.4)	35 (6.8)	58 (10.8)	25 (16.6)	122 (12.7)	21 (4.7)	52 (11.6)	18 (14.5)
	50–<60	321 (30.7)	93 (18.1)	162 (30.1)	42 (27.8)	271 (28.3)	87 (19.3)	110 (24.5)	42 (33.9)
	60–<70	392 (37.5)	198 (38.5)	211 (39.2)	53 (35.1)	344 (35.9)	183 (40.7)	183 (40.8)	31 (25.0)
	70–<80	154 (14.7)	138 (26.8)	89 (16.5)	25 (16.6)	160 (16.7)	121 (26.9)	79 (17.6)	26 (21.0)
	≥80	14 (1.3)	41 (8.0)	8 (1.5)	5 (3.3)	21 (2.2)	29 (6.4)	13 (2.9)	1 (0.8)
	Total	**1,046 (100.0)**	**515 (100.0)**	**539 (100.0)**	**151 (100.0)**	**958 (100.0)**	**450 (100.0)**	**449 (100.0)**	**124 (100.0)**

**Others include Orang Asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, Punjabi, other Malaysian and Foreigner*

Table 1.4.2 Age-gender distribution of patients who underwent PCI, by ethnic group, NCVD-PCI Registry, 2019–2020

Gender	Age group	2017–2018				2019–2020			
		Total no. of patients = 21,618				Total no. of patients = 24,309			
		Malay	Chinese	Indian	*Others	Malay	Chinese	Indian	*Others
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	59 (0.6)	7 (0.2)	17 (0.5)	19 (1.2)	65 (0.6)	8 (0.2)	23 (0.7)	18 (1.0)
	30–<40	652 (6.9)	114 (3.1)	177 (5.5)	112 (7.0)	789 (7.8)	125 (2.7)	186 (5.3)	143 (8.2)
	40–<50	1,891 (20.1)	510 (13.7)	583 (18.2)	378 (23.7)	2,186 (21.6)	643 (13.8)	655 (18.5)	434 (24.8)
	50–<60	3,510 (37.3)	1,165 (31.4)	1,173 (36.6)	571 (35.8)	3,506 (34.6)	1,423 (30.5)	1,310 (37.1)	584 (33.4)
	60–<70	2,523 (26.8)	1,256 (33.8)	937 (29.3)	377 (23.7)	2,687 (26.5)	1,575 (33.8)	996 (28.2)	423 (24.2)
	70–<80	711 (7.6)	588 (15.8)	278 (8.7)	129 (8.1)	814 (8.0)	777 (16.7)	329 (9.3)	133 (7.6)
	≥80	75 (0.8)	75 (2.0)	38 (1.2)	8 (0.5)	82 (0.8)	114 (2.4)	33 (0.9)	16 (0.9)
	Total	**9,421 (100.0)**	**3,715 (100.0)**	**3,203 (100.0)**	**1,594 (100.0)**	**10,129 (100.0)**	**4,665 (100.0)**	**3,532 (100.0)**	**1,751 (100.0)**
Female	20–<30	4 (0.2)	1 (0.1)	6 (0.7)	2 (0.7)	13 (0.7)	2 (0.2)	1 (0.1)	2 (0.7)
	30–<40	43 (2.5)	7 (0.9)	22 (2.5)	4 (1.5)	62 (3.1)	17 (1.8)	22 (2.2)	5 (1.8)
	40–<50	201 (11.5)	40 (5.1)	87 (9.9)	32 (11.9)	252 (12.6)	56 (5.8)	110 (11.1)	43 (15.6)
	50–<60	527 (30.2)	164 (20.8)	272 (30.8)	72 (26.7)	592 (29.5)	180 (18.7)	272 (27.5)	84 (30.6)
	60–<70	675 (38.7)	308 (39.0)	345 (39.1)	102 (37.8)	736 (36.7)	381 (39.5)	394 (40.0)	84 (30.6)
	70–<80	266 (15.3)	219 (27.8)	133 (15.1)	51 (18.9)	314 (15.7)	259 (26.8)	168 (17.0)	51 (18.6)
	≥80	28 (1.6)	50 (6.3)	17 (1.9)	7 (2.6)	35 (1.8)	70 (7.3)	21 (2.1)	6 (2.2)
	Total	**1,744 (100.0)**	**789 (100.0)**	**882 (100.0)**	**270 (100.0)**	**2,004 (100.0)**	**965 (100.0)**	**988 (100.0)**	**275 (100.0)**

**Others include Orang Asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, Punjabi, other Malaysian and Foreigner*

Table 1.4.3 Age-gender distribution of patients who underwent PCI, by pre-morbid diabetes, NCVD-PCI Registry, 2019–2020

Gender	Age group	2019			2020		
		Total no. of patients = 12,885			Total no. of patients = 11,424		
		Pre-morbid diabetes			Pre-morbid diabetes		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	4 (0.1)	46 (0.8)	10 (1.6)	5 (0.1)	41 (0.8)	8 (1.3)
	30–<40	146 (3.4)	441 (7.7)	51 (8.2)	135 (3.5)	417 (8.4)	53 (8.6)
	40–<50	695 (16.1)	1,245 (21.8)	135 (21.7)	619 (16.1)	1,048 (21.1)	176 (28.5)
	50–<60	1,520 (35.3)	1,891 (33.2)	210 (33.8)	1,378 (35.8)	1,619 (32.6)	205 (33.2)
	60–<70	1,403 (32.6)	1,430 (25.1)	161 (25.9)	1,238 (32.1)	1,313 (26.4)	136 (22.0)
	70–<80	490 (11.4)	576 (10.1)	49 (7.9)	447 (11.6)	458 (9.2)	33 (5.3)
	≥80	52 (1.2)	74 (1.3)	5 (0.8)	32 (0.8)	75 (1.5)	7 (1.1)
	Total	**4,310 (100.0)**	**5,703 (100.0)**	**621 (100.0)**	**3,854 (100.0)**	**4,971 (100.0)**	**618 (100.0)**
Female	20–<30	6 (0.5)	5 (0.6)	1 (1.3)	3 (0.3)	3 (0.4)	0 (0)
	30–<40	28 (2.1)	15 (1.8)	2 (2.5)	29 (2.4)	30 (4.2)	2 (2.7)
	40–<50	125 (9.3)	109 (13.2)	14 (17.5)	132 (11.1)	72 (10.1)	9 (12.0)
	50–<60	389 (28.9)	202 (24.5)	27 (33.8)	335 (28.1)	164 (22.9)	11 (14.7)
	60–<70	539 (40.0)	293 (35.6)	22 (27.5)	465 (39.0)	246 (34.4)	30 (40.0)
	70–<80	231 (17.1)	162 (19.7)	13 (16.3)	199 (16.7)	167 (23.4)	20 (26.7)
	≥80	30 (2.2)	37 (4.5)	1 (1.3)	28 (2.4)	33 (4.6)	3 (4.0)
	Total	**1,348 (100.0)**	**823 (100.0)**	**80 (100.0)**	**1,191 (100.0)**	**715 (100.0)**	**75 (100.0)**

Gender	Age group	2017–2018			2019–2020		
		Total no. of patients = 21,618			Total no. of patients = 24,309		
		Pre-morbid diabetes			Pre-morbid diabetes		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	16 (0.2)	78 (0.8)	8 (0.8)	9 (0.1)	87 (0.8)	18 (1.5)
	30–<40	248 (3.5)	716 (7.4)	91 (8.8)	281 (3.4)	858 (8.0)	104 (8.4)
	40–<50	1,109 (15.4)	2,002 (20.6)	251 (24.4)	1,314 (16.1)	2,293 (21.5)	311 (25.1)
	50–<60	2,638 (36.7)	3,415 (35.1)	366 (35.5)	2,898 (35.5)	3,510 (32.9)	415 (33.5)
	60–<70	2,306 (32.1)	2,542 (26.2)	245 (23.8)	2,641 (32.4)	2,743 (25.7)	297 (24.0)
	70–<80	788 (11.0)	853 (8.8)	65 (6.3)	937 (11.5)	1,034 (9.7)	82 (6.6)
	≥80	79 (1.1)	112 (1.2)	5 (0.5)	84 (1.0)	149 (1.4)	12 (1.0)
	Total	**7,184 (100.0)**	**9,718 (100.0)**	**1,031 (100.0)**	**8,164 (100.0)**	**10,674 (100.0)**	**1,239 (100.0)**
Female	20–<30	7 (0.3)	5 (0.4)	1 (0.8)	9 (0.4)	8 (0.5)	1 (0.7)
	30–<40	40 (1.9)	32 (2.3)	4 (3.3)	57 (2.2)	45 (2.9)	4 (2.6)
	40–<50	215 (10.1)	132 (9.3)	13 (10.7)	257 (10.1)	181 (11.8)	23 (14.8)
	50–<60	634 (29.6)	373 (26.2)	28 (23.1)	724 (28.5)	366 (23.8)	38 (24.5)
	60–<70	841 (39.3)	544 (38.2)	45 (37.2)	1,004 (39.5)	539 (35.1)	52 (33.6)
	70–<80	365 (17.1)	277 (19.4)	27 (22.3)	430 (16.9)	329 (21.4)	33 (21.3)
	≥80	37 (1.7)	62 (4.4)	3 (2.5)	58 (2.3)	70 (4.6)	4 (2.6)
	Total	**2,139 (100.0)**	**1,425 (100.0)**	**121 (100.0)**	**2,539 (100.0)**	**1,538 (100.0)**	**155 (100.0)**

Table 1.4.4 Age-gender distribution of patients who underwent PCI, by pre-morbid hypertension, NCVD-PCI Registry, 2019–2020

Gender	Age group	2019			2020		
		Total no. of patients = 12,885			Total no. of patients = 11,424		
		Pre-morbid hypertension			Pre-morbid hypertension		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	10 (0.2)	41 (1.2)	9 (1.7)	10 (0.2)	37 (1.3)	7 (1.4)
	30–<40	263 (4.0)	322 (9.4)	53 (9.7)	256 (4.2)	306 (10.8)	43 (8.7)
	40–<50	1,087 (16.3)	871 (25.4)	117 (21.5)	1,000 (16.4)	701 (24.8)	142 (28.8)
	50–<60	2,236 (33.6)	1,185 (34.6)	200 (36.8)	2,064 (33.7)	974 (34.4)	164 (33.3)
	60–<70	2,124 (31.9)	742 (21.7)	128 (23.5)	1,956 (32.0)	618 (21.8)	113 (22.9)
	70–<80	849 (12.7)	233 (6.8)	33 (6.1)	740 (12.1)	177 (6.3)	21 (4.3)
	≥80	95 (1.4)	32 (0.9)	4 (0.7)	92 (1.5)	19 (0.7)	3 (0.6)
	Total	**6,664 (100.0)**	**3,426 (100.0)**	**544 (100.0)**	**6,118 (100.0)**	**2,832 (100.0)**	**493 (100.0)**
Female	20–<30	6 (0.3)	5 (1.2)	1 (1.4)	2 (0.1)	4 (1.2)	0 (0)
	30–<40	32 (1.8)	10 (2.4)	3 (4.1)	33 (2.1)	25 (7.5)	3 (5.3)
	40–<50	155 (8.8)	81 (19.1)	12 (16.4)	155 (9.8)	45 (13.4)	13 (22.8)
	50–<60	482 (27.5)	110 (25.9)	26 (35.6)	403 (25.4)	100 (29.9)	7 (12.3)
	60–<70	699 (39.9)	133 (31.4)	22 (30.1)	609 (38.3)	110 (32.8)	22 (38.6)
	70–<80	325 (18.5)	73 (17.2)	8 (11.0)	332 (20.9)	43 (12.8)	11 (19.3)
	≥80	55 (3.1)	12 (2.8)	1 (1.4)	55 (3.5)	8 (2.4)	1 (1.8)
	Total	**1,754 (100.0)**	**424 (100.0)**	**73 (100.0)**	**1,589 (100.0)**	**335 (100.0)**	**57 (100.0)**

Gender	Age group	2017–2018			2019–2020		
		Total no. of patients = 21,618			Total no. of patients = 24,309		
		Pre-morbid hypertension			Pre-morbid hypertension		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	26 (0.2)	69 (1.1)	7 (0.8)	20 (0.2)	78 (1.3)	16 (1.5)
	30–<40	418 (3.8)	549 (9.0)	88 (9.9)	519 (4.1)	628 (10.0)	96 (9.3)
	40–<50	1,673 (15.3)	1,461 (24.0)	228 (25.7)	2,087 (16.3)	1,572 (25.1)	259 (25.0)
	50–<60	3,930 (35.9)	2,167 (35.6)	322 (36.3)	4,300 (33.6)	2,159 (34.5)	364 (35.1)
	60–<70	3,489 (31.8)	1,408 (23.1)	196 (22.1)	4,080 (31.9)	1,360 (21.7)	241 (23.2)
	70–<80	1,270 (11.6)	393 (6.5)	43 (4.9)	1,589 (12.4)	410 (6.6)	54 (5.2)
	≥80	155 (1.4)	38 (0.6)	3 (0.3)	187 (1.5)	51 (0.8)	7 (0.7)
	Total	**10,961 (100.0)**	**6,085 (100.0)**	**887 (100.0)**	**12,782 (100.0)**	**6,258 (100.0)**	**1,037 (100.0)**
Female	20–<30	5 (0.2)	7 (0.9)	1 (1.1)	8 (0.2)	9 (1.2)	1 (0.8)
	30–<40	43 (1.5)	29 (3.7)	4 (4.3)	65 (1.9)	35 (4.6)	6 (4.6)
	40–<50	240 (8.6)	105 (13.3)	15 (16.1)	310 (9.3)	126 (16.6)	25 (19.2)
	50–<60	774 (27.6)	237 (30.1)	24 (25.8)	885 (26.5)	210 (27.7)	33 (25.4)
	60–<70	1,125 (40.1)	278 (35.3)	27 (29.0)	1,308 (39.1)	243 (32.0)	44 (33.9)
	70–<80	544 (19.4)	106 (13.5)	19 (20.4)	657 (19.7)	116 (15.3)	19 (14.6)
	≥80	74 (2.7)	25 (3.2)	3 (3.2)	110 (3.3)	20 (2.6)	2 (1.5)
	Total	**2,805 (100.0)**	**787 (100.0)**	**93 (100.0)**	**3,343 (100.0)**	**759 (100.0)**	**130 (100.0)**

Table 1.4.5 Age-gender distribution of patients who underwent PCI, by pre-morbid dyslipidaemia, NCVD-PCI Registry, 2019–2020

Gender	Age group	2019			2020		
		Total no. of patients = 12,885			Total no. of patients = 11,424		
		Pre-morbid dyslipidaemia			Pre-morbid dyslipidaemia		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	14 (0.3)	37 (0.8)	9 (1.2)	12 (0.2)	35 (1.0)	7 (1.0)
	30–<40	241 (4.5)	341 (7.6)	56 (7.7)	244 (4.6)	304 (8.9)	57 (8.2)
	40–<50	952 (17.6)	962 (21.3)	161 (22.2)	880 (16.5)	776 (22.8)	187 (27.0)
	50–<60	1,818 (33.7)	1,541 (34.2)	262 (36.0)	1,840 (34.4)	1,130 (33.2)	232 (33.5)
	60–<70	1,684 (31.2)	1,129 (25.1)	181 (24.9)	1,695 (31.7)	837 (24.6)	155 (22.4)
	70–<80	615 (11.4)	448 (9.9)	52 (7.2)	602 (11.3)	291 (8.5)	45 (6.5)
	≥80	76 (1.4)	49 (1.1)	6 (0.8)	72 (1.4)	33 (1.0)	9 (1.3)
	Total	**5,400 (100.0)**	**4,507 (100.0)**	**727 (100.0)**	**5,345 (100.0)**	**3,406 (100.0)**	**692 (100.0)**
Female	20–<30	4 (0.3)	6 (0.7)	2 (1.5)	4 (0.3)	2 (0.3)	0 (0)
	30–<40	19 (1.5)	20 (2.4)	6 (4.5)	27 (2.1)	29 (5.0)	5 (4.3)
	40–<50	115 (9.0)	108 (13.0)	25 (18.7)	119 (9.3)	73 (12.6)	21 (18.0)
	50–<60	362 (28.2)	211 (25.4)	45 (33.6)	334 (26.0)	149 (25.7)	27 (23.1)
	60–<70	512 (39.8)	300 (36.1)	42 (31.3)	495 (38.5)	203 (34.9)	43 (36.8)
	70–<80	234 (18.2)	159 (19.1)	13 (9.7)	266 (20.7)	101 (17.4)	19 (16.2)
	≥80	39 (3.0)	28 (3.4)	1 (0.8)	38 (3.0)	24 (4.1)	2 (1.7)
	Total	**1,285 (100.0)**	**832 (100.0)**	**134 (100.0)**	**1,283 (100.0)**	**581 (100.0)**	**117 (100.0)**

Gender	Age group	2017–2018			2019–2020		
		Total no. of patients = 21,618			Total no. of patients = 24309		
		Pre-morbid dyslipidaemia			Pre-morbid dyslipidaemia		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	22 (0.3)	74 (0.9)	6 (0.5)	26 (0.2)	72 (0.9)	16 (1.1)
	30–<40	351 (4.1)	595 (7.3)	109 (8.62)	485 (4.5)	645 (8.2)	113 (8.0)
	40–<50	1,469 (17.3)	1,593 (19.5)	300 (23.7)	1,832 (17.1)	1,738 (22.0)	348 (24.5)
	50–<60	3,067 (36.0)	2,883 (35.3)	469 (37.1)	3,658 (34.0)	2,671 (33.8)	494 (34.8)
	60–<70	2,608 (30.6)	2,189 (26.8)	296 (23.4)	3,379 (31.5)	1,966 (24.9)	336 (23.7)
	70–<80	900 (10.6)	728 (8.9)	78 (6.2)	1,217 (11.3)	739 (9.3)	97 (6.8)
	≥80	95 (1.1)	95 (1.2)	6 (0.5)	148 (1.4)	82 (1.0)	15 (1.1)
	Total	**8,512 (100.0)**	**8,157 (100.0)**	**1,264 (100.0)**	**10,745 (100.0)**	**7,913 (100.0)**	**1,419 (100.0)**
Female	20–<30	5 (0.3)	7 (0.5)	1 (0.6)	8 (0.3)	8 (0.6)	2 (0.8)
	30–<40	36 (1.8)	35 (2.4)	5 (2.8)	46 (1.8)	49 (3.5)	11 (4.4)
	40–<50	168 (8.3)	173 (11.7)	19 (10.8)	234 (9.1)	181 (12.8)	46 (18.3)
	50–<60	564 (27.7)	423 (28.7)	48 (27.3)	696 (27.1)	360 (25.5)	72 (28.7)
	60–<70	820 (40.3)	544 (36.9)	66 (37.5)	1,007 (39.2)	503 (35.6)	85 (33.9)
	70–<80	388 (19.1)	248 (16.8)	33 (18.8)	500 (19.5)	260 (18.4)	32 (12.8)
	≥80	53 (2.6)	45 (3.1)	4 (2.3)	77 (3.0)	52 (3.7)	3 (1.2)
	Total	**2,034 (100.0)**	**1,475 (100.0)**	**176 (100.0)**	**2,568 (100.0)**	**1,413 (100.0)**	**251 (100.0)**

Table 1.4.6 Age-gender distribution of patients who underwent PCI, by family history of premature cardiovascular disease, NCVD-PCI Registry, 2019–2020

Gender	Age group	2019			2020		
		Total no. of patients = 12,885			Total no. of patients = 11,424		
		Family history of premature cardiovascular disease			Family history of premature cardiovascular disease		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	19 (1.5)	37 (0.5)	4 (0.3)	16 (1.2)	30 (0.4)	8 (0.6)
	30–<40	119 (9.2)	435 (5.5)	84 (5.9)	115 (8.9)	418 (6.2)	72 (5.2)
	40–<50	300 (23.2)	1,528 (19.3)	247 (17.3)	277 (21.5)	1,295 (19.1)	271 (19.7)
	50–<60	435 (33.6)	2,674 (33.8)	512 (35.8)	457 (35.5)	2,285 (33.7)	460 (33.4)
	60–<70	314 (24.3)	2,272 (28.7)	408 (28.5)	321 (24.9)	1,961 (28.9)	405 (29.4)
	70–<80	93 (7.2)	866 (11.0)	156 (10.9)	93 (7.2)	706 (10.4)	139 (10.1)
	≥80	15 (1.2)	97 (1.2)	19 (1.3)	8 (0.6)	83 (1.2)	23 (1.7)
	Total	**1,295 (100.0)**	**7,909 (100.0)**	**1,430 (100.0)**	**1,287 (100.0)**	**6,778 (100.0)**	**1,378 (100.0)**
Female	20–<30	4 (1.4)	6 (0.4)	2 (0.6)	2 (0.8)	4 (0.3)	0 (0)
	30–<40	7 (2.5)	34 (2.1)	4 (1.3)	10 (4.0)	43 (3.0)	8 (2.6)
	40–<50	35 (12.6)	165 (10.0)	48 (15.0)	45 (17.8)	134 (9.5)	34 (10.9)
	50–<60	75 (27.0)	457 (27.7)	86 (26.9)	73 (28.9)	369 (26.1)	68 (21.7)
	60–<70	108 (38.9)	636 (38.5)	110 (34.4)	84 (33.2)	530 (37.5)	127 (40.6)
	70–<80	46 (16.6)	307 (18.6)	53 (16.6)	35 (13.8)	286 (20.2)	65 (20.8)
	≥80	3 (1.1)	48 (2.9)	17 (5.3)	4 (1.6)	49 (3.5)	11 (3.5)
	Total	**278 (100.0)**	**1,653 (100.0)**	**320 (100.0)**	**253 (100.0)**	**1,415 (100.0)**	**313 (100.0)**

Gender	Age group	2017–2018			2019–2020		
		Total no. of patients = 21,618			Total no. of patients = 24,309		
		Family history of premature cardiovascular disease			Family history of premature cardiovascular disease		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	16 (0.8)	74 (0.5)	12 (0.6)	35 (1.4)	67 (0.5)	12 (0.4)
	30–<40	157 (7.7)	788 (5.7)	110 (5.2)	234 (9.1)	853 (5.8)	156 (5.6)
	40–<50	503 (24.6)	2,442 (17.8)	417 (19.5)	577 (22.4)	2,823 (19.2)	518 (18.5)
	50–<60	737 (36.1)	4,881 (35.5)	801 (37.5)	892 (34.6)	4,959 (33.8)	972 (34.6)
	60–<70	468 (22.9)	4,050 (29.4)	575 (26.9)	635 (24.6)	4,233 (28.8)	813 (29.0)
	70–<80	147 (7.2)	1,356 (9.9)	203 (9.5)	186 (7.2)	1,572 (10.7)	295 (10.5)
	≥80	14 (0.7)	165 (1.2)	17 (0.8)	23 (0.9)	180 (1.2)	42 (1.5)
	Total	**2,042 (100.0)**	**13,756 (100.0)**	**2,135 (100.0)**	**2,582 (100.0)**	**14,687 (100.0)**	**2,808 (100.0)**
Female	20–<30	2 (0.6)	8 (0.3)	3 (0.7)	6 (1.1)	10 (0.3)	2 (0.3)
	30–<40	12 (3.3)	52 (1.8)	12 (3.0)	17 (3.2)	77 (2.5)	12 (1.9)
	40–<50	50 (13.9)	268 (9.2)	42 (10.3)	80 (15.1)	299 (9.8)	82 (13.0)
	50–<60	113 (31.4)	803 (27.5)	119 (29.2)	148 (27.8)	826 (26.9)	154 (24.3)
	60–<70	130 (36.1)	1,158 (39.7)	142 (34.9)	192 (36.2)	1,166 (38.0)	237 (37.4)
	70–<80	47 (13.1)	544 (18.6)	78 (19.2)	81 (15.3)	593 (19.3)	118 (18.6)
	≥80	6 (1.7)	85 (2.9)	11 (2.7)	7 (1.3)	97 (3.2)	28 (4.4)
	Total	**360 (100.0)**	**2,918 (100.0)**	**407 (100.0)**	**531 (100.0)**	**3,068 (100.0)**	**633 (100.0)**

Table 1.4.7 Age-gender distribution of patients who underwent PCI, by smoking status, NCVD-PCI Registry, 2019–2020

Gender	Age group	2019				2020			
		Total no. of patients = 12,885				Total no. of patients = 11,424			
		Never	Former	Current	Not available	Never	Former	Current	Not available
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	9 (0.3)	10 (0.4)	35 (1.1)	6 (0.3)	7 (0.3)	3 (0.1)	39 (1.3)	5 (0.4)
	30–<40	89 (3.3)	125 (4.8)	338 (10.6)	86 (4.1)	87 (3.6)	125 (4.8)	335 (11.2)	58 (4.2)
	40–<50	355 (13.0)	494 (18.8)	890 (28.0)	336 (16.2)	314 (12.8)	455 (17.4)	861 (28.8)	213 (15.3)
	50–<60	887 (32.4)	858 (32.6)	1,160 (36.5)	716 (34.4)	792 (32.4)	901 (34.4)	1,036 (34.7)	473 (34.0)
	60–<70	945 (34.5)	808 (30.7)	623 (19.6)	618 (29.7)	845 (34.6)	812 (31.0)	597 (20.0)	433 (31.1)
	70–<80	398 (14.5)	312 (11.9)	128 (4.0)	277 (13.3)	361 (14.8)	285 (10.9)	108 (3.6)	184 (13.2)
	≥80	55 (2.0)	27 (1.0)	7 (0.2)	42 (2.0)	40 (1.6)	38 (1.5)	11 (0.4)	25 (1.8)
	Total	**2,738 (100.0)**	**2,634 (100.0)**	**3,181 (100.0)**	**2,081 (100.0)**	**2,446 (100.0)**	**2,619 (100.0)**	**2,987 (100.0)**	**1,391 (100.0)**
Female	20–<30	10 (0.6)	1 (1.5)	1 (1.7)	0 (0)	6 (0.4)	0 (0)	0 (0)	0 (0)
	30–<40	31 (1.8)	1 (1.5)	4 (6.8)	9 (2.4)	42 (2.6)	2 (3.6)	7 (11.1)	10 (4.1)
	40–<50	186 (10.6)	8 (11.9)	9 (15.3)	45 (11.9)	161 (10.03)	9 (16.1)	18 (28.6)	25 (10.1)
	50–<60	490 (28.0)	18 (26.9)	21 (35.6)	89 (23.6)	411 (255)	20 (35.7)	17 (27.0)	62 (25.1)
	60–<70	664 (38.0)	27 (40.3)	17 (28.8)	146 (38.7)	618 (38.3)	13 (23.2)	12 (19.1)	98 (39.7)
	70–<80	310 (17.7)	12 (17.9)	7 (11.9)	77 (20.4)	322 (19.9)	12 (21.4)	8 (12.7)	44 (17.8)
	≥80	57 (3.3)	0 (0)	0 (0)	11 (2.9)	55 (3.4)	0 (0)	1 (1.6)	8 (3.2)
	Total	**1,748 (100.0)**	**67 (100.0)**	**59 (100.0)**	**377 (100.0)**	**1,615 (100.0)**	**56 (100.0)**	**63 (100.0)**	**247 (100.0)**

Table 1.4.7 Age-gender distribution of patients who underwent PCI, by smoking status, NCVD-PCI Registry, 2019–2020

Gender	Age group	2017–2018				2019–2020			
		Total no. of patients = 21,618				Total no. of patients = 24,309			
		Never	Former	Current	Not available	Never	Former	Current	Not available
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	10 (0.3)	14 (0.3)	67 (1.3)	11 (0.3)	16 (0.3)	13 (0.3)	74 (1.2)	11 (0.3)
	30–<40	116 (2.9)	198 (4.3)	562 (10.4)	179 (4.7)	176 (3.4)	250 (4.8)	673 (10.9)	144 (4.2)
	40–<50	519 (12.7)	752 (16.3)	1,491 (27.6)	600 (15.7)	669 (12.9)	949 (18.1)	1,751 (28.4)	549 (15.8)
	50–<60	1,381 (33.9)	1,677 (36.3)	2,015 (37.3)	1,346 (35.1)	1,679 (32.4)	1,759 (33.5)	2,196 (35.6)	1,189 (34.3)
	60–<70	1,403 (34.4)	1,424 (30.8)	1,040 (19.3)	1,226 (32.0)	1,790 (34.5)	1,620 (30.8)	1,220 (19.8)	1,051 (30.3)
	70–<80	571 (14.0)	493 (10.7)	216 (4.0)	426 (11.1)	759 (14.6)	597 (11.4)	236 (3.8)	461 (13.3)
	≥80	76 (1.9)	61 (1.3)	11 (0.2)	48 (1.3)	95 (1.8)	65 (1.2)	18 (0.3)	67 (1.9)
	Total	**4,076 (100.0)**	**4,619 (100.0)**	**5,402 (100.0)**	**3,836 (100.0)**	**5,184 (100.0)**	**5,253 (100.0)**	**6,168 (100.0)**	**3,472 (100.0)**
Female	20–<30	8 (0.3)	1 (1.1)	0 (0)	4 (0.5)	16 (0.5)	1 (0.8)	1 (0.8)	0 (0)
	30–<40	57 (2.1)	0 (0)	4 (4.7)	15 (1.7)	73 (2.2)	3 (2.4)	11 (9.0)	19 (3.0)
	40–<50	260 (9.7)	10 (11.4)	18 (21.2)	72 (8.6)	347 (10.3)	17 (13.8)	27 (22.1)	70 (11.2)
	50–<60	768 (28.8)	25 (28.4)	26 (30.6)	216 (25.7)	901 (26.8)	38 (30.9)	38 (31.2)	151 (4.2)
	60–<70	1,032 (38.7)	25 (28.4)	23 (27.1)	350 (41.6)	1,282 (38.1)	40 (32.5)	29 (23.8)	244 (39.1)
	70–<80	476 (17.8)	23 (26.1)	11 (12.9)	159 (18.9)	632 (18.8)	24 (19.5)	15 (12.3)	121 (19.4)
	≥80	69 (2.6)	4 (4.6)	3 (3.5)	26 (3.1)	112 (3.3)	0 (0)	1 (0.8)	19 (3.0)
	Total	**2,670 (100.0)**	**88 (100.0)**	**85 (100.0)**	**842 (100.0)**	**3,363 (100.0)**	**123 (100.0)**	**122 (100.0)**	**624 (100.0)**

Table 1.4.8 Age-gender distribution of patients who underwent PCI, by new onset of angina, NCVD-PCI Registry, 2019–2020

Gender	Age group	2019			2020		
		Total no. of patients = 12,885			Total no. of patients = 11,424		
		New onset of angina			New onset of angina		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	29 (0.8)	30 (0.5)	1 (0.3)	27 (0.7)	22 (0.4)	5 (1.4)
	30–<40	273 (7.2)	352 (5.5)	13 (3.5)	279 (7.5)	306 (5.7)	20 (5.6)
	40–<50	801 (21.0)	1,209 (18.7)	65 (17.6)	823 (22.1)	939 (17.5)	81 (22.8)
	50–<60	1,309 (34.3)	2,174 (33.7)	138 (37.4)	1,267 (34.0)	1,814 (33.9)	121 (34.1)
	60–<70	997 (26.1)	1,880 (29.2)	117 (31.7)	973 (26.1)	1,625 (30.3)	89 (25.1)
	70–<80	363 (9.5)	718 (11.1)	34 (9.2)	315 (8.5)	590 (11.0)	33 (9.3)
	≥80	43 (1.1)	87 (1.4)	1 (0.3)	45 (1.2)	63 (1.2)	6 (1.7)
	Total	**3,815 (100.0)**	**6,450 (100.0)**	**369 (100.0)**	**3,729 (100.0)**	**5,359 (100.0)**	**355 (100.0)**
Female	20–<30	5 (0.6)	6 (0.4)	1 (1.2)	3 (0.4)	3 (0.3)	0 (0)
	30–<40	18 (2.3)	24 (1.7)	3 (3.7)	22 (2.9)	35 (3.0)	4 (4.9)
	40–<50	100 (12.7)	139 (10.1)	9 (11.0)	80 (10.7)	122 (10.6)	11 (13.4)
	50–<60	223 (28.3)	364 (26.3)	31 (37.8)	183 (24.5)	308 (26.8)	19 (23.2)
	60–<70	279 (35.5)	546 (39.5)	29 (35.4)	275 (36.8)	438 (38.1)	28 (34.2)
	70–<80	129 (16.4)	269 (19.5)	8 (9.8)	161 (21.5)	209 (18.2)	16 (19.5)
	≥80	33 (4.2)	34 (2.5)	1 (1.2)	24 (3.2)	36 (3.1)	4 (4.9)
	Total	**787 (100.0)**	**1,382 (100.0)**	**82 (100.0)**	**748 (100.0)**	**1,151 (100.0)**	**82 (100.0)**

Gender	Age group	2017–2018			2019–2020		
		Total no. of patients = 21,618			Total no. of patients = 24,309		
		New onset of angina			New onset of angina		
		Yes	No	Not known	Yes	No	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Male	20–<30	48 (0.8)	51 (0.4)	3 (0.5)	56 (0.7)	52 (0.4)	6 (0.8)
	30–<40	426 (7.4)	601 (5.2)	28 (4.5)	552 (7.3)	658 (5.6)	33 (4.6)
	40–<50	1,163 (20.3)	2,058 (17.8)	141 (22.6)	1,624 (21.5)	2,148 (18.2)	146 (20.2)
	50–<60	2,009 (35.1)	4,177 (36.1)	233 (37.3)	2,576 (34.2)	3,988 (33.8)	259 (35.8)
	60–<70	1,476 (25.8)	3,450 (29.8)	167 (26.8)	1,970 (26.1)	3,505 (29.7)	206 (28.5)
	70–<80	529 (9.2)	1,128 (9.7)	49 (7.9)	678 (9.0)	1,308 (11.1)	67 (9.3)
	≥80	76 (1.3)	117 (1.0)	3 (0.5)	88 (1.2)	150 (1.3)	7 (1.0)
	Total	**5,727 (100.0)**	**11,582 (100.0)**	**624 (100.0)**	**7,544 (100.0)**	**11,809 (100.0)**	**724 (100.0)**
Female	20–<30	6 (0.6)	6 (0.2)	1 (0.8)	8 (0.5)	9 (0.4)	1 (0.6)
	30–<40	25 (2.4)	49 (2.0)	2 (1.6)	40 (2.6)	59 (2.3)	7 (4.3)
	40–<50	106 (10.0)	234 (9.4)	20 (15.6)	180 (11.7)	261 (10.3)	20 (12.2)
	50–<60	284 (26.8)	717 (28.7)	34 (26.6)	406 (26.5)	672 (26.5)	50 (30.5)
	60–<70	376 (35.5)	1,006 (40.3)	48 (37.5)	554 (36.1)	984 (38.9)	57 (34.8)
	70–<80	230 (21.7)	418 (16.7)	21 (16.4)	290 (19.9)	478 (18.9)	24 (14.6)
	≥80	31 (2.9)	69 (2.8)	2 (1.6)	57 (3.7)	70 (2.8)	5 (3.1)
	Total	**1,058 (100.0)**	**2,499 (100.0)**	**128 (100.0)**	**1,535 (100.0)**	**2,533 (100.0)**	**164 (100.0)**

Table 1.5.1 Presence of cumulative risk factors, NCVD-PCI Registry, 2019–2020

Presence of cumulative risk factors *	2017–2018 Total no. of patients = 21,618	2017 Total no. of patients = 12,885	2018 Total no. of patients = 11,424	2017–2018 Total no. of patients = 24,309
	No. (%)	No. (%)	No. (%)	No. (%)
None	891 (4.1)	588 (4.6)	316 (2.8)	904 (3.7)
1 risk factor	3,328 (15.4)	1,650 (12.8)	1,251 (11.0)	2,901 (11.9)
2 risk factors	4,775 (22.1)	3,107 (24.1)	2,547 (22.3)	5,654 (23.3)
3 risk factors	5,941 (27.5)	3,573 (27.7)	3,111 (27.2)	6,684 (27.5)
>3 risk factors	6,683 (30.9)	3,967 (30.8)	4,199 (36.8)	8,166 (33.6)

**Risk factors were defined as presence of 1) dyslipidaemia, 2) hypertension, 3) diabetes, 4) family history of premature cardiovascular disease, 5) smoking [current smokers & former smokers (quit more than 30 days)] and 6) obesity (BMI≥23.0)*

Table 1.5.2 Presence of cumulative risk factors by gender, NCVD-PCI Registry, 2019–2020

Gender	Presence of cumulative risk factors *	2017–2018 Total no. of patients = 21,618	2019 Total no. of patients = 12,885	2020 Total no. of patients = 11,424	2019–2020 Total no. of patients = 24,309
		No. (%)	No. (%)	No. (%)	No. (%)
Male	None	1,260 (7.0)	460 (4.3)	255 (2.7)	715 (3.6)
	1 risk factor	2,545 (14.2)	1,406 (13.2)	1,074 (11.4)	2,480 (12.4)
	2 risk factors	4,105 (22.9)	2,549 (24.0)	2,106 (22.3)	4,655 (23.2)
	3 risk factors	4,474 (25.0)	2,849 (26.8)	2,436 (25.8)	5,285 (26.3)
	>3 risk factors	5,549 (30.9)	3,370 (31.7)	3,572 (37.8)	6,942 (34.6)
	Total	**17,933 (100.0)**	**10,634 (100.0)**	**9,443 (100.0)**	**20,077 (100.0)**
Female	None	316 (8.6)	128 (5.7)	61 (3.1)	189 (4.5)
	1 risk factor	421 (11.4)	244 (10.8)	177 (8.9)	421 (10.0)
	2 risk factors	889 (24.1)	558 (24.8)	441 (22.3)	999 (23.6)
	3 risk factors	1,193 (32.4)	724 (32.2)	675 (34.1)	1,399 (33.1)
	>3 risk factors	866 (23.5)	597 (26.5)	627 (31.7)	1,224 (28.9)
	Total	**3,685 (100.0)**	**2,251 (100.0)**	**1,981 (100.0)**	**4,232 (100.0)**

**Risk factors were defined as presence of 1) dyslipidaemia, 2) hypertension, 3) diabetes, 4) family history of premature cardiovascular disease, 5) smoking [included current smokers & former smokers (quit more than 30 days)] and 6) obesity (BMI ≥23.0)*

CLINICAL PRESENTATIONS & INVESTIGATIONS

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Summary

1. There was an increment of 13.7% in the total PCI procedures in 2019–2020 (26,967 procedures) compared to 2017–2018 (23,729 procedures).

2. Majority of patients (91.5%) had low (<30) TIMI risk index (TRI), comparable to 2017–2018 cohort (90.9%).

3. 0.9% of patients undergoing PCI had concomitant atrial fibrillation, which was similar to the 2017–2018 cohort.

4. Only 13.7% of patients had non-invasive test or functional assessment prior to PCI and 92.9% of them had positive results.

5. The mean glomerular filtration rate (GFR) was 75.7 mls/min/1.73m^2 and 22.8% of patients undergoing PCI had GFR <60 mls/min/1.73m^2.

6. Among patients with history of heart failure, 7.9% had NYHA class III and IV, which was slightly higher than the 2017–2018 cohort (6.9%).

7. Majority of the PCI procedures were performed in patients with history of ACS (78.5%) and 21.6% with history of chronic stable angina.

8. Anterior STEMI (47.1%) remained the predominant presentation in the STEMI cohort.

9. Majority of the STEMI patients were in Killip class I (85.5%), 1.4% in Killip class III and 7.2% in Killip class IV. The distributions were similar to the 2017–2018 cohort.

10. The mean left ventricular ejection fraction (EF) was 51.8%.

11. There was a 12.5% reduction in primary PCI procedures, from 1,838 procedures in 2017–2018 to 1,609 procedures in 2019–2020 attributed to the COVID-19 pandemic.

12. Among transferred patients from non-PCI centre, a lower rate (36.2%) achieved first door-to-balloon (DTB) time <120 minutes than the 2017–2018 cohort (45.8%). The median transfer time (TT) was also longer in the 2019–2020 cohort (70.0 minutes), compared to the 2017–2018 cohort (65.0 minutes).

13. Among patients presenting to PCI centre, a lower rate of patients (60.2%) were able to achieve DTB time <90 minutes than the 2017–2018 cohort (64.4%).

This chapter discussed the clinical presentations and relevant investigations performed at the time of PCI for patients enrolled in the registry between 2019–2020. Overall, there was an increment of 13.7% in the total number of procedures performed throughout 2019–2020 (26,967 procedures) compared to 2017–2018 (23,729 procedures). However, for primary PCI, there was a reduction from 1,838 procedures in 2017–2018 to 1,609 procedures in 2019–2020 (reduction of 12.5%) attributed to the COVID-19 pandemic.

Patient clinical status at time of PCI procedure

Heart rate and blood pressure were recorded at presentation and prior to the start of each procedure. The mean heart rate at presentation was 73.8 beats/min (SD 15.0 beats/min) with 14.3% of patients with heart rate of ≥90 beats/min. This was similar to the previous 2017–2018 cohort. The mean systolic blood pressure was 142.8 mmHg (SD 27.2 mmHg) and mean diastolic pressure was 78.2 mmHg (SD 13.5 mmHg). [Table 2.1]

The TIMI risk index (TRI) was calculated for each patient and categorised into low (<30), intermediate (30–70) and high (>70) risks. The TRI is a predictor of 30-day and long-term mortality. The mean TIMI risk index was 18.4 (SD 8.4) which was similar to the 2017–2018 cohort (18.7, SD 8.6). The majority (91.5%) of patients in this cohort had low TRI (<30), compared to the 2017–2018 cohort (90.9%). [Table 2.1]

Majority of patients (71.5%) were in sinus rhythm and only 0.9% of them had atrial fibrillation. This atrial fibrillation prevalence was higher than the number reported in the Malaysian Cardiovascular Registry (REDISCOVER), which was 0.54%, but lower than the 6.2–7.9% in the GRACE registry and 5.3% in the KAMIR registry.[1-3] With the increase of PCIs in patients with atrial fibrillation, the choice of antiplatelet and anticoagulation is important. With the publications of PIONEER AF-PCI (2016), RE-DUAL PCI (2017), AUGUSTUS (2019) and ENTRUST-AF PCI (2020), direct oral anticoagulation (DOAC) are the reasonable alternative to be used in combination with clopidogrel post-PCI compared to warfarin to reduce bleeding risk.[4-9] [Table 2.1]

Only 13.7% of patients who underwent PCI had non-invasive test or functional assessment prior to procedure. Of those who underwent non-invasive test or functional assessment, 92.9% had positive results. [Table 2.1]

The mean glomerular filtration rates (GFR) were 75.7 mls/min/1.73m2 in the 2019–2020 cohort and 76.8 mls/min/1.73m2 in the 2017–2018 cohort. Majority of patients (77.2%) had a GFR ≥60 mls/min/1.73m2 and 22.9% had GFR <60 mls/min/1.73m2 with only 5.8% with GFR of <30 mls/min/1.73m2. Mean HbA1c was 7.1% (SD 2.0%), which was similar to the 2017–2018 cohort (7.3%, SD 2.0%). However, most of the time, the test for HbA1c was not routinely done at the time of PCI (46.7% did not have information available and 30.5% had missing data). [Table 2.1]

Among the patients who underwent PCI with history of heart failure, 7.9% were in NYHA class III and IV, which was slightly higher than the 2017–2018 cohort (6.9%). Majority of the patients who underwent PCI (43.8%) were asymptomatic at the time of PCI procedure, followed by 36.2% with Canadian Cardiovascular Score (CCS) class I. Only 3.6% of them had CCS class III and 4.6% had CCS class IV at time of PCI procedure. [Table 2.1]

In the 2019–2020 cohort, majority of the PCI procedures were performed in patients with history of ACS (78.4%) and 21.6% presented with history of chronic stable angina. Of the ACS subtypes, 28.0% were STEMI, followed by NSTEMI (34.1%) and unstable angina (16.4%).

Of all the STEMI patients, 47.1% were anterior STEMI, 35.9% were inferior STEMI and 7.6% were lateral STEMI. Only 0.7% of the STEMI patients had left main stem involvement. [Table 2.1]

Among the 6,180 STEMI patients who underwent PCI, majority of them were in Killip class I (85.5%). There was only 1.4% in Killip class III and 7.2% in Killip class IV. The distributions of patients in the Killip classes were similar to the 2017–2018 cohort. The low percentage of PCI in Killip class III and class IV patients could be explained by high mortality when performing PCI in this group of patients with acute pulmonary oedema. [Table 2.1]

In terms of left ventricular systolic function, the mean ejection fraction (EF) was 51.8% (SD 12.7%) compared to 50.5% (SD 12.6%) in the 2017–2018 cohort. Majority of them (47.3%) had EF ≥55% and only 4.6% had EF <30%. [Table 2.1]

STEMI: Time to treatment analysis

Total number of primary PCI reduced by 12.5% compared to the 2017–2018 cohort, from 1,838 procedures to 1,609 procedures. This could be due to the COVID-19 pandemic that limited the accessibility to primary PCI and more thrombolysis were done compared to primary PCI.

The median symptom-to-door time was shorter for patients presenting at PCI centre compared to transferred patients presenting to non-PCI centre (177.5 minutes vs. 200.0 minutes). When we compared the data for STEMI primary PCI in the 2017–2018 and 2019–2020 cohorts, the median symptom-to-door times were 210.0 minutes and 200.0 minutes respectively for patients presenting to non-PCI centre. The median symptom-to-door times were longer compared to the previous cohort (177.5 minutes vs. 160.0 minutes) for patients presenting to PCI centre. [Table 2.2.1 & Table 2.2.2]

For transferred patients from non-PCI centre, the median first door-to-balloon (DTB) time was 104.0 minutes, which was the same as the 2017–2018 cohort. Only 36.2% of them were able to achieve first DTB time <120 minutes, which was lower than the 2017–2018 cohort (45.8%). The median transfer time (TT) was longer in the 2019–2020 cohort (70.0 minutes), especially in 2020 which was 75 minutes, compared to the 2017–2018 cohort (65.0 minutes). Besides, for transferred patients from non-PCI centre to PCI centre, the median DTB time upon arrival at PCI centre was similar between the 2019–2020 cohort and previous cohorts (2017–2018 and 2019–2020), which was 43 minutes. This short DTB time could be attributed to the good communication between referring teams and cardiology teams. Also, this could be due to the prompt actions by the accepting teams and hence patients were sent to invasive cardiac lab immediately upon arrival. [Table 2.2.1]

As for patients presenting to PCI centre, the median DTB time was 77 minutes, which was longer compared to 72 minutes in the 2017–2018 cohort. 60.2% of them were able to achieve DTB time <90 minutes in the 2019–2020 cohort (vs. 64.4% in the 2017–2018 cohort). [Table 2.2.2] The median DTB time in PCI centre was 77 minutes compared to median DTB time for transferred patients upon arrival at PCI centre which was 43 minutes in the 2019–2020 cohort. As for the 2017–2018 cohort, the median DTB time in PCI centre was 72 minutes compared to median DTB time for transferred patients upon arrival at PCI centre which was 43 minutes. [Table 2.2.1 & Table 2.2.2]

The longer DTB time in PCI centre, longer first DTB time in non-PCI centre and longer transfer time in the 2019–2020 cohort could be attributed to the COVID-19 pandemic in which extra time was spent on clearing patients of COVID-19 infection prior to primary PCI procedure.

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Table 2.1 Patient clinical status at time of PCI procedure, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Clinical examination				
Heart rate at presentation, beats/minute				
N	19,365	12,712	11,490	24,202
Mean (SD)	74.3 (15.5)	74.1 (15.4)	73.5 (14.7)	73.8 (15.0)
Median (min, max)	72.0 (28.0, 200.0)	72.0 (25.0, 190.0)	72.0 (29.0, 191.0)	72.0 (25.0, 191.0)
Missing	4,366 (18.4)	1,609 (11.2)	1,156 (9.1)	2,765 (10.3)
Heart rate at presentation, beats/minute, No. (%)				
<90	16,403 (84.7)	10,801 (85.0)	9,953 (86.6)	20,754 (85.8)
≥90	2,962 (15.3)	1,911 (15.0)	1,537 (13.4)	3,448 (14.3)
Missing	4,364	1,609	1,156	2,765
Systolic blood pressure, mmHg				
N	18,976	23,590	11,415	24,005
Mean (SD)	140.5 (26.5)	141.9 (26.5)	143.7 (27.9)	142.8 (27.2)
Median (min, max)	138.0 (60.0, 230.0)	140.0 (60.0, 230.0)	141.0 (60.0, 230.0)	140.0 (60.0, 230.0)
Missing, No. (%)	4,753 (20.0)	1,731 (12.1)	1,231 (9.7)	2,962 (11.0)
Systolic blood pressure, mmHg, No. (%)				
<90	241 (1.3)	120 (1.0)	142 (1.2)	262 (1.1)
≥90	18,735 (98.7)	12,470 (99.1)	11,273 (98.8)	23,743 (98.9)
Missing	4,753	1,731	1,231	2,962
Diastolic blood pressure, mmHg				
N	18,932	12,544	11,406	23,950
Mean (SD)	77.3 (13.5)	78.1 (13.4)	78.4 (13.5)	78.2 (13.5)
Median (min, max)	77.0 (13.0, 120.0)	78.0 (15.0, 120.0)	78.0 (27.0, 120.0)	78 (15.0, 120.0)
Missing, No. (%)	4,797 (20.2)	1,777 (12.4)	1,240 (9.8)	3,017 (11.2)
TIMI risk index (TRI)				
N	18,639	12,321	11,185	23,506
Mean (SD)	18.7 (8.6)	18.5 (8.3)	18.2 (8.4)	18.4 (8.4)
Median (min, max)	17.2 (1.8, 118.2)	17.2 (1.7, 104.7)	16.7 (2.0, 104.9)	17.0 (1.7, 104.9)
Missing, No. (%)	5,090 (21.5)	2,000 (14.0)	1,461 (11.6)	3,461 (12.8)
TRI classification, No. (%)				
Low <30	16,951 (90.9)	11,255 (91.4)	10,242 (91.6)	21,497 (91.5)
Intermediate 30–70	1,670 (9.0)	1,056 (8.6)	935 (8.4)	1,991 (8.5)
High >70	18 (0.1)	10 (0.1)	8 (0.1)	18 (0.1)
Missing	5,090	2,000	1,416	3,461

Year	**2017–2018**	**2019**	**2020**	**2019–2020**
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Baseline ECG, No. (%)				
Sinus rhythm	15,550 (65.5)	9,818 (68.6)	9,475 (74.9)	19,293 (71.5)
Atrial fibrillation	206 (0.9)	146 (1.0)	98 (0.8)	244 (0.9)
2nd/3rd AVB	73 (0.3)	42 (0.3)	28 (0.2)	70 (0.3)
LBBB	47 (0.2)	23 (0.2)	23 (0.2)	46 (0.2)
RBBB	54 (0.2)	38 (0.3)	50 (0.4)	88 (0.3)
HbA1c, %				
N	6,811	3,287	2,862	6,149
Mean (SD)	7.3 (2.0)	7.0 (18.8)	7.2 (2.1)	7.1 (2.0)
Median (min, max)	6.7 (4.0, 30.0)	6.4 (4.0, 17.6)	6.5 (4.1, 31.0)	6.5 (4.0, 31.0)
Not available, No. (%)	9,659 (40.7)	6,611 (46.2)	5,991 (47.4)	12,602 (46.7)
Missing, No. (%)	4,265 (19.8)	4,423 (30.9)	3,793 (30.0)	8,216 (30.5)
NYHA, No. (%)				
Total no. of procedures among patients with history heart failure	**N=980**	**N=565**	**N=731**	**N=1,296**
NYHA I	504 (56.0)	302 (62.3)	411 (67.5)	713 (65.2)
NYHA II	334 (37.1)	139 (28.7)	156 (25.6)	295 (27.0)
NYHA III	48 (5.3)	30 (6.2)	29 (4.8)	59 (5.4)
NYHA IV	14 (1.6)	14 (2.9)	13 (2.1)	27 (2.5)
Not available	36	21	40	61
Missing	44	59	82	141
Non-invasive test, No. (%)				
Yes	1,634 (10.1)	1,402 (13.0)	1,466 (14.5)	2,868 (13.7)
No	14,521 (89.9)	9,390 (87.0)	8,615 (85.5)	18,005 (86.3)
Missing	7,574	3,529	2,565	6,094
Functional ischaemia, No. (%)				
N of valid data	1,134 (4.8)	847 (5.9)	1,420 (11.2)	2,267 (8.4)
Positive	*1,064 (93.8)*	*773 (91.3)*	*1,333 (93.9)*	*2,106 (92.9)*
Negative	*33 (2.9)*	*56 (6.6)*	*53 (3.7)*	*109 (4.8)*
Equivocal	*37 (2.3)*	*18 (2.1)*	*34 (2.4)*	*52 (2.3)*
Not applicable/ Missing	22,595 (95.2)	13,474 (94.1)	11,226 (88.8)	24,700 (91.6)
Canadian cardiovascular score (CCS), No. (%)				
CCS 1	7,178 (38.4)	4,758 (38.5)	3,571 (33.5)	8,329 (36.2)
CCS 2	2,861 (15.3)	1,622 (13.1)	1,096 (10.3)	2,718 (11.8)
CCS 3	513 (2.7)	523 (4.2)	315 (3.0)	838 (3.6)
CCS 4	801 (4.3)	610 (4.9)	442 (4.1)	1,052 (4.6)
Asymptomatic	7,364 (39.3)	4,839 (39.2)	5,253 (49.2)	10,092 (43.8)
Not available	1,671	588	778	1,366
Missing	3,343	1,381	1,191	2,572

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
*Intra-aortic balloon pump (IABP), No. (%)				
Yes	117 (0.5)	65 (0.5)	48 (0.4)	113 (0.4)
No	21,704 (99.5)	13,621 (99.5)	12,177 (99.6)	25,798 (99.6)
Not applicable	66	30	32	62
Missing	1,802	605	389	994
ACS type, No. (%)				
Total no. of procedures across ACS spectrum				
STEMI	5,475 (34.7)	3,263 (29.2)	2,917 (26.7)	6,180 (28.0)
NSTEMI	3,934 (24.9)	3,644 (32.6)	3,879 (35.6)	7,523 (34.1)
UA	2,333 (14.8)	1,796 (16.1)	1,819 (16.7)	3,615 (16.4)
Chronic stable angina	4,065 (25.7)	2,476 (22.2)	2,296 (21.0)	4,772 (21.6)
Not available	7,921	3,142	1,735	4,877
Missing	1	0	0	0
STEMI, No. (%)				
Total no. of procedures among patients with ACS-STEMI	**N=5,475**	**N=3,263**	**N=2,917**	**N=6,180**
Anterior	2,564 (46.8)	1,551 (47.5)	1,358 (46.6)	2,909 (47.1)
Non-anterior	NA	NA	NA	NA
• Posterior	416 (7.6)	222 (6.8)	240 (8.2)	462 (7.5)
• Lateral	413 (7.5)	277 (8.5)	193 (6.6)	470 (7.6)
• Right-sided	251 (4.6)	171 (5.2)	130 (4.5)	301 (4.9)
• Inferior	1,925 (35.2)	1,182 (36.2)	1,034 (35.6)	2,216 (35.9)
• Left main stem	42 (0.8)	22 (0.7)	24 (0.8)	46 (0.7)
Ejection fraction (EF) status				
N	8,462	5,661	5,971	11,632
Mean (SD)	50.5 (12.6)	51.6 (12.8)	51.9 (12.6)	51.8 (12.7)
Median (min, max)	50.0 (10.0, 80.0)	53.0 (10.0, 80.0)	53.0 (13.0, 80.0)	53.0 (10.0, 80.0)
Not available, No. (%)	9,396 (39.6)	5,486 (38.3)	4,088 (32.3)	9,574 (35.5)
Missing, No. (%)	5,871 (24.7)	3,174 (22.2)	2,587 (20.5)	5,761 (21.4)
Ejection fraction (EF) status, No. (%)				
<30	428 (5.1)	265 (4.7)	272 (4.6)	537 (4.6)
30–<45	2,062 (24.4)	1,252 (22.1)	1,294 (21.7)	2,546 (21.9)
45–<55	2,366 (28.0)	1,483 (26.2)	1,569 (26.3)	3,052 (26.2)
≥55	3,606 (42.6)	2,661 (47.0)	2,836 (47.5)	5,497 (47.3)
Not available	9,396	5,486	4,088	9,574
Missing	5,871	3,174	2,587	5,761

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Killip class, No. (%)				
Total no. of procedures among patients with ACS-STEMI	**N=5,475**	**N=3,263**	**N=2,917**	**N=6,180**
I	4,065 (82.6)	2,585 (83.6)	2,418 (87.6)	5,003 (85.5)
II	419 (8.5)	211 (6.8)	134 (4.9)	345 (5.9)
III	67 (1.4)	43 (1.4)	39 (1.4)	82 (1.4)
IV	369 (7.5)	252 (8.2)	169 (6.1)	421 (7.2)
Not applicable/Not available	272	78	62	140
Missing	283	94	95	189
STEMI: Time-to-treatment analysis				
Total no. of procedures among patients with primary PCI	**N=1,838**	**N=1,054**	**N=555**	**N=1,609**
Symptom-to-door time, minutes				
N	1,475	821	369	1190
Mean (SD)	265.2 (224.7)	272.8 (235.8)	260.5 (230.2)	269.0 (234.0)
Median (min, max)	198 (10.0, 1,423.0)	197.0 (10.0, 1,440.0)	185.0 (15.0, 1,328.0)	194.5 (10.0, 1,440.0)
Not available, No. (%)	108 (5.9)	75 (7.1)	57 (10.3)	1,32 (8.2)
Missing, No. (%)	255 (13.9)	158 (15.0)	129 (23.2)	2,87 (17.8)
Door-to-balloon time, minutes				
N	1,459	829	384	1,213
Mean (SD)	70.5 (68.6)	63.5 (55.9)	85.7 (77.3)	70.6 (64.2)
Median (min, max)	50.0 (10.0, 710.0)	48.0 (10.0, 688.0)	65.0 (10.0, 590.0)	53.0 (10.0, 688.0)
Not available, No. (%)	98 (5.3)	71 (6.7)	49 (8.8)	120 (7.5)
Missing, No. (%)	281 (15.3)	154 (14.6)	122 (22.0)	276 (17.2)
Door-to-balloon time, minutes, No. (%)				
<90	1,129 (77.4)	675 (81.4)	262 (68.2)	937 (77.3)
≥90	330 (22.6)	154 (18.6)	122 (31.8)	276 (22.8)
Not available, N	98	71	49	120
Missing, N	281	154	122	276
Transfer time				
N	829	454	123	577
Mean (SD)	92.3 (86.9)	92.7 (88.7)	118.5 (125.3)	98.2 (98.1)
Median (min, max)	65.0 (10.0, 710.0)	70.0 (13.0, 700.0)	75.0 (15.0, 720.0)	70.0 (13.0, 720.0)
Not available, No. (%)	469 (25.5)	300 (28.5)	172 (31.0)	472 (29.3)
Missing, No. (%)	540 (29.4)	300 (28.5)	260 (46.9)	560 (34.8)

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Glomerular filtration rate (GFR), MDRD				
N	17,466	11,054	10,439	21,493
Mean (SD)	76.8 (26.6)	76.0 (26.5)	75.3 (26.1)	75.7 (26.3)
Median (min, max)	78.3 (2.4, 193.5)	77.6 (2.6, 198.9)	76.8 (2.7, 197.2)	77.2 (2.6, 198.9)
Missing, No. (%)	6,263	3,513	2,149	5,662
Glomerular filtration rate (GFR), MDRD, No. (%)				
<15	645 (3.7)	447 (4.0)	408 (3.9)	855 (4.0)
15–<30	313 (1.8)	199 (1.8)	182 (1.7)	381 (1.8)
30–<45	823 (4.7)	564 (5.1)	536 (5.1)	1,100 (5.1)
45–<60	2,083 (11.9)	1,300 (11.8)	1,271 (12.2)	2,571 (12.0)
≥60	13,602 (77.9)	8,544 (77.3)	8,042 (77.0)	16,586 (77.2)
Missing	6,263	3,267	2,207	5,474

**IABP was listed in separate sections in the previous and new CRFs. In the old CRF, it was reported in Section 6 (Cath lab visit) and in the new CRF, it was reported in Section 7 (PCI procedure details)*

Table 2.2.1 Time to treatment for STEMI, with transfer, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Total no. of procedures with primary PCI (with transfer)	**N=1,378**	**N=757**	**N=391**	**N=1,148**
Symptom-to-door time (minutes)				
N	1116	606	258	864
Mean (SD)	275.4 (223.4)	276.0 (223.9)	269.8 (239.3)	274.2 (228.5)
Median (min, max)	210.0 (10.0, 1,423.0)	200.0 (10.0, 1,440.0)	192.0 (15.0, 1,328.0)	200.0 (10.0, 1,440.0)
Not available, No. (%)	22 (1.6)	7 (1.0)	14 (3.6)	21 (1.8)
Missing, No. (%)	240 (17.4)	144 (19.0)	119 (30.4)	263 (22.9)
Door-to-balloon time (minutes) at PCI centre				
N	1,085	600	264	864
Mean (SD)	62.5 (63.6)	53.6 (52.7)	79.7 (78.0)	61.6 (62.7)
Median (min, max)	43.0 (10.0, 710.0)	40.0 (10.0, 688.0)	59.5 (10.0, 590.0)	43.0 (10.0, 688.0)
Not available, No. (%)	21 (1.5)	12 (1.6)	11 (2.8)	23 (2.0)
Missing, No. (%)	272 (19.7)	145 (19.2)	116 (29.7)	261 (22.7)
Door-to-balloon time (minutes), No. (%)				
<90	888 (81.8)	537 (89.5)	190 (72.0)	727 (84.1)
≥90	197 (18.2)	63 (10.5)	74 (28.0)	137 (15.9)
Not available, N	21	12	11	23
Missing, N	272	145	116	261
Transfer-to-PCI centre time, (minutes)				
N	829	454	123	577
Mean (SD)	92.3 (86.9)	92.7 (88.7)	118.5 (125.3)	98.2 (98.1)
Median (min, max)	65.0 (10.0, 710.0)	70.0 (13.0, 700.0)	75.0 (15.0, 720.0)	70.0 (13.0, 720.0)
Not available, No. (%)	9 (0.7)	3 (0.4)	8 (2.1)	11 (1.0)
Missing, No. (%)	540 (39.2)	300 (39.6)	260 (66.5)	560 (48.8)
Symptom-to-balloon time (minutes)				
N	1,086	594	262	856
Mean (SD)	329.7 (217.5)	320.1 (217.6)	335.0 (249.6)	324.7 (227.8)
Median (min, max)	265.0 (55.0, 1,434.0)	249.0 (36.0, 1,440.0)	256.5 (62.0, 1,428.0)	250.0 (36.0, 1,440.0)
Not available, No. (%)	24 (1.7)	14 (1.9)	10 (2.6)	24 (2.1)
Missing, No. (%)	268 (19.5)	149 (19.7)	119 (30.4)	268 (23.3)
First Door-to- balloon time (minutes)				
N	1,000	478	187	665
Mean (SD)	127.7 (84.1)	124.8 (84.1)	143.7 (115.8)	130.1 (94.4)
Median (min, max)	104.0 (20.0, 713.0)	102.0 (28.0, 714.0)	112.0 (20.0, 720.0)	104.0 (20.0, 720.0)
Not available, No. (%)	13 (0.9)	10 (1.3)	4 (1.0)	14 (1.2)

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Total no. of procedures with primary PCI (with transfer)	**N=1,378**	**N=757**	**N=391**	**N=1,148**
First door to balloon time, No. (%)				
<120	631 (45.8)	309 (40.8)	107 (27.4)	416 (36.2)
≥120	747 (54.2)	448 (59.2)	284 (72.6)	732 (63.8)

Table 2.2.2 Time to treatment for STEMI, without transfer, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Total no. of procedures with primary PCI (without transfer)	**N=460**	**N=297**	**N=164**	**N=461**
Symptom-to-door time (minutes)				
N	359	215	11	326
Mean (SD)	233.6 (226.2)	263.8 (266.6)	239.0 (206.8)	255.4 (247.8)
Median (min, max)	160.0 (10.0, 1,345.0)	160.0 (10.0, 1,440.0)	180.0 (18.0, 1,080.0)	177.5 (10.0, 1,440.0)
Not available, No. (%)	86 (18.7)	68 (22.9)	43 (26.2)	111 (24.1)
Missing, No. (%)	15 (3.3)	14 (4.7)	10 (6.1)	24 (5.2)
Door-to-balloon time (minutes)				
N	374	229	120	349
Mean (SD)	93.4 (76.7)	89.7 (55.5)	99.0 (74.3)	92.9 (62.6)
Median (min, max)	72.0 (14.0, 643.0)	76.0 (11.0, 462.0)	81.0 (12.0, 530.0)	77.0 (11.0, 530.0)
Not available, No. (%)	77 (16.7)	59 (19.9)	38 (23.2)	97 (21.0)
Missing, No. (%)	9 (2.0)	9 (3.0)	6 (3.7)	15 (3.3)
Door-to-balloon time (minutes), No. (%)				
<90	241 (64.4)	138 (60.3)	72 (60.0)	210 (60.2)
≥90	133 (35.6)	91 (39.7)	48 (40.0)	139 (39.8)
Not available, N	77	59	38	97
Missing, N	9	9	6	15
Symptom-to-balloon time (minutes)				
N	368	220	116	336
Mean (SD)	305.7 (218.9)	345.4 (273.0)	322.3 (213.0)	337.4 (253.8)
Median (min, max)	243.0 (15.0, 1,190.0)	252.5 (10.0, 1,401.0)	263.5 (60.0, 1,130.0)	254.0 (10.0, 1,401.0)
Not available, No. (%)	84 (18.3)	64 (21.6)	43 (26.2)	107 (23.2)
Missing, No. (%)	8 (1.7)	13 (4.4)	5 (3.1)	18 (3.9)

Table 2.3 Comparison of heart rate according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Heart rate (beats/min)	Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	<60	2,105 (16.7)	351 (12.9)	406 (10.0)
	60–80	7,444 (59.2)	1,550 (56.9)	1,843 (45.4)
	>80–100	2,658 (21.1)	652 (23.9)	1,317 (32.5)
	>100	375 (3.0)	172 (6.3)	492 (12.1)
	Missing	3,352	405	607
	Total	**15,934**	**3,130**	**4,665**
2019 Total no. of procedures = 14,321	<60	1,431 (17.3)	246 (11.9)	220 (9.2)
	60–80	4,863 (58.9)	1,163 (56.4)	1,124 (47.1)
	>80–100	1,683 (20.4)	533 (25.8)	765 (32.1)
	>100	286 (3.5)	121 (5.9)	277 (11.6)
	Missing	1035	231	343
	Total	**9,298**	**2,294**	**2,729**
2020 Total no. of procedures = 12,646	<60	1,243 (16.0)	208 (11.8)	196 (10.1)
	60–80	4,744 (61.0)	1,069 (60.4)	984 (50.5)
	>80–100	1,570 (20.2)	402 (22.7)	575 (29.5)
	>100	215 (2.8)	91 (5.1)	193 (9.9)
	Missing	683	190	283
	Total	**8,455**	**1,960**	**2,231**
2019–2020 Total no. of procedures = 26,967	<60	2,674 (16.7)	454 (11.8)	416 (9.6)
	60–80	9,607 (59.9)	2,232 (58.2)	2,108 (48.6)
	>80–100	3,253 (20.3)	935 (24.4)	1,340 (30.9)
	>100	501 (3.1)	212 (5.5)	470 (10.8)
	Missing	1,718	421	626
	Total	**17,753**	**4,254**	**4,960**

Table 2.4 Comparison of heart rate according to ACS subtypes, NCVD-PCI Registry, 2019–2020

Year	Heart rate (beats/min)	STEMI	NSTEMI	UA	Chronic stable angina
		No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	<60	538 (11.3)	433 (12.5)	332 (15.4)	710 (18.8)
	60–80	2,253 (47.4)	2,050 (59.0)	1,247 (57.7)	2,347 (61.6)
	>80–100	1,460 (30.7)	818 (23.5)	506 (23.4)	651 (17.1)
	>100	507 (10.7)	174 (5.0)	75 (3.5)	98 (2.6)
	Missing	717	459	173	254
	Total	**5,475**	**3,934**	**2,333**	**4,065**
2019 Total no. of procedures = 14,321	<60	326 (11.3)	399 (12.0)	270 (15.9)	444 (17.4)
	60–80	1,403 (48.5)	1,947 (58.4)	1,008 (59.4)	1,309 (60.4)
	>80–100	878 (30.3)	822 (24.7)	351 (20.7)	354 (16.3)
	>100	288 (10.0)	159 (4.8)	68 (4.0)	59 (2.7)
	Missing	368	317	99	310
	Total	**3,263**	**3,644**	**1,796**	**2,476**
2020 Total no. of procedures = 12,646	<60	283 (10.8)	495 (13.5)	259 (15.1)	366 (19.0)
	60–80	1,387 (52.8)	2,219 (60.4)	1,056 (61.7)	1,185 (61.6)
	>80–100	734 (27.9)	823 (22.4)	343 (20.0)	329 (17.1)
	>100	223 (8.5)	136 (3.7)	54 (3.2)	43 (2.2)
	Missing	290	206	107	373
	Total	**2,917**	**3,879**	**1819**	**2296**
2019–2020 Total no. of procedures = 26,967	<60	609 (11.0)	894 (12.8)	529 (15.5)	810 (19.8)
	60–80	2,790 (50.5)	4,166 (59.5)	2,064 (60.6)	2,494 (61.0)
	>80–100	1,612 (29.2)	1,645 (23.5)	694 (20.4)	683 (16.7)
	>100	511 (9.3)	295 (4.2)	122 (3.6)	102 (2.5)
	Missing	658	523	206	683
	Total	**6,180**	**7,523**	**3,615**	**4,772**

Table 2.5 Comparison of systolic blood pressure according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Systolic BP (mmHg)	Elective	NSTEMI	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	<90	67 (0.6)	28 (1.0)	146 (3.6)
	≥90	12,175 (99.5)	2,692 (99.0)	3,868 (96.4)
	Missing	3,692	410	651
	Total	**15,934**	**3,130**	**4,665**
2019 Total no. of procedures = 14,321	<90	42 (0.5)	15 (0.7)	63 (2.6)
	≥90	8,110 (99.5)	2,027 (99.3)	2,333 (97.4)
	Missing	1146	252	333
	Total	**9,298**	**2,294**	**27,229**
2020 Total no. of procedures = 12,646	<90	52 (0.7)	27 (1.5)	63 (3.2)
	≥90	7,635 (99.3)	1,750 (98.5)	1,888 (96.8)
	Missing	768	183	280
	Total	**8,455**	**1,960**	**2,231**
2019–2020 Total no. of procedures = 26,967	<90	94 (0.6)	42 (1.1)	126 (2.9)
	≥90	15,745 (99.4)	3,777 (98.9)	4,221 (97.1)
	Missing	1,914	435	613
	Total	**17,753**	**4,254**	**4,960**

Table 2.6 Comparison of arterial blood pressure according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Arterial blood pressure, mmHg	Elective	NSTEMI	STEMI
2017–2018 Total no. of procedures = 23,729	**N**	12,192	2,707	3,985
	Mean (SD)	99.5 (14.7)	97.9 (15.7)	94.8 (16.6)
	Median (min, max)	99.0 (47.3, 152.7)	96.7 (38.0, 153.0)	93.7 (40.0, 151.3)
	Missing, No. (%)	3,742 (23.5)	423 (13.5)	680 (14.6)
2019 Total no. of procedures = 14,321	**N**	8,116	2,034	2,369
	Mean (SD)	100.1 (14.9)	99.7 (15.7)	96.1 (16.4)
	Median (min, max)	99.7 (36.0, 154.0)	99.0 (44.3, 154.3)	95.0 (41.7, 149.7)
	Missing, No. (%)	1,182 (12.7)	260 (11.3)	360 (13.2)
2020 Total no. of procedures = 12,646	**N**	7,659	1763	1,938
	Mean (SD)	101.5 (15.7)	98.9 (15.8)	95.2 (15.6)
	Median (min, max)	100.7 (48.3, 155.0)	98.3 (50.3, 154.7)	94.3 (47.7, 145.0)
	Missing, No. (%)	796 (9.4)	197 (10.1)	293 (13.1)
2019–2020 Total no. of procedures = 26,967	**N**	15,775	3,797	4,307
	Mean (SD)	100.8 (15.3)	99.3 (15.7)	95.7 (16.0)
	Median (min, max)	100.0 (36.0, 155.0)	98.7 (44.3, 154.7)	95.0 (41.7, 149.7)
	Missing, No. (%)	1978 (11.1)	457 (10.7)	653 (13.2)

Table 2.7 Comparison of TIMI risk index according to ACS status, NCVD-PCI Registry, 2019–2020

Year	TIMI risk index	STEMI	NSTEMI	UA	Chronic stable angina
		No (%)	**No (%)**	**No (%)**	**No (%)**
2017–2018 Total no. of procedures = 23,729	Low (<30)	4,039 (73.8)	2,940 (74.7)	1,938 (83.1)	3,467 (85.3)
	Intermediate (30–70)	536 (9.8)	317 (8.1)	145 (6.2)	240 (5.9)
	High (>70)	14 (0.3)	0 (0)	0 (0)	0 (0)
	Missing	886 (16.2)	677 (17.2)	250 (10.7)	358 (8.8)
	Total	**5,475**	**3,934**	**2,333**	**4,065**
2019 Total no. of procedures = 14,321	Low (<30)	2,503 (76.7)	2,929 (80.4)	1,539 (85.7)	1,969 (79.5)
	Intermediate (30–70)	311 (9.5)	217 (6.0)	124 (6.9)	146 (5.9)
	High (>70)	5 (0.2)	4 (0.1)	1 (0.1)	0 (0)
	Missing	444 (13.6)	494 (13.6)	132 (7.4)	361 (14.6)
	Total	**3,263**	**3,644**	**1,796**	**2,476**
2020 Total no. of procedures = 12,646	Low (<30)	2,267 (77.7)	3,285 (84.7)	1,553 (85.4)	1,768 (77.0)
	Intermediate (30–70)	285 (9.8)	251 (6.5)	125 (6.9)	119 (5.2)
	High (>70)	5 (0.2)	3 (0.1)	0 (0)	0 (0)
	Missing	360 (12.3)	340 (8.8)	141 (7.8)	409 (17.8)
	Total	**2,917**	**3,879**	**1,819**	**2,296**
2019–2020 Total no. of procedures = 26,967	Low (<30)	4,770 (77.2)	6,214 (82.6)	3,092 (85.5)	3,737 (78.3)
	Intermediate (30–70)	596 (9.6)	468 (6.2)	249 (6.9)	265 (5.6)
	High (>70)	10 (0.2)	7 (0.1)	1 (0.0)	0 (0)
	Missing	804 (13.0)	834 (11.1)	273 (7.6)	770 (16.1)
	Total	**6,180**	**7,523**	**3,615**	**4,772**

Table 2.8 Comparison of ejection fraction according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Ejection fraction (EF)	Elective	NSTEMI	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	<30	305 (5.1)	70 (6.4)	53 (4.0)
	30–<45	1,298 (21.5)	256 (23.3)	508 (38.3)
	45–<55	1,624 (26.9)	287 (26.1)	455 (34.3)
	≥55	2,810 (46.5)	486 (44.2)	310 (23.4)
	Not available	5,660	1,464	2,272
	Missing	4,237	567	1,067
	Total	**15,934**	**3,130**	**4,665**
2019 Total no. of procedures = 14,321	<30	217 (5.5)	28 (3.0)	20 (2.6)
	30–<45	755 (19.1)	209 (22.6)	288 (37.1)
	45–<55	996 (25.2)	220 (23.8)	267 (34.4)
	≥55	1,991 (50.3)	468 (50.6)	202 (26.0)
	Not available	3,360	958	1,168
	Missing	1979	411	784
	Total	**9,298**	**2,294**	**2,729**
2020 Total no. of procedures = 12,646	<30	194 (4.6)	38 (4.3)	40 (4.7)
	30–<45	829 (19.6)	197 (22.4)	268 (31.2)
	45–<55	1,030 (24.3)	222 (25.2)	317 (37.0)
	≥55	2,179 (51.5)	424 (48.1)	233 (27.2)
	Not available	2,500	721	867
	Missing	1,723	358	506
	Total	**8,455**	**1,960**	**2,231**
2019–2020 Total no. of procedures = 26,967	<30	411 (5.0)	66 (3.7)	60 (3.7)
	30–<45	1,584 (19.3)	406 (22.5)	556 (34.0)
	45–<55	2,026 (24.7)	442 (24.5)	584 (35.7)
	≥55	4,170 (50.9)	892 (49.4)	435 (26.6)
	Not available	5,860	1,679	2,035
	Missing	3,702	769	1290
	Total	**17,753**	**4,254**	**4,960**

Table 2.9 Comparison of NYHA according to PCI status among patients with heart failure, NCVD-PCI Registry, 2019–2020

Year	Ejection fraction (EF)	Elective	NSTEMI	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	NYHA I	9,891 (82.3)	1,961 (73.5)	3,301 (80.3)
	NYHA II	2,022 (16.8)	625 (23.4)	512 (12.5)
	NYHA III	101 (0.8)	54 (2.0)	171 (4.2)
	NYHA IV	9 (0.1)	28 (1.1)	129 (3.1)
	Not available	1,494	163	154
	Missing	2,417	299	398
	Total	**15,934**	**3,130**	**4,665**
2019 Total no. of procedures = 14,321	NYHA I	6,605 (86.8)	1,446 (76.6)	1,907 (77.7)
	NYHA II	928 (12.2)	386 (20.5)	214 (8.7)
	NYHA III	70 (0.9)	38 (2.0)	216 (8.8)
	NYHA IV	5 (0.1)	17 (0.9)	117 (4.8)
	Not available	557	73	141
	Missing	1,133	334	134
	Total	**9,298**	**2,294**	**2,729**
2020 Total no. of procedures = 12,646	NYHA I	5,829 (85.9)	1,297 (80.2)	1,657 (85.0)
	NYHA II	861 (12.7)	257 (15.9)	171 (8.8)
	NYHA III	76 (1.1)	35 (2.2)	65 (3.3)
	NYHA IV	17 (0.3)	29 (1.8)	56 (2.9)
	Not available	571	132	137
	Missing	1,101	210	145
	Total	**8,455**	**1,960**	**2,231**
2019–2020 Total no. of procedures = 26,967	NYHA I	12,434 (86.4)	2,743 (78.3)	3,564 (80.9)
	NYHA II	1,789 (12.4)	643 (18.4)	385 (8.7)
	NYHA III	146 (1.0)	73 (2.1)	281 (6.4)
	NYHA IV	22 (0.2)	46 (1.3)	173 (3.9)
	Not available	1,128	205	278
	Missing	2,234	544	279
	Total	**17,753**	**4,254**	**4,960**

Table 2.10 Comparison of previous PCI according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Previous PCI	Elective	NSTEMI	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	Yes	4,411 (29.1)	563 (24.4)	267 (6.5)
	No	10,729 (70.9)	1,742 (75.6)	3,826 (93.5)
	Total	**15,140 (100.0)**	**2,305 (100.0)**	**4,093 (100.0)**
2019 Total no. of procedures = 14,321	Yes	2,287 (30.5)	336 (22.5)	164 (7.2)
	No	5,205 (69.5)	1,158 (77.5)	2,117 (92.8)
	Total	**7,492 (100.0)**	**1,494 (100.0)**	**2,281 (100.0)**
2020 Total no. of procedures = 12,646	Yes	2,095 (24.8)	343 (21.0)	136 (5.7)
	No	6,347 (75.2)	1,293 (79.0)	2,248 (94.3)
	Total	**8,442 (100.0)**	**1,636 (100.0)**	**2,384 (100.0)**
2019–2020 Total no. of procedures = 26,967	Yes	4,382 (27.5)	679 (21.7)	300 (6.4)
	No	11,552 (72.5)	2,451 (78.3)	4,365 (93.6)
	Total	**15,934 (100.0)**	**3,130 (100.0)**	**4,665 (100.0)**

Table 2.10.1 Comparison of previous PCI according to elective PCI status, NCVD-PCI Registry, 2019–2020

Year	Previous PCI	Staged PCI	Ad hoc	Not available
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	Yes	2,414 (51.4)	1,935 (17.5)	33 (19.4)
	No	2,280 (48.6)	9,135 (82.5)	137 (80.6)
	Total	**4,694 (100.0)**	**11,070 (100.0)**	**170 (100.0)**
2019 Total no. of procedures = 14,321	Yes	1,673 (54.6)	1,222 (19.7)	10 (27.0)
	No	1,392 (45.4)	4,974 (80.3)	27 (73.0)
	Total	**3,065 (100.0)**	**6,196 (100.0)**	**37 (100.0)**
2020 Total no. of procedures = 12,646	Yes	1,706 (57.0)	1,214 (22.7)	26 (22.8)
	No	1,289 (43.0)	4,132 (77.3)	88 (77.2)
	Total	**2,995 (100.0)**	**5,346 (100.0)**	**114 (100.0)**
2019–2020 Total no. of procedures = 26,967	Yes	3,379 (55.8)	2,436 (21.1)	36 (23.8)
	No	2,681 (44.2)	9,106 (78.9)	115 (76.2)
	Total	**6,060 (100.0)**	**11,542 (100.0)**	**151 (100.0)**

Table 2.10.2 Comparison of previous PCI according to NSTEMI/UA PCI status, NCVD-PCI Registry, 2019–2020

Year	Previous PCI	Urgent	In hospital (>24 hrs.)	PCI within 30 days post event	Not available
		No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	Yes	132 (22.4)	367 (20.9)	152 (24.7)	28 (16.7)
	No	457 (77.6)	1,390 (79.1)	464 (75.3)	140 (83.3)
	Total	**589 (100.0)**	**1,757 (100.0)**	**616 (100.0)**	**168 (100.0)**
2019 Total no. of procedures = 14,321	Yes	103 (16.9)	254 (22.0)	117 (25.4)	14 (21.2)
	No	507 (83.1)	903 (78.1)	344 (74.6)	52 (78.8)
	Total	**610 (100.0)**	**1,157 (100.0)**	**461 (100.0)**	**66 (100.0)**
2020 Total no. of procedures = 12,646	Yes	110 (21.0)	221 (20.4)	60 (21.8)	21 (26.3)
	No	413 (79.0)	861 (79.6)	215 (78.2)	59 (73.8)
	Total	**523 (100.0)**	**1,082 (100.0)**	**275 (100.0)**	**80 (100.0)**
2019–2020 Total no. of procedures = 26,967	Yes	213 (18.8)	475 (21.2)	177 (24.1)	35 (24.0)
	No	920 (81.2)	1,764 (78.8)	559 (76.0)	111 (76.0)
	Total	**1,133 (100.0)**	**2,239 (100.0)**	**736 (100.0)**	**146 (100.0)**

Table 2.10.3 Comparison of previous PCI according to STEMI PCI status, NCVD-PCI Registry, 2019–2020

Year	Previous PCI	Rescue	Primary	Delayed routine PCI	Delayed selective PCI	Pharmaco-invasive	Not available
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	Yes	37 (5.6)	138 (7.5)	55 (5.0)	36 (9.4)	27 (4.7)	7 (6.4)
	No	621 (94.4)	1,700 (92.5)	1,045 (95.0)	347 (90.6)	549 (95.3)	103 (93.6)
	Total	**658 (100.0)**	**1,838 (100.0)**	**1,100 (100.0)**	**383 (100.0)**	**576 (100.0)**	**110 (100.0)**
2019 Total no. of procedures = 14,321	Yes	25 (6.3)	91 (8.6)	47 (7.3)	16 (9.3)	21 (5.0)	9 (23.7)
	No	371 (93.7)	962 (91.4)	600 (92.7)	157 (90.8)	401 (95.0)	29 (76.3)
	Total	**396 (100.0)**	**1,053 (100.0)**	**647 (100.0)**	**173 (100.0)**	**422 (100.0)**	**38 (100.0)**
2020 Total no. of procedures = 12,646	Yes	31 (9.6)	64 (11.5)	48 (7.3)	22 (11.5)	35 (7.5)	7 (18.4)
	No	291 (90.4)	491 (88.5)	607 (92.7)	169 (88.5)	435 (92.6)	31 (81.6)
	Total	**322 (100.0)**	**555 (100.0)**	**655 (100.0)**	**191 (100.0)**	**470 (100.0)**	**38 (100.0)**
2019–2020 Total no. of procedures = 26,967	Yes	56 (7.8)	155 (9.6)	95 (7.3)	38 (10.4)	56 (6.3)	16 (21.1)
	No	662 (92.2)	1,453 (90.4)	1,207 (92.7)	326 (89.6)	836 (93.7)	60 (79.0)
	Total	**718 (100.0)**	**1,608 (100.0)**	**1,302 (100.0)**	**364 (100.0)**	**892 (100.0)**	**76 (100.0)**

Table 2.11 Comparison of HbA1c according to PCI status, NCVD-PCI Registry, 2019–2020

Year	HbA1c (mmol/L)	Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	**N**	**5,369**	**681**	**761**
	Mean (SD)	7.2 (1.8)	7.5 (2.4)	7.6 (2.4)
	Median (min, max)	6.7 (4.0, 18.4)	6.9 (4.4, 30.0)	6.6 (4.2, 18.7)
	Not available, No. (%)	5,788 (36.3)	1,487 (47.5)	2,384 (51.1)
	Missing, No. (%)	4,777 (30.0)	962 (30.7)	1,520 (32.6)
2019 Total no. of procedures = 14,321	**N**	**2,523**	**450**	**314**
	Mean (SD)	7.0 (1.8)	7.2 (1.8)	7.4 (2.2)
	Median (min, max)	6.4 (4.0, 17.6)	6.7 (4.4, 15.1)	6.5 (4.2, 14.8)
	Not available, No. (%)	4,056 (43.6)	1,197 (52.2)	1,358 (49.8)
	Missing, No. (%)	2,719 (29.2)	647 (28.2)	1,057 (38.7)
2020 Total no. of procedures = 12,646	**N**	**2,122**	**406**	**334**
	Mean (SD)	7.2 (2.1)	7.4 (2.0)	7.3 (2.4)
	Median (min, max)	6.5 (4.1, 31.0)	6.6 (4.6, 15.4)	6.4 (4.4, 22.2)
	Not available, No. (%)	3,948 (46.7)	953 (48.6)	1,090 (48.9)
	Missing, No. (%)	2,385 (28.2)	601 (30.7)	807 (36.2)
2019–2020 Total no. of procedures = 26,967	**N**	**4,645**	**856**	**648**
	Mean (SD)	7.1 (1.9)	7.3 (1.9)	7.4 (2.3)
	Median (min, max)	6.4 (4.0, 31.0)	6.6 (4.4, 15.4)	6.5 (4.2, 22.2)
	Not available, No. (%)	8,004 (45.1)	2,150 (50.5)	2,448 (49.4)
	Missing, No. (%)	5,104 (28.8)	1,248 (29.3)	1,864 (37.6)

Table 2.12 Comparison of baseline creatinine according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Baseline creatinine (mmol/L)	Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	**N**	**11,771**	**2,451**	**3,199**
	Mean (SD)	119.0 (131.3)	131.5 (155.0)	100.6 (74.0)
	Median (min, max)	90.0 (44.0, 1,791.0)	90.0 (45.0, 1,495.0)	88.0 (44.0, 1,750.0)
	Not available, No. (%)	889 (5.6)	268 (8.6)	708 (15.2)
	Missing, No. (%)	3,274 (20.6)	411 (13.1)	758 (16.3)
2019 Total no. of procedures = 14,321	**N**	**7,485**	**1815**	**1,716**
	Mean (SD)	121.2 (136.6)	131.0 (164.9)	105.7 (88.3)
	Median (min, max)	90.0 (44.0, 1,628.0)	90.0 (44.0, 1,775.0)	90.0 (44.7, 1,434.0)
	Not available, No. (%)	806 (8.7)	233 (10.2)	471 (17.3)
	Missing, No. (%)	1,007 (10.8)	246 (10.7)	542 (19.9)
2020 Total no. of procedures = 12,646	**N**	**7,177**	**1,621**	**1,620**
	Mean (SD)	122.0 (134.5)	131.2 (162.1)	104.8 (99.8)
	Median (min, max)	92.0 (44.0, 1,768.0)	92.0 (44.0, 1,450.0)	89.0 (44.0, 1,632.0)
	Not available, No. (%)	528 (6.2)	123 (6.3)	249 (11.2)
	Missing, No. (%)	750 (8.9)	216 (11.0)	362 (16.2)
2019–2020 Total no. of procedures = 26,967	**N**	**14,662**	**3,436**	**3,336**
	Mean (SD)	121.6 (135.6)	131.1 (163.6)	105.3 (94.0)
	Median (min, max)	91.0 (44.0, 1,768.0)	91.0 (44.0, 1,775.0)	89.0 (44.0, 1,632.0)
	Not available, No. (%)	1,334 (7.5)	356 (8.4)	720 (14.5)
	Missing, No. (%)	1,757 (9.9)	462 (10.9)	904 (18.2)

Table 2.13 Comparison of GFR according to PCI status, NCVD-PCI Registry, 2019–2020

Year	GFR	Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	**N**	**11,799**	**2,458**	**3,209**
	Mean (SD)	76.1 (26.2)	74.4 (29.1)	81.3 (25.5)
	Median (min, max)	77.6 (2.6, 189.3)	76.7 (2.4, 193.5)	81.2 (2.8, 183.6)
	Missing, No. (%)	4,135 (26.0)	672 (21.5)	1,456 (31.2)
2019 Total no. of procedures = 14,321	**N**	**6,552**	**1720**	**1,617**
	Mean (SD)	75.8 (26.1)	75.4 (28.1)	79.6 (26.4)
	Median (min, max)	77.7 (2.8, 198.9)	77.9 (2.9, 188.8)	79.4 (3.0, 188.4)
	Missing, No. (%)	2,032 (23.7)	477 (21.7)	1,004 (38.3)
2020 Total no. of procedures = 12,646	**N**	**6,770**	**1570**	**1,592**
	Mean (SD)	74.7 (25.7)	74.9 (27.5)	80.7 (24.5)
	Median (min, max)	76.3 (2.7, 197.2)	76.7 (2.8, 183.8)	80.7 (2.9, 185.6)
	Missing, No. (%)	1,225 (15.3)	331 (17.4)	593 (27.1)
2019–2020 Total no. of procedures = 26,967	**N**	**14,967**	**3,449**	**3,347**
	Mean (SD)	74.8 (26.0)	74.8 (28.1)	80.1 (25.5)
	Median (min, max)	76.7 (2.7, 198.9)	77.0 (2.6, 188.8)	80.2 (2.9, 188.4)
	Missing, No. (%)	3,056 (17.2)	805 (18.9)	1,613 (32.5)

Table 2.14 Comparison of total cholesterol according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Total cholesterol (mmol/L)	Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	**N**	**6,660**	**1,116**	**1,565**
	Mean (SD)	4.4 (1.4)	4.7 (1.4)	5.4 (1.4)
	Median (min, max)	4.2 (2.0, 17.5)	4.6 (2.0, 12.3)	5.3 (2.1, 11.7)
	Not available, No. (%)	4,592 (28.8)	1,227 (39.2)	1,871 (40.1)
	Missing, No. (%)	4,682 (29.4)	787 (25.1)	1,229 (26.3)
2019 Total no. of procedures = 14,321	**N**	**3,912**	**927**	**802**
	Mean (SD)	4.4 (1.4)	4.7 (1.4)	5.4 (1.5)
	Median (min, max)	4.1 (2.0, 14.5)	4.6 (2.0, 13.0)	5.4 (2.0, 15.0)
	Not available, No. (%)	3,172 (34.1)	853 (37.2)	1,077 (39.5)
	Missing, No. (%)	2,214 (23.8)	514 (22.4)	850 (31.2)
2020 Total no. of procedures = 12,646	**N**	**3,811**	**833**	**770**
	Mean (SD)	4.5 (1.4)	4.9 (1.5)	5.4 (1.5)
	Median (min, max)	4.2 (2.0, 14.5)	4.7 (2.0, 10.6)	5.3 (2.0, 14.9)
	Not available, No. (%)	2,684 (31.7)	616 (31.4)	759 (34.0)
	Missing, No. (%)	1,960 (23.2)	511 (26.1)	702 (31.5)
2019–2020 Total no. of procedures = 26,967	**N**	**7,723**	**1,760**	**1,572**
	Mean (SD)	4.5 (1.4)	4.8 (1.5)	5.4 (1.5)
	Median (min, max)	4.2 (2.0, 14.5)	4.6 (2.0, 13.0)	5.3 (2.0, 15.0)
	Not available, No. (%)	5,856 (33.0)	1,469 (34.5)	1,836 (37.0)
	Missing, No. (%)	4,174 (23.5)	1,025 (24.1)	1,552 (31.3)

Table 2.15 Comparison of LDL according to PCI status, NCVD-PCI Registry, 2019–2020

Year	LDL cholesterol (mmol/L)	Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	**N**	**6,342**	**1,040**	**1,474**
	Mean (SD)	2.5 (1.3)	2.9 (1.3)	3.5 (1.3)
	Median (min, max)	2.3 (0.8, 19.0)	2.7 (0.7, 11.8)	3.4 (0.8, 18.9)
	Not available, No. (%)	4,633 (29.1)	1,250 (39.9)	1,880 (40.3)
	Missing, No. (%)	4,959 (31.1)	840 (26.8)	1,311 (28.1)
2019 Total no. of procedures = 14,321	**N**	**3,668**	**844**	**745**
	Mean (SD)	2.5 (1.3)	2.8 (1.3)	3.5 (1.3)
	Median (min, max)	2.2 (0.7, 20.0)	2.7 (0.8, 12.1)	3.4 (0.8, 11.9)
	Not available, No. (%)	3,246 (34.9)	875 (38.1)	1,098 (40.2)
	Missing, No. (%)	2,384 (25.6)	575 (25.1)	886 (32.5)
2020 Total no. of procedures = 12,646	**N**	**3,224**	**733**	**691**
	Mean (SD)	2.6 (1.3)	3.0 (1.3)	3.5 (1.3)
	Median (min, max)	2.3 (0.8, 20.0)	2.8 (0.8, 8.7)	3.4 (0.8, 13.2)
	Not available, No. (%)	2,739 (32.4)	651 (33.2)	783 (35.1)
	Missing, No. (%)	2,136 (25.3)	536 (27.4)	739 (33.1)
2019–2020 Total no. of procedures = 26,967	**N**	**7,248**	**1,617**	**1,454**
	Mean (SD)	2.6 (1.3)	2.9 (1.3)	3.5 (1.3)
	Median (min, max)	2.3 (0.7, 20.0)	2.7 (0.8, 12.1)	3.4 (0.8, 13.2)
	Not available, No. (%)	5,985 (33.7)	1,526 (35.9)	1,881 (37.9)
	Missing, No. (%)	4,520 (25.5)	1,111 (26.1)	1,625 (32.8)

Table 2.16 Comparison of functional ischaemia according to PCI status, NCVD-PCI Registry, 2019–2020

Year	Functional ischaemia	Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of procedures = 23,729	Positive	833 (93.6)	153 (96.8)	78 (90.7)
	Negative	28 (3.2)	3 (1.9)	2 (2.3)
	Equivocal	29 (3.3)	2 (1.3)	6 (7.0)
	Not available	4,003	905	1,424
	Missing	11,041	2,067	3,155
	Total	**15,934**	**3,130**	**4,665**
2019 Total no. of procedures = 14,321	Positive	582 (91.5)	118 (90.8)	73 (90.1)
	Negative	40 (6.3)	9 (6.9)	7 (8.6)
	Equivocal	14 (2.2)	3 (2.3)	1 (1.2)
	Not available	2,901	769	932
	Missing	5,761	1,395	1,716
	Total	**9,298**	**2,294**	**2,729**
2020 Total no. of procedures = 12,646	Positive	1,064 (93.7)	155 (93.4)	114 (95.8)
	Negative	43 (3.8)	7 (4.2)	3 (2.5)
	Equivocal	28 (2.5)	4 (2.4)	2 (1.7)
	Not available	2,572	773	814
	Missing	4,748	1,021	1,298
	Total	**8,455**	**1,960**	**2,231**
2019–2020 Total no. of procedures = 26,967	Positive	1,646 (92.9)	273 (92.2)	187 (93.5)
	Negative	83 (4.7)	16 (5.4)	10 (5.0)
	Equivocal	42 (2.4)	7 (2.4)	3 (1.5)
	Not available	5,473	1,542	1,746
	Missing	10,509	2,416	3,014
	Total	**17,753**	**4,254**	**4,960**

Table 2.17 Comparison of ECG rhythm according to ACS subtypes, NCVD-PCI Registry, 2019–2020

Year	ECG rhythm	STEMI	NSTEMI	UA	Chronic stable angina
		No (%)	No (%)	No (%)	No (%)
2017–2018 Total no. of procedures = 23,729	**Total**	**5,330**	**3,901**	**2,328**	**4,040**
	Sinus rhythm	3,413 (14.4)	2,762 (11.6)	1,752 (7.4)	3,091 (13.0)
	Atrial fibrillation	40 (0.2)	40 (0.2)	28 (0.1)	34 (0.1)
	2nd/3rd AVB	46 (0.2)	8 (0.0)	4 (0.0)	5 (0.0)
	LBBB	11 (0.0)	11 (0.0)	11 (0.0)	7 (0.0)
	RBBB	18 (0.1)	16 (0.1)	5 (0.0)	4 (0.0)
	ST deviation	291 (1.2)	18 (0.1)	11 (0.0)	10 (0.0)
2019 Total no. of procedures = 14,321	**Total**	**6,263**	**3,644**	**1796**	**2476**
	Sinus rhythm	2,181 (66.8)	2,551 (70.0)	1,414 (78.7)	1,692 (68.3)
	Atrial fibrillation	27 (0.8)	36 (1.0)	18 (1.0)	22 (0.9)
	2nd/3rd AVB	20 (0.6)	8 (0.2)	7 (0.4)	1 (0.0)
	LBBB	7 (0.2)	6 (0.2)	1 (0.2)	4 (0.2)
	RBBB	6 (0.2)	10 (0.3)	7 (0.4)	8 (0.3)
	ST deviation	77 (2.4)	39 (1.1)	34 (1.9)	9 (0.4)
2020 Total no. of procedures = 12,646	**Total**	**2,917**	**3,879**	**1819**	**2296**
	Sinus rhythm	2,151 (73.7)	3,030 (78.1)	1,462 (80.4)	1,681 (73.2)
	Atrial fibrillation	18 (0.6)	26 (0.7)	22 (1.2)	20 (0.9)
	2nd/3rd AVB	10 (0.4)	11 (0.3)	4 (0.2)	3 (0.1)
	LBBB	8 (0.3)	8 (0.3)	3 (0.2)	1 (0.0)
	RBBB	7 (0.2)	16 (0.4)	14 (0.8)	5 (0.2)
	ST deviation	132 (4.5)	64 (1.7)	34 (1.9)	4 (0.2)
2019–2020 Total no. of procedures = 26,967	**Total**	**6,180**	**7,523**	**3,615**	**4,772**
	Sinus rhythm	4,332 (70.1)	5,581 (74.2)	2,876 (79.6)	3,373 (70.7)
	Atrial fibrillation	45 (0.7)	62 (0.8)	40 (1.1)	42 (0.9)
	2nd/3rd AVB	30 (0.5)	19 (0.3)	11 (0.3)	4 (0.1)
	LBBB	15 (0.2)	16 (0.2)	4 (0.1)	5 (0.1)
	RBBB	13 (0.2)	26 (0.4)	21 (0.6)	13 (0.3)
	ST deviation	209 (3.4)	103 (1.4)	68 (1.9)	13 (0.3)

Table 2.18 Comparison of IABP use according to ACS subtypes, NCVD-PCI Registry, 2019–2020

Year	IABP	STEMI	NSTEMI	UA	Chronic stable angina
		No (%)	**No (%)**	**No (%)**	**No (%)**
2017–2018 Total no. of procedures = 23,729	Yes	68 (1.4)	22 (0.6)	3 (0.1)	9 (0.2)
	No	4,906 (98.6)	3,608 (99.4)	2,245 (99.9)	3,936 (99.8)
	Not applicable	21	18	4	8
	Missing	336	253	76	87
	Total	**5,331**	**3,901**	**2,328**	**4,040**
2019 Total no. of procedures = 14,321	Yes	26 (0.8)	18 (0.5)	3 (0.2)	8 (0.3)
	No	3,055 (99.2)	3,442 (99.5)	1,737 (99.8)	2,401 (99.7)
	Not applicable	8	11	4	2
	Missing	174	173	52	65
	Total	**3,263**	**3,644**	**1,796**	**2,476**
2020 Total no. of procedures = 12,646	Yes	21 (0.8)	12 (0.3)	4 (0.2)	4 (0.2)
	No	2,759 (99.2)	3,747 (99.7)	1,762 (99.8)	2,242 (99.8)
	Not applicable	7	5	4	3
	Missing	130	115	49	47
	Total	**2,917**	**2,879**	**1,819**	**2,296**
2019–2020 Total no. of procedures = 26,967	Yes	47 (0.8)	30 (0.4)	7 (0.2)	12 (0.3)
	No	5,814 (99.2)	7,189 (99.6)	3,499 (99.8)	4,653 (99.7)
	Not applicable	15	16	8	5
	Missing	304	288	101	112
	Total	**6,180**	**7,523**	**3,615**	**4,772**

PROCEDURAL SETTINGS

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Summary

1. There was a 13.7% increase in the total number of PCIs performed in 2019–2020, versus 2017–2018.
2. There was a significant drop in primary PCIs performed in 2019–2020, versus the preceding years, likely attributed to the COVID-19 pandemic.
3. There was, consequently, increased numbers of delayed routine PCIs, rescue PCIs and pharmaco-invasive PCIs in 2019–2020, versus 2017–2018.
4. Radial access remained the route of choice for percutaneous PCI.
5. Use of ticagrelor as an alternative P2Y12-receptor inhibitor saw an exponential growth, as observed in preceding years.

Introduction

This chapter will discuss procedural settings for patients who underwent percutaneous coronary intervention (PCI) between 2019 and 2020. The inclusion criteria for analysis were patients ages 20 years or older, who underwent PCI between 1st January 2019 and 31st December 2020. The total number of PCIs performed during this duration was 26,967 procedures, a 13.7% increase versus the total number of PCIs performed in 2017–2018. [Table 3.1]

Characteristics of PCI procedures & thrombolytic use

Majority of PCIs were performed in an elective setting (65.8%), whilst the remaining were performed following acute coronary syndrome (ACS) during index admission; either in the event of a Non-ST Elevation Myocardial Infarction or unstable angina (NSTEMI/UA) (15.8 %); or ST Elevation Myocardial Infarction (STEMI) (18.4%). [Table 3.1]

For elective PCIs, the total number of cases increased by 11.4% from 2017–2018 (N=15,934) to 2019–2020 (N=17,753). Majority of elective PCIs remained to be ad hoc PCIs (65.6%), although there was a 4.2% drop compared to the previous cohort. Additionally, 34.4% were staged PCI. [Table 3.1]

Commonest findings angiographically was single vessel disease (73.0%), followed by multi-vessel disease (23.4%). Up to 2.8% had left main stem involvement and 0.7% had bypass graft involvement during PCI. When compared to the 2017–2018 cohort, the extent of coronary artery disease was fairly similar to the 2019–2020. [Table 3.1]

Likewise, there was an increase in the number of PCI cases performed for both NSTEMI/UA and STEMI (35.9% and 6.3% respectively) compared to the 2017–2018 cohort. Majority of PCI procedures for NSTEMI/UA were performed during index hospitalisation (54.5%). Majority of PCI procedure for STEMI were performed as primary PCIs, although there were decreases in the number of primary PCIs performed from 2017–2018 to 2019–2020 (12.5% decrease) as well as in the overall proportion of STEMI PCIs performed as primary PCIs (32.9% of total STEMI PCIs in 2019–2020, versus 40.4% in 2017–2018). Furthermore, there were increases in the number of delayed routine PCIs, rescue PCIs and pharmaco-invasive PCIs (increase of 18.4%, 9.1% and 54.9%, respectively) in 2019–2020 versus 2017–2018. Of those with STEMI-ACS, only 30.2% had received thrombolytics therapy, which was similar to the previous cohort. [Table 3.1]

Malaysia underwent changes in practices due to the SARS-CoV-2 virus prior to our first case being reported on the 25th January 2020. As the ongoing threat of the virus continued, many clinical services including acute

cardiovascular care were forced to adapt.[1] One of the earliest guides in dealing with STEMI during the pandemic produced was from Sichuan, China.[2] In cases of COVID-19 proven patients presenting within a 12-hour window from symptom onset, thrombolysis within an isolated area was the preferred option. This was to ensure that minimal contact was maintained throughout the management of patients with STEMI. Primary PCI was only performed in those presenting outside this window or who had failed thrombolytics. Even then, the degree of pneumonia was accounted for to gauge futility. It should be noted that at the time of these guidelines, the true virulence of COVID-19 was yet to be established, illustrating the already cautious approach taken by Sichuan physicians at the start of the epidemic. Guidelines from various parts of the world, including Malaysia, soon emerged echoing this stance in managing simultaneous COVID-19 infections and STEMI, while acknowledging limitations in delivering effective primary PCI during these troubling times.[3-6]

However, there were also criticisms of the favouring of thrombolytic use due to concerns of evidence-based, suboptimal care and major risks following thrombolytics administration and subsequent unfamiliarity in dealing with complications.[7,8] Furthermore, a case series illustrating ST-elevation changes with concurrent COVID-19 infection showed a high prevalence of non-obstructive coronary disease in this group of patients, suggesting a multifactorial pathological process taking place, for whom the benefit of thrombolysis remains in question.[9] An even more conservative approach is taken for NSTEMI/UA patients who were infected by COVID-19, that is delaying coronary assessment until immediate COVID-19 infection had resolved. The National Heart Association of Malaysia (NHAM) and its sub-society, the Interventional Cardiovascular Society of Malaysia, had similarly introduced guidelines on ACS management during COVID-19, promoting thrombolytic administration in favour of primary PCI, which was widely adopted by all cardiac centres in Malaysia.[10]

Unsurprisingly, there had been reports of great reductions in catheterisation laboratory activation worldwide. Numbers had dropped by 38% in the USA and 70% in Italy.[11] Data from South-East Asia and the Middle East showed a significant decrease in PCI cases from prior to COVID-19 to during the COVID-19 period (13,089 versus 11,449; p=0.020). Although this data was mainly driven by data from Singapore. In contrast, the PCI case load in both Malaysia and Abu Dhabi remained relatively constant (p>0.05) during that period.[12] Contributing factors include rising numbers of fibrinolytics use and reduced numbers of patients presenting to the emergency departments globally, fearing COVID-19 infection. The reduction in patients presenting to emergency departments remained an even bigger cause for concern as acknowledged and addressed by major societies like the European Society of Cardiology.[13,14]

Route of percutaneous access, guiding type and size, use of closure device, adjunctive procedures, fluoroscopy time, and contrast use

The commonest route for percutaneous access remained via radial (78.3%), followed by femoral (25.3%) and brachial (1.0%) artery routes respectively. There was a slight increase (14.4% increase) in the number of PCIs performed via radial compared to the 2017–2018 cohort. [Table 3.1] Radial was also the commonest route of access, irrespective of type of PCI (elective or in response to an ACS event), with far more radial-accessed PCIs being performed in 2019–2020, versus 2017–2018. Trans-radial approach has been the default route of access for coronary angiography and percutaneous coronary intervention, with a Class I recommendation in the European Society of Cardiology guidelines.[15,16] This is mainly driven by lower rates of bleeding, vascular complications, and overall mortality.[17]

The commonest choice of sheath includes conventional catheter sheaths (92.4%), followed by slender sheaths (7.6%). Conventional catheter sheaths were often 6 or 7 French in size (94.6% and 5.0%, respectively), and slender sheaths were also often 6 or 7 French in size (97.5% and 2.4%, respectively). Although the use of closure devices, as a whole, remained uncommon in clinical practice (89.8% with no closure devices used following PCI) likely due to the predominant use of radial route for access, there was an increase in the use of seal-based devices from 2017–2018 to 2019–2020 (67.5% increase). This was possibly due to wide availability of such devices over time. The need for mechanical ventilation (0.4%) and temporary cardiac pacing wire insertion (0.4%) peri-procedurally remained low and relatively similar to 2017–2018. [Table 3.1]

The mean fluoroscopy time for PCI was 20.6 minutes (SD 16.2 minutes), with a median of 16.0 minutes (min 1.0 minute, max 180.0 minutes). The mean fluoroscopy radiation dose for PCI was 45,227.9 mGy (SD 235,304.4 mGy), with a median of 2,276.2 mGy (min 0.0 mGy, max 20,621,600.0 mGy). The mean volume of contrast used during PCI was 156.3 mL (SD 66.6 mL), with a median of 150.0 mL (min 20.0 mL, max 500.0 mL). When compared to 2017–2018, fluoroscopy time, radiation dose and contrast volumes were relatively similar to 2019–2020. [Table 3.1]

Medication, duration of thienopyridine

The use of glycoprotein IIb/IIIa (GPIIb/IIIa) remained low in our Malaysian setting (1.1%); majority of which were instituted during the PCI procedure itself (73.9% of those prescribed). There was also predominant use of heparin (95.1%) over low-molecular weight heparin (LMWH) (1.0%) during PCI procedures. [Table 3.1]

This is in line with contemporary recommendations advocating for a balanced and more selective use of GPIIb/IIIa, bivalirudin and LMWH in the setting of ACS.[18,19] Aspirin (66.2%), clopidogrel (55.6%), prasugrel (0.3%), ticagrelor (43.3%) and fondaparinux (8.0%) use remained relatively similar in 2019–2020, versus 2017–2018. With regards to clopidogrel, the commonest initial dose of the drug was 75 mg (57.0%). However, among those with STEMI and prescribed clopidogrel, majority received an initial dose of 300 mg (54.3%). Among those prescribed clopidogrel, majority were planned for 12 months total in duration (93.3%). As noted in the previous NCVD-PCI 2017–2018 report, there continues to be an exponential rise in the use of ticagrelor as the P2Y12-receptor inhibitor of choice, with an increase of 49.5% in 2019–2020. This comes as no surprise following the increased availability of ticagrelor in Malaysia, and updated recommendations of using ticagrelor, alongside prasugrel, as alternatives for antiplatelet therapy in PCI and ACS cases.[18-20] [Table 3.1]

Table 3.2 highlights an important shift in current PCI practice – the move away from the use of bare-metal stents. Majority of patients in the 2019–2020 cohort underwent PCI using drug-eluting stents (DES) (72.1%). Those who underwent PCI using DES were commonly planned for 12 months of thienopyridine therapy (91.9%).

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Table 3.1 PCI status of patients who underwent procedures, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Characteristics of PCI procedures				
PCI status, No. (%)				
Elective	15,934 (67.2)	9,298 (64.9)	8,455 (66.9)	17,753 (65.8)
NSTEMI/UA	3,130 (13.2)	2,294 (16.0)	1,960 (15.5)	4,254 (15.8)
STEMI	4,665 (19.7)	2,729 (19.1)	2,231 (17.6)	4,960 (18.4)
Elective, No. (%)	**N=15,934**	**N=9,298**	**N=8,455**	**N=17,753**
Staged PCI	4,694 (29.8)	3,065 (33.1)	2,995 (35.9)	6,060 (34.4)
Ad hoc	11,070 (70.2)	6,196 (66.9)	5,346 (64.1)	11,542 (65.6)
Not available	170	37	114	151
NSTEMI/UA, No. (%)	**N=3,130**	**N=2,294**	**N=1,960**	**N=4,254**
Urgent	589 (19.9)	601 (27.4)	523 (27.8)	1,133 (27.6)
In hospital	1,757 (59.3)	1,157 (51.9)	1,082 (57.6)	2,239 (54.5)
PCI within 30 days post event	616 (20.8)	461 (20.7)	275 (14.6)	736 (17.9)
Not available	168	66	80	146
STEMI, No. (%)	**N=4,665**	**N=2,729**	**N=2,231**	**N=4,960**
Rescue	658 (14.5)	396 (14.7)	322 (114.7)	718 (14.7)
Primary	1,838 (40.4)	1,053 (39.1)	555 (25.3)	1,608 (32.9)
Delayed routine PCI	1,100 (24.2)	647 (24.0)	655 (29.9)	1,302 (26.7)
Delayed selective PCI	383 (8.4)	173 (6.4)	191 (8.7)	364 (7.5)
Pharmaco-invasive	576 (12.7)	422 (15.7)	470 (21.4)	892 (18.3)
Not available	110	38	38	76
#Percutaneous entry, No. (%)				
Brachial	242 (1.0)	137 (1.0)	140 (1.1)	277 (1.0)
Radial	18,456 (77.8)	11,198 (78.2)	9,916 (78.4)	21,114 (78.3)
Femoral	5,975 (25.2)	3,660 (25.6)	3,148 (24.9)	6,808 (25.3)
French size type				
Guiding catheter	21,761 (92.0)	13,269 (92.8)	11,624 (92.0)	24,893 (92.4)
Guiding sheath (slender)	1,898 (8.0)	1,028 (7.2)	1,015 (8.0)	2,043 (7.6)
Not available	30	24	7	31
Missing	40	0	0	0
French size (guiding catheter), No. (%)	**N=21761**	**N=13269**	**N=11,616**	**N=24,893**
4	8 (0.0)	2 (0.0)	4 (0.0)	6 (0.0)
5	37 (0.2)	15 (0.1)	59 (0.5)	74 (0.3)
6	21,172 (97.3)	12,547 (94.6)	10,990 (94.6)	23,537 (94.6)
7	519 (2.4)	687 (5.2)	554 (4.8)	1,241 (5.0)
8	9 (0.0)	13 (0.1)	4 (0.0)	17 (0.1)
Others	5 (0.0)	2 (0.0)	5 (0.0)	7 (0.0)
Not available	11	3	8	11

Year	**2017–2018**	**2019**	**2020**	**2019–2020**
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Characteristics of PCI procedures				
French size (sheath), No. (%)	**N=1,898**	**N=1,028**	**N=1,015**	**N=2,043**
4	0 (0)	1 (0.1)	0 (0)	1 (0.1)
5	3 (0.2)	1 (0.1)	1 (0.1)	2 (0.1)
6	1,856 (97.8)	1,001 (97.7)	986 (97.2)	1,987 (97.5)
7	39 (2.1)	22 (2.2)	27 (2.7)	49 (2.4)
8	0 (0)	0 (0)	0 (0)	0 (0)
Others	0 (0)	0 (0)	0 (0)	0 (0)
Not available	0	3	1	4
Other adjunctive procedure, No. (%)				
Yes	217 (1.0)	125 (0.9)	90 (0.8)	215 (0.8)
Ventilator	99 (45.6)	55 (44.0)	42 (46.7)	97 (45.1)
Temporary Cardiac Pacing Wire	104 (47.9)	52 (41.6)	44 (48.9)	96 (44.7)
No	21,618 (99.0)	13,736 (99.1)	11,989 (99.3)	25,725 (99.2)
Not applicable	72	26	34	60
Missing	1,822	434	533	967
Closure device, No. (%)				
No	19,053 (91.1)	11,282 (89.6)	9,713 (90.0)	20,995 (89.8)
Seal	554 (2.7)	553 (4.4)	375 (3.5)	928 (4.0)
Suture	730 (3.5)	405 (3.2)	405 (3.8)	810 (3.5)
Exoseal	70 (0.3)	53 (0.4)	9 (0.1)	62 (0.3)
Others	508 (2.4)	297 (2.4)	291 (2.7)	588 (2.5)
Not available	197	52	144	196
Missing	2,617	1,679	1,709	3,388
[+]Extent of coronary disease, No. (%)				
Single vessel disease	18,720 (78.9)	10,512 (73.4)	9,172 (72.5)	19,684 (73.0)
Multiple vessel disease	4,198 (17.7)	3,265 (22.8)	3,054 (24.2)	6,319 (23.4)
Left main/LMS	574 (2.4)	433 (3.0)	334 (2.6)	767 (2.8)
Graft	235 (1.0)	111 (0.8)	86 (0.7)	197 (0.7)
Not available	2	0	0	0
Fluoroscopy time, min				
N	19,140	12,578	11,464	24,042
Mean (SD)	19.3 (15.3)	20.1 (16.3)	21.1 (16.2)	20.6 (16.2)
Median (min, max)	15.2 (1.0, 180.0)	15.4 (1.0, 180.0)	16.5 (1.0, 180.0)	16.0 (1.0, 180.0)
Not available, No. (%)	1,075 (4.5)	746 (5.2)	613 (4.9)	1,359 (5.0)
Missing, No. (%)	3,514 (14.8)	997 (7.0)	569 (4.5)	1,566 (5.8)

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Fluoroscopy total dose, mGy				
N	12,988	8,094	6,928	15,022
Mean (SD)	52,362.8 (127,979.4)	41,538.8 (250,524.8)	49,537.9 (216,107.5)	45,227.9 (235,304.4)
Median (min, max)	2,205.5 (0.0, 4,100,644.0)	2,057.0 (0.0, 20,621,600.0)	2,576.0 (1.6, 11,163,582.0)	2,276.2 (0.0, 20,621,600.0)
Not available, No. (%)	4,120 (17.4)	2,564 (17.9)	3,077 (24.3)	5,641 (20.9)
Missing, No. (%)	6,621 (27.9)	3,663 (25.6)	2,641 (20.9)	6,304 (23.4)
Contrast volume, ml				
N	19,120	12,321	11,429	23,750
Mean (SD)	156.2 (64.0)	154.8 (65.1)	157.9 (68.1)	156.3 (66.6)
Median (min, max)	150.0 (18.0, 500.0)	150.0 (20.0, 500.0)	150.0 (20.0, 500.0)	150.0 (20.0, 500.0)
Not available, No. (%)	1,024 (4.3)	998 (7.0)	684 (5.4)	1,682 (6.2)
Missing, No. (%)	3,587 (15.1)	1,002 (7.0)	533 (4.2)	1,535 (5.7)
Thrombolytics prior to PCI procedure in ACS STEMI, No. (%)				
Total no. of procedures among ACS STEMI patients	**N=5,475**	**N=3,263**	**N=2,917**	**N=6,180**
Yes	1,514 (27.7)	918 (28.1)	945 (32.4)	1,863 (30.2)
No	3,961 (72.4)	2,345 (71.9)	1,972 (67.6)	4,317 (69.9)
Duration of thrombolytics given prior to PCI procedure in ACS STEMI, No. (%)	**N=1,514**	**N=918**	**N=945**	**N=1,863**
<3 hrs	318 (22.4)	210 (24.3)	202 (22.3)	412 (23.2)
3–6 hrs	320 (22.6)	261 (30.2)	302 (33.4)	564 (31.8)
6–12 hrs	190 (13.4)	128 (14.8)	86 (9.5)	214 (12.1)
12–24 hrs	164 (11.6)	93 (10.8)	73 (8.0)	166 (9.4)
>24 hrs	425 (30.0)	173 (20.0)	244 (26.9)	417 (23.5)
Not available	97	53	37	90
Medications				
IIb/IIIa Blockade, No. (%)				
Yes	292 (1.2)	122 (0.9)	161 (1.3)	283 (1.1)
No	23,437 (98.8)	14,199 (99.2)	12,485 (98.7)	26,684 (99.0)
IIb/IIIa blockade given status, No. (%)	**N=292**	**N=122**	**N=161**	**N=283**
Prior	60 (21.8)	14 (12.2)	14 (8.9)	28 (10.3)
After	166 (60.4)	80 (69.6)	121 (77.1)	201 (73.9)
During	49 (17.8)	21 (18.3)	22 (14.0)	43 (15.8)
Not available	17	7	4	11

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Heparin, No. (%)				
Yes	22,433 (94.5)	13,728 (95.9)	11,919 (94.3)	25,647 (95.1)
No	1,296 (5.5)	593 (4.1)	727 (5.8)	1,320 (4.9)
LMWH, No. (%)				
Yes	323 (1.4)	122 (0.9)	56 (1.2)	278 (1.0)
No	23,406 (98.6)	14,199 (99.2)	12,490 (98.9)	26,689 (99.0)
Ticlopidine, No. (%)				
Yes	46 (0.2)	23 (0.2)	26 (0.2)	49 (0.2)
No	23,683 (99.8)	14,298 (99.8)	12,620 (99.8)	26,918 (99.8)
Aspirin, No. (%)				
Yes	17,873 (75.3)	9,975 (69.7)	7,873 (62.3)	17,848 (66.2)
No	5,856 (24.7)	4,346 (30.4)	4,773 (37.7)	9,119 (33.8)
Clopidogrel, No. (%)				
Yes	15,731 (66.3)	7,564 (55.6)	7,037 (55.7)	15,001 (55.6)
No	7,998 (33.7)	6,357 (44.4)	5,609 (44.4)	11,966 (44.4)
First starting dose, mg, No. (%)	**N=15,731**	**N=7,564**	**N=7,037**	**N=15,001**
75	9,495 (61.6)	4,553 (58.2)	3,871 (55.5)	8,424 (57.0)
300	4,594 (29.8)	2,379 (30.4)	2,465 (35.4)	4,844 (32.8)
600	1,335 (8.7)	885 (11.3)	634 (9.1)	1,519 (10.3)
≥1200	1 (0.0)	0 (0)	0 (0)	0 (0)
Not available	306	147	67	214
*Clopidogrel dose of ACS STEMI patient, mg, No. (%)				
Total no. of PCI procedures among ACS STEMI patients who are taking Clopidogrel	**N=3,512**	**N=1,991**	**N=17,685**	**N=3,776**
75	1026 (30.1)	712 (36.4)	647 (36.8)	1359 (36.6)
300	2023 (59.3)	1015 (51.9)	1002 (56.9)	2017 (54.3)
600	359 (10.5)	228 (11.7)	111 (6.3)	339 (9.1)
≥1200	1 (0.0)	0 (0)	0 (0)	0 (0)
Not available	103	36	25	61
Fondaparinox, No. (%)				
Yes	1,721 (7.3)	1,142 (8.0)	1,025 (8.1)	2,167 (8.0)
No	22,008 (92.7)	13,179 (92.0)	11,621 (91.9)	24,800 (92.0)

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
Prasugrel, No. (%)				
Yes	118 (0.5)	46 (0.3)	47 (0.4)	93 (0.3)
No	23,611 (99.5)	14,275 (99.7)	12,599 (99.6)	26,874 (99.7)
Ticagrelor, No. (%)				
Yes	7,800 (32.9)	6,202 (43.3)	5,462 (43.2)	11,664 (43.3)
No	15,929 (67.1)	8,119 (56.7)	7,184 (56.8)	15,303 (56.8)
Planned duration of clopidogrel/ticlopidine, month, No. (%)				
1	330 (1.5)	158 (1.2)	101 (0.8)	259 (1.0)
3	393 (1.8)	192 (1.5)	222 (1.9)	414 (1.6)
6	521 (2.4)	582 (4.4)	667 (5.6)	1,249 (5.0)
12	20,509 (93.1)	12,034 (90.7)	10,851 (90.6)	22,885 (90.6)
>12	277 (1.3)	305 (2.3)	139 (1.2)	444 (1.8)
Not available	870	618	219	837
Missing	829	432	447	879

#Patients can be in more than one type of category

[+]Extent of coronary disease referring to:

"Single vessel disease refers to patients with single vessel disease information (old CRF)/ patients with only one information of either LAD, LCx or RCA

Multiple vessel disease refers to patients with multiple vessel disease information (old CRF)/patients with more than one information of LAD, LCx or RCA

Left main stem (LMS) refers to patients with information of LMS (LMS alone or in combination with LAD, LCx, RCA or single vessel disease)

Graft refers to patients with information on graft (graft alone or in combination with LAD, LCx, RCA, single vessel disease, multiple vessel disease or LMS)

**Only applicable to STEMI patients who are taking Clopidogrel*

Table 3.2 Duration of thienopyridine in patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Year	Planned duration of clopidogrel/ticlopidine (months)	[#]Intracoronary devices used		
		Balloon only/POBA	Drug eluting stent	Bare metal stent
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of lesions = 28,354	1	75 (2.1)	171 (0.9)	27 (19.0)
	3	76 (2.1)	78 (0.4)	9 (6.3)
	6	121 (3.3)	320 (1.7)	8 (5.6)
	12	3,267 (89.3)	17,762 (95.5)	95 (66.9)
	>12	119 (3.3)	262 (1.4)	3 (2.1)
	Not available	114	411	4
	Missing	105	815	3
	Total	**3,877**	**19,819**	**149**
2019 Total no. of lesions = 17,397	1	55 (1.5)	82 (0.7)	0 (0)
	3	51 (1.4)	37 (0.3)	0 (0)
	6	342 (9.1)	560 (4.7)	0 (0)
	12	3,158 (84.4)	10,968 (91.6)	10 (90.9)
	>12	137 (3.7)	326 (2.7)	1 (9.1)
	Not available	46	451	0
	Missing	81	301	0
	Total	**3,870**	**12,725**	**11**
2020 Total no. of lesions = 15,987	1	26 (0.8)	40 (0.4)	0 (0)
	3	72 (2.1)	62 (0.6)	0 (0)
	6	322 (9.5)	620 (5.7)	0 (0)
	12	2946 (87.2)	9,977 (92.2)	4 (100.0)
	>12	14 (0.4)	127 (1.2)	0 (0)
	Not available	35	127	0
	Missing	89	404	0
	Total	**3,504**	**11,357**	**4**
2019–2020 Total no. of lesions = 33,384	1	81 (1.1)	122 (0.5)	0 (0)
	3	123 (1.7)	99 (0.4)	0 (0)
	6	664 (9.3)	1,180 (5.2)	0 (0)
	12	6,104 (85.7)	20,945 (91.9)	14 (93.3)
	>12	151 (2.1)	453 (2.0)	1 (6.7)
	Not available	81	578	0
	Missing	170	705	0
	Total	**7,374**	**24,082**	**15**

[#]*Patients can be in more than one type of category*

Table 3.3 Access site of patients who underwent procedures, by PCI status, NCVD-PCI Registry, 2019–2020

Year	[#]Percutaneous entry	PCI status		
		Elective	NSTEMI/UA	STEMI
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of lesions = 28,354	Brachial	160 (1.0)	26 (0.8)	56 (1.2)
	Radial	12,438 (78.1)	2,397 (76.6)	3,621 (77.6)
	Femoral	4,048 (25.4)	813 (26.0)	1,114 (23.9)
2019 Total no. of lesions = 17,397	Brachial	77 (0.8)	30 (1.3)	30 (1.1)
	Radial	7,138 (76.8)	1,838 (80.1)	2,222 (81.4)
	Femoral	2,559 (27.5)	511 (22.3)	590 (21.6)
2020 Total no. of lesions = 15,987	Brachial	84 (1.0)	28 (1.4)	28 (1.3)
	Radial	6,503 (76.9)	1,577 (80.5)	1,836 (82.3)
	Femoral	2,300 (27.2)	435 (22.2)	413 (18.5)
2019–2020 Total no. of lesions = 33,384	Brachial	161 (0.9)	58 (1.4)	58 (1.2)
	Radial	13,641 (76.8)	3,415 (80.3)	4,058 (81.8)
	Femoral	4,859 (27.4)	946 (22.2)	1,003 (20.2)

[#]*Patients can be in more than one type of category*

LESION CHARACTERISTICS

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Summary

1. Left anterior descending artery (LAD) remained the most frequently treated lesion (46.8%).
2. 95.0% of treated lesions were de novo lesion and 57.6% were complex lesion (type B2 and C).
3. Drug eluting stent (DES) remained the mainstay of treatment, used in 75.5% of cases. There was significantly increased use of drug coated balloon (DCB), 21.3% vs 14.3% reported in the previous cohort.
4. PCI for in-stent restenosis was performed in 4.2% of cases. DCB remained the treatment of choice in 72.1%, with the remainder treated with DES.
5. The left main stem (LMS) intervention continued to increase (1,631 vs. 1,205) over the years, with a high procedural success rate of 97.7%.
6. Graft PCI was uncommon (0.4%). Vein grafts remained the most treated lesion (82.9%) and left internal mammary artery (LIMA) interventions was 12.6%.
7. PCI to chronic total occlusion (CTO) >3 months constituted 6.0% of all lesions treated with a success rate of 78.3%.
8. Overall, the use of intracoronary imaging such as IVUS and OCT were still low at 4.9% and 0.5% respectively.
9. Despite more complex PCI being performed, the overall rate of procedural complications remained low.

Anatomical location of lesions

There was an increase in the number of angioplasties done between 2019 and 2020. This increase was almost 5% compared to the number of angioplasties done in 2017 and 2018. Of the more than 33,000 angioplasties done, 50% of the PCIs were in the left anterior descending (LAD), followed by a third in the right coronary artery (RCA) and less than a fifth in the left circumflex artery (LCx). Proximal lesions were the highest treated in each vessel (i.e. more than 75% in the LAD, more than 50% in the LCx and more than 46% in the RCA). These distribution patterns were similar to that previously seen in 2017 and 2018. Intervention to the left main stem (LMS) increased significantly to 1,631 (4.9%) cases, compared to only 1,205 (4.3%) cases reported in the previous cohort. [Table 4.1]

Lesion characteristics

The percentage of de novo PCI cases remained the same at 95% out of the total number of PCI done. Interventions to both in-stent restenosis (ISR) and stent thrombosis remained relatively low at 4.2% and 0.5%, respectively. [Table 4.2]

The complex lesion (type B2 and C) made up 57.6% of the treated lesion, with the majority of cases were type C lesions at 38.4%. The total number of type C lesions treated moderately increased to 12,586 cases from 11,883 cases. This is equivalent to an increase of 5.9% from the previous cohort. [Table 4.3]

The mean stenosis pre-PCI was at 86.4%, while post-PCI stenosis was at 5.7%. The mean lesion length was 29.6 mm, while the mean stent length was 35.5 mm. The mean stent diameter was 3.0 mm, and the mean pre-dilatation

and post-dilatation balloons were 2.5 mm and 3.3 mm, respectively. Around 3.6% of PCIs were direct stenting. [Table 4.7]

The distribution of high-risk lesion types remained the same, with calcified and chronic total occlusions (CTO) lesions collectively holding the highest numbers at nearly 15%. PCI to LMS and calcified lesions showed a marked increase to more than 10% of the total number of lesions treated. [Table 4.4]

More than 50% of lesions were TIMI 3 pre-angioplasty, and almost 97% of PCI cases achieved or maintained TIMI 3 flow post-procedure. [Table 4.5]

Types of stents and devices used

Drug-eluting stents (DES) remained the cornerstone of angioplasty treatment, with more than 75% of cases utilising DES. Interestingly, there was a marked increase in the prevalence of DCB usage from 14.3% of total angioplasties in 2017 and 2018 to 21.3% of total angioplasties in 2019 and 2020. Numerically, the increase was even more astounding, from 4,356 cases in 2017 and 2018 to 8,496 cases in 2019 and 2020. This corresponds to a percentage increase of 95% from the two previous cohort. [Table 4.6]

In terms of adjunctive devices used for PCI, the IVUS usage has doubled from 569 cases in 2017–2018 to 1,641 cases in 2019–2020. As previously reported, the application of functional physiological coronary assessment with FFR remained low at 1.1%. Intracoronary imaging, such as IVUS and OCT, were still low at 4.9% (previous cohort: 2.0%) and 0.5%, respectively. [Table 4.8]

Complications during PCI

The overall rate of post-procedural complications was low. Dissection occurred in 2.5% (mainly non-flow limiting 92.9%) of cases, no-reflow in 0.6% and perforation in 0.1%. [Table 4.9]

Table 4.1 Summary of location of lesions treated with percutaneous coronary intervention, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Location of lesion				
Left main stem	**1,205 (4.3)**	**894 (5.1)**	**737 (4.6)**	**1,631 (4.9)**
Left anterior descending artery (LAD)	**13,626 (48.1)**	**8,233 (47.3)**	**7,372 (46.1)**	**15,605 (46.8)**
LAD proximal	10,494 (77.0)	6,421 (78.0)	5,460 (74.1)	11,881 (76.1)
LAD mid	2,398 (17.6)	1,419 (17.2)	1,389 (18.8)	2,808 (18.0)
LAD apical	375 (2.8)	187 (2.3)	215 (2.9)	402 (2.6)
First diagonal	332 (2.4)	171 (2.1)	264 (3.6)	435 (2.8)
First diagonal a	12 (0.1)	17 (0.2)	26 (0.4)	43 (0.2)
Second diagonal	15 (0.1)	16 (0.2)	17 (0.2)	33 (0.2)
Second diagonal a	0 (0.0)	2 (0.0)	1 (0.0)	3 (0.0)
Right coronary artery (RCA)	**8,543 (30.2)**	**5,195 (29.9)**	**4,718 (29.5)**	**9,913 (29.7)**
RCA proximal	3,862 (45.2)	2,431 (46.8)	2,179 (46.2)	4,610 (46.5)
RCA mid	2,703 (31.6)	1,609 (31.0)	1,311 (27.8)	2,920 (29.5)
RCA distal	1,497 (17.5)	852 (16.4)	801 (17.0)	1,653 (16.7)
Posterior descending	225 (2.6)	161 (3.1)	196 (4.2)	357 (3.6)
Posterolateral from RCA	256 (3.0)	140 (2.7)	228 (4.8)	368 (3.7)
Left circumflex artery (LCx)	**4,764 (16.8)**	**3,004 (17.3)**	**3,093 (19.4)**	**6,097 (18.3)**
Proximal circumflex	2,486 (52.2)	1,601 (53.3)	1,489 (48.1)	3,090 (50.7)
Intermediate/ anterolateral	205 (4.3)	177 (5.9)	176 (5.7)	353 (5.8)
Obtuse marginal a	353 (7.4)	199 (6.6)	181 (5.9)	380 (6.2)
Obtuse marginal b	47 (1.0)	32 (1.1)	41 (1.3)	73 (1.2)
Distal circumflex	1,489 (31.3)	844 (28.1)	978 (31.6)	1,822 (29.9)
Left posterolateral	101 (2.1)	89 (3.0)	163 (5.3)	252 (4.1)
Left posterolateral a	12 (0.3)	7 (0.2)	8 (0.3)	15 (0.3)
Left posterolateral b	27 (0.6)	22 (0.7)	26 (0.8)	48 (0.8)
Posterior descending	44 (0.9)	33 (1.1)	31 (1.0)	64 (1.1)
Graft	**174 (0.6)**	**70 (0.4)**	**65 (0.4)**	**135 (0.4)**
LIMA	13 (7.5)	4 (5.7)	13 (20.0)	17 (12.6)
RIMA	0 (0)	0 (0)	6 (9.2)	6 (4.4)
SVG1	152 (87.4)	57 (81.4)	37 (56.9)	94 (69.6)
SVG2	8 (4.6)	7 (10.0)	6 (7.7)	12 (8.9)
SVG3	1 (0.6)	2 (2.9)	4 (6.2)	6 (4.4)
RAD1	0 (0)	0 (0)	0 (0)	0 (0)
RAD2	0 (0)	0 (0)	0 (0)	0 (0)
RAD3	0 (0)	0 (0)	0 (0)	0 (0)
Missing	**42**	**1**	**2**	**3**

Table 4.2 Characteristics of lesions treated by PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Types of lesions				
De novo	26,306 (95.1)	16,418 (95.4)	15,008 (94.7)	31,426 (95.0)
Restenosis (no prior stent)	38 (0.1)	48 (0.3)	48 (0.3)	96 (0.3)
Stent thrombosis	137 (0.5)	88 (0.5)	71 (0.5)	159 (0.5)
In-stent restenosis	1,182 (4.3)	661 (3.8)	726 (4.6)	1,387 (4.2)
Not available	651	182	134	316
Missing	40	0	0	0
Total	**28,354**	**17,397**	**15,987**	**33,384**

Table 4.3 Prevalence of lesions according to American College of Cardiology (ACC) classifications, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Types of lesions				
A	2,940 (10.7)	2,375 (13.9)	2,676 (17.0)	5,051 (15.4)
B1	8,454 (30.7)	4,769 (27.9)	4,103 (26.1)	8,872 (27.1)
B2	4,303 (15.6)	3,152 (18.5)	3,127 (19.9)	6,279 (19.2)
C	11,883 (43.1)	6,784 (39.7)	5,802 (36.9)	12,586 (38.4)
Not available	734	317	279	596
Missing	40	0	0	0
Total	**28,354**	**17,397**	**15,987**	**33,384**

Table 4.4 Prevalence of high-risk lesion type, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
[#]Types of lesions				
Ostial	1,537 (5.4)	886 (5.1)	795 (5.0)	1,681 (5.0)
Bifurcation	907 (3.2)	542 (3.1)	521 (3.3)	1,063 (3.2)
CTO>3 months	1,739 (6.1)	1,105 (6.4)	897 (5.6)	2,002 (6.0)
Thrombus	1,258 (4.4)	600 (3.5)	543 (3.4)	1,143 (3.4)
Calcified lesion	1,835 (6.5)	1,395 (8.0)	1,388 (8.7)	2,783 (8.3)
LMS	619 (2.2)	467 (2.7)	357 (2.2)	824 (2.5)

[#]*Patients can be in more than one type of category*

Table 4.5 Comparison of TIMI flow grade by pre- and post-procedure, NCVD-PCI Registry, 2019–2020

Year	TIMI flow grade	Pre-procedure	Post-procedure
		No. (%)	No. (%)
2017–2018 Total no. of lesions = 28,354	TIMI-0	3,287 (20.3)	367 (1.7)
	TIMI-1	1,567 (9.7)	115 (0.5)
	TIMI-2	2,093 (12.9)	285 (1.3)
	TIMI-3	9,230 (57.1)	20,956 (96.5)
	Not available	3,495	1,785
	Missing	8,642	4,806
	Total	**28,354**	**28,354**
2019 Total no. of lesions = 17,397	TIMI-0	1,728 (15.3)	175 (1.3)
	TIMI-1	913 (8.1)	75 (0.6)
	TIMI-2	1,915 (17.0)	185 (1.4)
	TIMI-3	6,713 (59.6)	12,781 (96.7)
	Not available	2,545	1,010
	Missing	3,583	3,171
	Total	**17,397**	**17,397**
2020 Total no. of lesions = 15,987	TIMI-0	1,381 (12.9)	151 (1.3)
	TIMI-1	975 (9.1)	38 (0.3)
	TIMI-2	2,430 (22.7)	175 (1.5)
	TIMI-3	5,944 (55.4)	11,261 (96.9)
	Not available	1,370	853
	Missing	3,887	3,509
	Total	**15,987**	**15,987**
2019–2020 Total no. of lesions = 33,384	TIMI-0	3,109 (14.1)	326 (1.3)
	TIMI-1	1,888 (8.6)	113 (0.5)
	TIMI-2	4,345 (19.8)	360 (1.5)
	TIMI-3	12,657 (57.5)	24,042 (96.8)
	Not available	3,915	1,863
	Missing	7,470	6,680
	Total	**33,384**	**33,384**

Table 4.6 Types of stents used, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of stents/ balloons used	**30,750**	**20,603**	**19,297**	**39,900**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Types of stents/balloons used				
Drug eluting stent	24,188 (79.1)	15,947 (77.4)	14,172 (73.4)	30,119 (75.5)
Bare metal stent	155 (0.5)	13 (0.1)	5 (0.0)	18 (0.1)
Bio-absorbable stent	129 (0.4)	18 (0.1)	11 (0.1)	29 (0.1)
Antibody coated stent	0 (0)	0 (0)	0 (0)	0 (0)
*Others	19 (0.1)	11 (0.1)	7 (0.0)	18 (0.1)
Drug coated balloon	4,356 (14.3)	3,929 (19.1)	4,567 (23.7)	8,496 (21.3)
Bifurcated stent	6 (0.0)	0 (0)	0 (0)	0 (0)
Covered stent	21 (0.1)	19 (0.1)	24 (0.1)	43 (0.1)
Combo stent	1,702 (5.6)	666 (3.2)	511 (2.7)	1,177 (3.0)
Missing/ No stent used	174	0	0	0
Total	**30,750**	**20,603**	**19,297**	**39,900**

**Stents which are not listed in the NCVD-PCI Stent List*

Table 4.7 Lesion characteristics for patients who undergone PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Pre-procedure stenosis, %				
N	20,896	14,201	13,799	28,000
Mean (SD)	87.7 (11.8)	86.8 (13.5)	85.9 (14.7)	86.4 (14.1)
Median (min, max)	90.0 (0.0, 100.0)	90.0 (0.0, 100.0)	90.0 (0.0, 100.0)	90.0 (0.0, 100.0)
Missing, No. (%)	7459 (26.3)	3196 (18.4)	2188 (13.7)	5384 (16.1)
Post-procedure stenosis, %				
N	19,813	13,724	13,552	27,276
Mean (SD)	5.7 (19.4)	5.5 (18.9)	5.8 (18.9)	5.7 (18.9)
Median (min, max)	0.0 (0.0, 100.0)	0.0 (0.0, 100.0)	0.0 (0.0, 100.0)	0.0 (0.0, 100.0)
Missing, No. (%)	8541 (30.1)	3673 (21.1)	2435 (15.2)	6108 (18.3)
Estimated lesion length, mm				
N	23,619	15,312	14,036	29,348
Mean (SD)	27.8 (16.6)	29.3 (17.8)	30.0 (17.9)	29.6 (17.9)
Median (min, max)	24.0 (1.0, 150.0)	25.0 (1.0, 130.0)	26.0 (1.0, 140.0)	25.0 (1.0, 140.0)
Missing, No. (%)	4735 (16.7)	2085 (12.0)	1951 (12.2)	4036 (12.1)
Lesion result, No. (%)				
Successful	27,290 (96.7)	16,749 (96.5)	15,508 (97.1)	32,257 (96.8)
Unsuccessful	936 (3.3)	613 (3.5)	458 (2.9)	1,071 (3.2)
Not available	88	35	21	56
Missing	40	0	0	0

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
*Stent length, mm				
N	24,811	15,751	14,728	30,479
Mean (SD)	32.8 (18.2)	35.2 (20.3)	35.8 (20.0)	35.5 (20.1)
Median (min, max)	28.0 (8.0, 171.0)	30.0 (8.0, 176.0)	30.0 (8.0, 166.0)	30.0 (8.0, 176.0)
Not available, No. (%)	2,543 (12.5)	1,646 (9.5)	1,259 (7.9)	2,905 (8.7)
**Stent diameter, mm				
N	24,758	15,768	14,745	30,513
Mean (SD)	3.0 (0.5)	3.0 (0.5)	3.0 (0.5)	3.0 (0.5)
Median (min, max)	3.0 (2.0, 6.0)	3.0 (2.0, 5.5)	3.0 (2.0, 5.2)	3.0 (2.0, 5.5)
Not available, No. (%)	3,596 (12.7)	1,629 (9.4)	1,242 (7.8)	2,871 (8.6)
Maximum balloon size used (predilatation), mm				
N	21,744	14,912	14,197	29,109
Mean (SD)	2.5 (0.4)	2.5 (0.5)	2.6 (0.5)	2.5 (0.5)
Median (min, max)	2.5 (1.0, 5.0)	2.5 (1.0, 5.0)	2.5 (1.0, 6.0)	2.5 (1.0, 6.0)
Missing, No. (%)	6,610 (23.3)	2,485 (14.3)	1,790 (11.2)	4,275 (12.8)
Maximum balloon size used (postdilatation), mm				
N	19246	10995	9947	20942
Mean (SD)	3.3 (0.5)	3.3 (0.5)	3.3 (0.6)	3.3 (0.6)
Median (min, max)	3.25 (1.0, 6.0)	3.5 (1.0, 6.0)	3.5 (1.0, 5.7)	3.5 (1.0, 6.0)
Missing, No. (%)	9,108 (32.1)	6,402 (36.8)	6,040 (37.8)	12,442 (37.3)
Maximum stent/balloon deploy pressure, atm				
N	19,132	10,836	9,839	20,675
Mean (SD)	16.7 (4.9)	17.4 (4.5)	17.5 (4.7)	17.4 (464)
Median (min, max)	18.0 (1.0, 40.0)	18.0 (2.0, 40.0)	18.0 (1.0, 40.0)	18.0 (1.0, 40.0)
Missing, No. (%)	9,222 (32.5)	6,561 (37.7)	6,148 (38.5)	12,709 (38.1)
Direct stenting, No. (%)				
Yes	1,299 (4.6)	685 (4.0)	524 (3.3)	1,209 (3.6)
No	26,808 (95.4)	16,617 (96.0)	15,369 (96.7)	31,986 (96.4)
Not applicable	207	95	94	189
Missing	40	0	0	0

**Summation of stent length was used for lesions which were treated with more than one stent*
***Average of stent diameter was used for lesions which were treated with more than one stent*

Table 4.8 Types of devices used during percutaneous coronary intervention, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
#Intracoronary devices				
Aspiration/aspiration catheter	970 (3.4)	541 (3.1)	447 (2.8)	988 (3.0)
Balloon only/POBA	3,877 (13.7)	3,870 (22.3)	3,504 (21.9)	7,374 (22.1)
Drug coated balloon	3,925 (13.8)	3,465 (19.9)	4,000 (25.0)	7,465 (22.4)
Drug eluting stent	19,817 (69.9)	12,725 (73.1)	11,357 (71.0)	24,082 (72.1)
Cutting balloon/ scoring balloon	NA	NA	NA	NA
Coil	3 (0.0)	5 (0.0)	3 (0.0)	8 (0.0)
OCT	103 (0.4)	57 (0.3)	95 (0.6)	152 (0.5)
Mother and child	NA	NA	NA	NA
Micro catheter	1,131 (4.0)	1,165 (6.7)	999 (6.3)	2,164 (6.5)
Angiojet	21 (0.8)	4 (0.0)	4 (0.0)	8 (0.0)
IVUS	569 (2.0)	699 (4.0)	942 (5.9)	1,641 (4.9)
Flowire/FFR	235 (0.8)	155 (0.9)	195 (1.2)	350 (1.1)
Rotablator	268 (1.0)	306 (1.8)	313 (2.0)	619 (1.9)
Bare metal stent	149 (0.5)	11 (0.1)	4 (0.0)	15 (0.0)
Embolic protection	20 (0.1)	11 (0.1)	6 (0.0)	17 (0.1)
Extension catheter	34 (0.1)	108 (0.6)	174 (1.1)	282 (0.8)
Double lumen micro catheter	13 (0.1)	26 (0.2)	29 (0.2)	55 (0.2)
Others	265 (0.9)	242 (1.4)	353 (2.2)	595 (1.8)
Embolic protection status	**N=20**	**N=11**	**N=6**	**N=17**
Filter	5 (83.3)	7 (87.5)	6 (100.0)	13 (92.9)
Balloon/distal	NA	NA	NA	NA
Proximal	1 (16.7)	1 (12.5)	0 (0)	1 (7.1)
Missing	14	3	0	3

#Patients can be in more than one type of category

Table 4.9 Types of post-procedure complications, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**28,354**	**17,397**	**15,987**	**33,384**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
***Types of post-procedure complications**				
Dissection	465 (1.6)	352 (2.0)	469 (2.9)	821 (2.5)
Flow limiting	52 (11.9)	30 (8.8)	27 (5.9)	57 (7.1)
Non-flow limiting	387 (88.2)	312 (91.2)	433 (94.1)	745 (92.9)
Not available	26	10	9	19
No reflow	209 (0.7)	103 (0.6)	108 (0.7)	211 (0.6)
Transient	136 (69.7)	66 (68.0)	67 (66.3)	133 (67.2)
Persistent	59 (30.3)	31 (32.0)	34 (33.7)	65 (32.8)
Not available	14	6	7	13
Perforation	58 (0.2)	19 (0.1)	11 (0.1)	30 (0.1)

**Results only showed for number of patients who were reported to have the complications*

In-stent restenosis (ISR)

Among the ISR PCIcases, majority (72.6%) presented as ACS. Only 27.4% presented as stable angina. Around 12.1% of ISR cases were STEMI, and almost half were anterior STEMI cases. [Table 4.10]

DCB remained the mainstay of treatment for ISR lesions, with 72.1% being treated with a DCB. Meanwhile, the remainder were treated with DES. [Table 4.11]

Around 15.0% of ISR cases utilised imaging, with most of the imaging used was IVUS. Usage of IVUS more than doubled from 6.5% (2017–2018 cohort) to 14.2% (2019–2020 cohort). [Table 4.12]

Table 4.10 Acute coronary syndrome status of in-stent restenosis percutaneous coronary intervention, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,182**	**661**	**726**	**1,387**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Acute coronary syndrome type, No. (%)	**N=292**	**N=625**	**N=557**	**N=1,182**
STEMI	77 (11.0)	49 (11.3)	74 (12.7)	123 (12.1)
NSTEMI	194 (27.6)	142 (32.9)	208 (35.8)	350 (34.6)
UA	167 (23.8)	115 (26.6)	147 (25.3)	262 (25.9)
Chronic stable angina	264 (37.6)	126 (29.2)	152 (26.2)	278 (27.4)
Not available	480	229	145	374
STEMI, No. (%)	**N=77**	**N=49**	**N=74**	**N=123**
Anterior	30 (39.0)	22 (44.9)	33 (44.6)	55 (44.7)
Non anterior	NA	NA	NA	NA
• Posterior	3 (3.9)	5 (10.2)	3 (4.1)	8 (6.5)
• Lateral	5 (6.5)	7 (14.3)	1 (1.4)	8 (6.5)
• Right-sided	7 (9.1)	2 (4.1)	2 (2.7)	4 (3.3)
• Inferior	20 (26.0)	17 (34.7)	27 (36.5)	44 (35.8)
• Left Main Stem	1 (1.3)	1 (2.0)	2 (2.7)	3 (2.4)

Table 4.11 Treatment strategy used in the in-stent restenosis, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of stents used	**1,383**	**848**	**959**	**1,807**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Types of stents				
Drug eluting stent	395 (28.8)	252 (29.7)	235 (24.5)	487 (27.0)
Bare metal stent	0 (0)	0 (0)	0 (0)	0 (0)
Bio-absorbable stent	0 (0)	0 (0)	0 (0)	0 (0)
Antibody coated stent	0 (0)	0 (0)	0 (0)	0 (0)
*Others	1 (0.1)	0 (0)	1 (0.1)	1 (0.1)
Drug coated balloon	950 (69.3)	587 (69.2)	715 (74.6)	1302 (72.1)
Bifurcated stent	0 (0)	0 (0)	0 (0)	0 (0)
Covered stent	0 (0)	0 (0)	0 (0)	0 (0)
Combo stent	25 (1.8)	9 (1.1)	8 (0.8)	17 (0.9)
Missing	12	0	0	0
Total	1,383	848	959	1,807

**Stents which are not listed in the NCVD-PCI Stent List*

Table 4.12 Types of devices used in the in-stent restenosis, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,182**	**661**	**726**	**1,387**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
[#]Intracoronary devices				
Aspiration/aspiration catheter	22 (1.9)	13 (2.0)	13 (1.8)	26 (1.9)
Balloon only/POBA	190 (16.1)	174 (26.3)	220 (30.3)	394 (28.4)
Drug coated balloon	816 (69.0)	465 (70.4)	562 (77.4)	1,027 (74.0)
Drug eluting stent	331 (28.0)	204 (30.9)	193 (26.6)	397 (28.6)
Cutting balloon/scoring balloon	NA	NA	NA	NA
Coil	0 (0)	1 (0.2)	0 (0)	1 (0.1)
OCT	16 (1.4)	4 (0.7)	7 (1.1)	11 (0.9)
Mother and child	NA	NA	NA	NA
Micro catheter	51 (4.3)	43 (7.2)	50 (7.9)	93 (7.6)
Angiojet	0 (0)	0 (0)	0 (0)	0 (0)
IVUS	77 (6.5)	67 (10.1)	130 (17.9)	197 (14.2)
Flowire/FFR	15 (1.3)	1 (0.2)	13 (1.8)	14 (1.0)
Rotablator	4 (0.3)	2 (0.3)	6 (0.8)	8 (0.6)
Bare metal stent	0 (0)	0 (0)	0 (0)	0 (0)
Embolic protection	0 (0)	1 (0.2)	1 (0.1)	2 (0.1)
Extension catheter	1 (0.1)	3 (0.5)	11 (1.5)	14 (1.0)
Double lumen micro catheter	0 (0)	1 (0.2)	1 (0.1)	2 (0.1)
Others	22 (1.9)	4 (0.6)	19 (2.6)	23 (1.7)
Embolic protection status	**N=0**	**N=1**	**N=1**	**N=2**
Filter	0 (0)	0 (0)	1 (100.0)	1 (100.0)
Balloon/distal	0	0	0	0
Proximal	0 (0)	1 (100.0)	0 (0)	1 (100.0)

[#]Patients *can be in more than one type of category*

Table 4.13 Types of complications in post in-stent restenosis, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,182**	**661**	**726**	**1,387**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
***Types of post-procedure complications in ISR**				
Dissection	13 (1.1)	19 (2.9)	20 (2.8)	39 (2.8)
Flow limiting	1 (9.1)	0 (0)	2 (10.5)	2 (5.4)
Non-flow limiting	10 (90.9)	18 (100.0)	17 (89.5)	35 (94.6)
Not available	2	1	1	2
No reflow	6 (0.5)	2 (0.3)	4 (0.6)	6 (0.4)
Transient	4 (66.7)	1 (50.0)	3 (75.0)	4 (66.7)
Persistent	2 (33.3)	1 (50.0)	1 (25.0)	2 (33.3)
Perforation	3 (0.3)	0 (0)	0 (0)	0 (0)

*** Results only showed for number of patients who were reported to have the complications*

PCI of Left Main Stem (LMS)

An increasing trend of LMS lesions were treated with coronary angioplasty (1,631 vs. 1,205). Almost 94% of LMS PCI cases were for de novo lesions. [Table 4.14]

The initial clinical presentation of LM PCI cases was NSTEMI, followed by chronic stable angina at 41.3 % and 20.8%, respectively. The majority of the LM PCI cases were elective cases. Amongst these elective cases, there was a slight preponderance of ad hoc PCI to the LM at 55.2%, compared to stage PCI to the LM at 44.8%. Only 2.5% of LMS PCI were protected LM stentings. [Table 4.15]

Operators chose the radial approach in 68.2% of LMS PCI cases, which increased from 63.9% in the previous cohort. The successful intervention was achieved in 97.7% of cases. [Table 4.15] Complication rates post LM PCI were at 2.3%, with most complications being non-flow limiting dissection. [Table 4.19]

The cornerstone of treatment of LM PCI was DES at 87.8%. Interestingly, the use of DCB for LMS lesions had increased to almost 10% compared to 6.4% previously. [Table 4.17]

The use of IVUS in LM PCI increased from 23.2% to 27.4%. Meanwhile, invasive physiological studies like FFR were only done in around 1.5% of cases. Rotational atherectomy was performed in 6% of LM PCI cases. [Table 4.18]

Regarding dual anti-platelet therapy, 91.1% of cases were prescribed DAPT for 12 months. [Table 4.20]

Table 4.14 Types of lesions in left main stem procedure, NCVD-PCI Registry, 2019–2020

Year	**2017–2018**	**2019**	**2020**	**2019–2020**
Total no. of lesions	**1,205**	**894**	**737**	**1,631**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Types of lesion in left main stem procedure				
De novo	1,118 (95.0)	835 (94.1)	682 (93.6)	1,517 (93.9)
Restenosis (no prior stent)	2 (0.2)	5 (0.6)	5 (0.7)	10 (0.6)
Stent thrombosis	5 (0.4)	6 (0.7)	1 (0.1)	7 (0.4)
In-stent restenosis	52 (4.4)	41 (4.6)	41 (5.6)	82 (5.1)
Previous DES	40 (90.9)	34 (94.4)	25 (100.0)	59 (96.7)
Previous BMS	3 (6.8)	2 (5.6)	0 (0)	2 (3.3)
Previous BVS	0 (0)	0 (0)	0 (0)	0 (0)
Previous Mg	0 (0)	0 (0)	0 (0)	0 (0)
Previous others	1 (2.3)	0 (0)	0 (0)	0 (0)
Not available	8	5	16	21
Not available	28	7	8	15
Total	**1,205**	**894**	**737**	**1,631**

Table 4.15 Clinical presentation of left main stem, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,205**	**894**	**737**	**1,631**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
ACS type, No. (%)				
STEMI	217 (25.4)	136 (18.4)	122 (19.4)	258 (18.9)
NSTEMI	292 (34.6)	298 (40.3)	266 (42.4)	564 (41.3)
UA	140 (16.4)	144 (19.5)	117 (18.6)	261 (19.1)
Chronic stable angina	201 (23.6)	161 (21.8)	123 (19.6)	284 (20.8)
Not available	352	155	109	264
Previous PCI, No. (%)				
Yes	337 (28.0)	274 (30.7)	250 (33.9)	524 (32.1)
No	868 (72.0)	620 (69.4)	487 (66.1)	1,107 (67.9)
Previous CABG, No. (%)				
Yes	49 (4.1)	25 (2.8)	16 (2.2)	41 (2.5)
No	1,156 (95.9)	869 (97.2)	721 (97.8)	1,590 (97.5)
PCI status, No. (%)				
Elective	842 (69.9)	618 (69.1)	543 (73.7)	1,161 (71.2)
NSTEMI/UA	181 (15.0)	166 (18.6)	117 (15.9)	283 (17.4)
STEMI	182 (15.1)	110 (12.3)	77 (10.5)	187 (11.5)
Elective, No. (%)	**N=842**	**N=618**	**N=543**	**N=1,161**
Staged PCI	379 (45.3)	260 (42.6)	254 (47.3)	514 (44.8)
Ad hoc	458 (54.7)	350 (57.4)	283 (52.7)	633 (55.2)
Not available	5	8	6	14
NSTEMI/UA, No. (%)	**N=181**	**N=166**	**N=117**	**N=283**
Urgent (within 24 hours)	53 (31.0)	50 (31.1)	37 (33.0)	87 (31.9)
Non urgent	NA	NA	NA	NA
In hospital (>24 hours)	90 (52.6)	60 (37.3)	53 (47.3)	113 (41.4)
PCI within 30 days post event	28 (16.4)	51 (31.7)	22 (19.6)	73 (26.7)
Not available	10	5	5	10
STEMI, No. (%)	**N=182**	**N=110**	**N=77**	**N=187**
Rescue	35 (19.2)	25 (22.9)	11 (15.5)	36 (20.0)
Primary	67 (36.8)	45 (41.3)	18 (25.4)	63 (35.0)
Facilitated	33 (18.1)	NA	NA	NA
Delayed routine PCI	27 (14.8)	19 (17.4)	20 (28.2)	39 (21.7)
Delayed selective PCI	14 (7.7)	4 (3.7)	6 (9.5)	10 (5.6)
Pharmaco-invasive	6 (3.3)	16 (14.7)	16 (22.5)	32 (17.8)
Not available	6	1	6	7

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,205**	**894**	**737**	**1,631**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
#Percutaneous entry, No. (%)				
Brachial	14 (1.2)	6 (0.7)	5 (0.7)	11 (0.7)
Radial	770 (63.9)	614 (68.7)	499 (67.7)	1,113 (68.2)
Femoral	498 (41.3)	317 (35.5)	284 (38.5)	601 (36.9)
Pre-procedure stenosis, %				
N	946	783	647	1,430
Mean (SD)	86.5 (12.4)	86.3 (11.7)	83.6 (17.6)	85.1 (14.7)
Median (min, max)	90.0 (0.0, 100.0)	90.0 (0.0, 100.0)	90.0 (0.0, 100.0)	90.0 (0.0, 100.0)
Missing, No. (%)	259 (21.5)	111 (12.4)	90 (12.2)	201 (12.3)
Post-procedure stenosis, %				
N	929	762	637	1,399
Mean (SD)	4.2 (16.4)	3.4 (13.6)	5.5 (19.1)	4.4 (16.3)
Median (min, max)	0.0 (0.0, 100.0)	0.0 (0.0, 100.0)	0.0 (0.0, 100.0)	0.0 (0.0, 100.0)
Missing, No. (%)	276 (22.9)	132 (14.8)	100 (13.6)	232 (14.2)
Estimated lesion length, mm				
N	1,053	821	682	1,503
Mean (SD)	34.1 (20.0)	36.0 (21.0)	37.2 (21.2)	36.6 (21.1)
Median (min, max)	30.0 (4.0, 128.0)	30.0 (4.0, 120.0)	34.0 (4.0, 130.0)	32.0 (4.0, 130.0)
Missing, No. (%)	152 (12.6)	73 (8.2)	55 (7.5)	128 (7.9)
Lesion result, No. (%)				
Successful	1,162 (96.9)	875 (98.2)	713 (97.0)	1,588 (97.7)
Unsuccessful	37 (3.1)	16 (1.8)	22 (3.0)	38 (2.3)
Not available	6	3	2	5
*Stent length, mm				
N	1,128	846	692	1,538
Mean (SD)	41.0 (22.8)	43.8 (24.4)	44.9 (24.9)	44.3 (24.6)
Median (min, max)	37.0 (8.0, 145.0)	38.0 (8.0, 162.0)	38.0 (8.0, 159.0)	38.0 (8.0, 162.0)
Not available, No. (%)	77 (6.4)	48 (5.4)	45 (6.1)	93 (5.7)
**Stent diameter, mm				
N	1,123	848	692	1,540
Mean (SD)	3.2 (0.5)	3.3 (0.4)	3.3 (0.4)	3.3 (0.4)
Median (min, max)	3.3 (2.0, 5.0)	3.3 (2.0, 5.0)	3.3 (2.0, 5.0)	3.3 (2.0, 5.0)
Not available, No. (%)	82 (6.8)	46 (5.2)	45 (6.1)	91 (5.6)

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,205**	**894**	**737**	**1,631**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Direct stenting, No. (%)				
Yes	35 (2.9)	16 (1.8)	30 (4.1)	46 (2.8)
No	1,166 (97.1)	876 (98.2)	704 (95.9)	1,580 (97.2)
Not applicable	4	2	3	5

#Patients can be in more than one type of category
**Summation of stent length was used for lesions which were treated with more than one stent*
***Average of stent diameter was used for lesions which were treated with more than one stent*

Table 4.16 TIMI flow in left main stem procedure, NCVD-PCI Registry, 2019–2020

Year	TIMI flow grade	Pre-procedure	Post-procedure
		No (%)	**No (%)**
2017–2018 Total no. of lesions = 1,205	TIMI-0	112 (16.1)	12 (1.4)
	TIMI-1	96 (13.8)	6 (0.7)
	TIMI-2	94 (13.5)	13 (1.5)
	TIMI-3	395 (56.7)	859 (96.5)
	Not available	111	59
	Missing	397	256
	Total	**1,205**	**1,205**
2019 Total no. of lesions = 894	TIMI-0	64 (10.1)	3 (0.4)
	TIMI-1	62 (9.8)	6 (0.9)
	TIMI-2	127 (20.1)	8 (1.2)
	TIMI-3	378 (60.0)	675 (97.5)
	Not available	90	46
	Missing	173	156
	Total	**894**	**894**
2020 Total no. of lesions = 737	TIMI-0	36 (7.4)	3 (0.6)
	TIMI-1	47 (9.6)	0 (0.0)
	TIMI-2	129 (26.4)	3 (0.6)
	TIMI-3	276 (56.6)	528 (98.9)
	Not available	63	27
	Missing	186	176
	Total	**737**	**737**
2019–2020 Total no. of lesions = 1,631	TIMI-0	100 (8.9)	6 (0.5)
	TIMI-1	109 (9.7)	6 (0.5)
	TIMI-2	256 (22.9)	11 (0.9)
	TIMI-3	654 (58.5)	1,203 (98.1)
	Not available	153	73
	Missing	359	332
	Total	**1,631**	**1,631**

Table 4.17 Treatment strategy used in left main stem procedure, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of stents used	**1,731**	**1,359**	**1,108**	**2,467**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Types of stents				
Drug eluting stent	540 (89.1)	1,201 (88.4)	966 (87.2)	2,167 (87.8)
Bare metal stent	3 (0.2)	0 (0)	1 (0.1)	1 (0.0)
Bio-absorbable stent	3 (0.2)	1 (0.1)	2 (0.2)	3 (0.1)
*Others	0 (0)	0 (0)	1 (0.1)	1 (0.0)
Drug coated balloon	111 (6.4)	123 (9.1)	113 (10.2)	236 (9.6)
Covered stent	0 (0)	3 (0.2)	0 (0)	3 (0.1)
Combo stent	71 (4.1)	31 (2.3)	25 (2.3)	56 (2.3)
Missing	3	0	0	0
Total	**1,731**	**1,359**	**1,108**	**2,467**

*****Stents which are not listed in the NCVD-PCI Stent List*

Table 4.18 Types of devices used in left main stem procedure, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,205**	**894**	**737**	**1,631**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
#Intracoronary devices				
Aspiration/aspiration catheter	35 (2.9)	20 (2.2)	11 (1.5)	31 (1.9)
Balloon only/POBA	193 (16.0)	239 (27.6)	170 (24.8)	409 (26.3)
Drug-coated balloon	89 (7.4)	102 (11.4)	88 (11.9)	190 (11.7)
Drug eluting stent	1,026 (85.2)	775 (86.7)	633 (85.9)	1,408 (86.3)
Cutting balloon/scoring balloon	NA	NA	NA	NA
Coil	0 (0)	0 (0)	0 (0)	0 (0)
OCT	10 (0.8)	6 (0.7)	12 (1.6)	18 (1.1)
Mother and child	NA	NA	NA	NA
Micro catheter	78 (6.5)	117 (13.1)	85 (11.5)	202 (12.4)
Angiojet	0 (0)	0 (0)	0 (0)	0 (0)
IVUS	153 (12.7)	207 (23.2)	239 (32.4)	446 (27.4)
Flowire/FFR	13 (1.1)	12 (1.3)	12 (1.6)	24 (1.5)
Rotablator	58 (4.8)	64 (7.2)	43 (5.8)	107 (6.6)
Bare metal stent	3 (0.3)	0 (0)	1 (0.1)	1 (0.1)
Embolic protection	0 (0)	0 (0)	0 (0)	0 (0)
Extension catheter	2 (0.2)	10 (1.1)	5 (0.7)	15 (0.9)
Double lumen micro catheter	1 (0.1)	5 (0.6)	5 (0.7)	10 (0.6)
Others	7 (0.6)	25 (2.8)	29 (3.9)	54 (3.3)

#Patients can be in more than one type of category

Table 4.19 Types of complications in post left main stem, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,205**	**894**	**737**	**1,631**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
***Types of post-procedure complications in LMS**				
Dissection	23 (1.9)	19 (2.1)	19 (2.6)	38 (2.3)
Flow limiting	5 (22.7)	3 (15.8)	0 (0)	3 (7.9)
Non-flow limiting	17 (77.3)	16 (84.2)	19 (100.0)	35 (92.1)
Not available	1	0	0	0
No reflow	16 (1.3)	5 (0.6)	9 (1.2)	14 (0.9)
Transient	12 (75.0)	3 (60.0)	5 (55.6)	8 (57.1)
Persistent	4 (25.0)	2 (40.0)	4 (44.4)	6 (42.9)
Not available	2	0	0	0
Perforation	0 (0)	1 (0.1)	1 (0.1)	2 (0.1)

**Results only showed for number of patients who were reported to have the complications*

Table 4.20 Planned duration of dual antiplatelet therapy in left main stem procedure, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,205**	**894**	**737**	**1,631**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Planned duration of dual antiplatelet therapy in left main stem procedure (months)				
1	10 (0.9)	11 (1.3)	6 (0.9)	17 (1.1)
3	10 (0.9)	5 (0.6)	2 (0.3)	7 (0.5)
6	16 (1.4)	33 (3.9)	31 (4.4)	64 (4.1)
12	1,050 (93.3)	756 (89.7)	654 (92.9)	1,410 (91.1)
>12	39 (3.5)	38 (4.5)	11 (1.6)	49 (3.2)
Not available	45	40	14	54
Missing	35	11	19	30
Total	**1,205**	**894**	**737**	**1,631**

PCI to the grafts

A declining trend of bypass graft angioplasty was noted from the previous 2017–2018 cohort. In the 135 cases of graft PCI, de novo lesions remained the majority at 84.0% of cases. [Table 4.21] Different types of vein grafts were treated in 82.9% of lesions, and LIMA was treated in 12.6% of lesions. The success rate for graft PCI was 97.0%. [Table 4.22]

Among graft lesions, the mean lesion length was 20.8 mm and the mean lesion diameter was 3.0 mm. [Table 4.22]

Almost two-thirds of graft PCIs were treated with DES, and the remainder were treated with DCB. [Table 4.23] Mean stent lengths and mean stent diameters used were 27.0 mm and 3.0 mm, respectively. [Table 4.22]

Post-procedural complication following graft PCI was very low. [Table 4.24] Dual anti-platelet therapy was planned for 12 months in 89.3% of cases. [Table 4.25]

Table 4.21 Lesion types in graft PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**174**	**70**	**65**	**135**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Lesion type in graft PCI				
De novo	147 (88.6)	56 (82.4)	54 (85.7)	110 (84.0)
Restenosis (no prior stent)	0 (0)	1 (1.5)	1 (1.6)	2 (1.5)
Stent thrombosis	0 (0)	0 (0)	1 (1.6)	1 (0.8)
In-stent restenosis	19 (11.5)	11 (16.2)	7 (11.1)	18 (13.7)
Not available	8	2	2	4
Total	**174**	**70**	**65**	**135**

Table 4.22 Lesion characteristics of graft PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**174**	**70**	**65**	**135**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Graft, No. (%)				
18 LIMA	13 (7.5)	4 (5.7)	13 (20.0)	17 (12.6)
19 RIMA	0 (0)	0 (0)	6 (9.2)	6 (4.4)
20 SVG1	152 (87.4)	57 (81.4)	37 (56.9)	94 (69.6)
21 SVG2	8 (4.6)	7 (10.0)	5 (7.7)	12 (8.9)
22 SVG3	1 (0.6)	2 (2.9)	4 (6.2)	6 (4.4)
23 RAD1	0 (0)	0 (0)	0 (0)	0 (0)
24 RAD2	0 (0)	0 (0)	0 (0)	0 (0)
25 RAD3	0 (0)	0 (0)	0 (0)	0 (0)
Pre-procedure stenosis, %				
N	57	29	43	72
Mean (SD)	87.9 (9.0)	85.9 (11.8)	85.5 (16.5)	85.7 (14.7)
Median (min, max)	90.0 (60.0, 100.0)	90.0 (50.0, 100.0)	90.0 (0.0, 100.0)	90.0 (0.0, 100.0)
Missing, No. (%)	117 (67.2)	41 (58.6)	22 (33.9)	63 (46.7)
Post-procedure stenosis, %				
N	54	23	43	66
Mean (SD)	6.8 (15.6)	7.2 (21.4)	5.7 (20.0)	6.2 (20.3)
Median (min, max)	0 (0.0, 99.0)	0 (0.0, 100.0)	0 (0.0, 95.0)	0 (0.0, 100.0)
Missing, No. (%)	120 (69.0)	47 (67.1)	22 (33.9)	69 (51.1)
Estimated lesion length, mm				
N	136	60	51	111
Mean (SD)	16.6 (8.8)	18.7 (14.8)	23.4 (16.0)	20.8 (15.5)
Median (min, max)	14.0 (4.0, 50.0)	14.5 (4.0, 86.0)	18.0 (6.0, 80.0)	16.0 (4.0, 86.0)
Missing, No. (%)	38 (21.8)	10 (14.3)	14 (21.5)	24 (17.8)

Year	**2017–2018**	**2019**	**2020**	**2019–2020**
Total no. of lesions	**174**	**70**	**65**	**135**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Lesion result, No. (%)				
Successful	169 (97.1)	69 (98.6)	62 (95.4)	131 (97.0)
Unsuccessful	5 (2.9)	1 (1.4)	3 (4.6)	4 (3.0)
*Stent length, mm				
N	147	60	58	118
Mean (SD)	21.2 (9.6)	23.9 (16.7)	30.2 (23.6)	27.0 (20.5)
Median (min, max)	18.0 (8.0, 66.0)	18.0 (8.0, 86.0)	21.0 (12.0, 144.0)	20.0 (8.0, 144.0)
Not available, No. (%)	27 (15.5)	10 (14.3)	7 (10.8)	17 (12.6)
**Stent diameter, mm				
N	147	60	58	118
Mean (SD)	3.0 (0.5)	3.1 (0.5)	3.0 (0.5)	3.0 (0.5)
Median (min, max)	3.0 (2.0, 5.0)	3.0 (2.0, 4.0)	3.0 (2.3, 4.5)	3.0 (2.0, 4.5)
Not available, No. (%)	27 (15.5)	10 (14.3)	7 (10.8)	17 (12.6)
#Intracoronary devices				
Aspiration/aspiration catheter	3 (1.7)	4 (5.7)	2 (3.1)	6 (4.4)
Balloon only/POBA	13 (7.5)	12 (17.1)	25 (38.5)	37 (27.4)
Drug coated balloon	39 (22.4)	18 (25.7)	20 (30.8)	38 (28.2)
Drug eluting stent	95 (54.6)	43 (61.4)	41 (63.1)	84 (62.2)
Cutting balloon/scoring balloon	NA	NA	NA	NA
Coil	1 (0.6)	0 (0)	0 (0)	0 (0)
OCT	0 (0)	0 (0)	0 (0)	0 (0)
Mother and child	NA	NA	NA	NA
Micro catheter	3 (1.7)	2 (8.6)	3 (4.6)	5 (3.7)
Angiojet	0 (0)	0 (0)	0 (0)	0 (0)
IVUS	0 (0)	0 (0)	2 (3.1)	2 (1.5)
Flowire/FFR	0 (0)	0 (0)	0 (0)	0 (0)
Rotablator	0 (0)	1 (1.4)	1 (1.5)	2 (1.5)
Bare metal stent	4 (2.3)	0 (0)	0 (0)	0 (0)
Embolic protection	4 (2.3)	2 (2.9)	5 (7.7)	7 (5.2)
Extension catheter	2 (0.2)	1 (1.4)	1 (1.5)	2 (1.5)
Double lumen micro catheter	1 (0.1)	0 (0)	1 (1.5)	1 (0.7)
Others	4 (2.3)	2 (2.9)	2 (3.1)	4 (3.0)
Embolic protection status	**N=4**	**N=2**	**N=5**	**N=7**
Filter	3 (100.0)	2 (100.0)	5 (100.0)	7 (100.0)
Balloon/distal	0 (0)	0 (0)	0 (0)	0 (0)
Proximal	0 (0)	0 (0)	0 (0)	0 (0)
Missing	1	0	0	0

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**174**	**70**	**65**	**135**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Direct stenting, No. (%)				
Yes	7 (4.0)	4 (4.8)	6 (9.5)	10 (7.6)
No	167 (96.0)	65 (94.2)	57 (90.5)	122 (92.4)
Not applicable	0	1	2	3

**Summation of stent length was used for lesions which were treated with more than one stent*
***Average of stent diameter was used for lesions which were treated with more than one stent*
#Patients can be in more than one type of category

Table 4.23 Treatment strategy used in graft PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
N	**157**	**71**	**74**	**145**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Total no. of stents/balloons used				
Drug eluting stent	103 (65.6)	51 (71.8)	49 (66.2)	100 (69.0)
Bare metal stent	4 (2.6)	0 (0)	0 (0)	0 (0)
Bio-absorbable stent	0 (0)	0 (0)	0 (0)	0 (0)
Antibody coated stent	0 (0)	0 (0)	0 (0)	0 (0)
*Others	0 (0)	0 (0)	1 91.5)	1 (0.9)
Drug coated balloon	40 (25.5)	19 (26.8)	25 (33.8)	44 (30.3)
Bifurcated stent	0 (0)	0 (0)	0 (0)	0 (0)
Covered stent	0 (0)	0 (0)	0 (0)	0 (0)
Combo stent	10 (6.4)	1 (1.4)	0 (0)	1 (0.7)
Total	157	71	74	145

**Stents which are not listed in the NCVD-PCI Stent List*

Table 4.24 Types of complications in graft PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**174**	**70**	**65**	**135**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
***Types of post-procedure complications in graft PCI**				
Dissection	0 (0)	0 (0)	3 (4.6)	3 (2.2)
Flow limiting	0 (0)	0 (0)	0 (0)	0 (0)
Non-flow limiting	0 (0)	0 (0)	3 (100.0)	3 (100.0)
No reflow	1 (0.6)	1 (1.4)	0 (0)	1 (0.7)
Transient	0 (0)	0 (0)	0 (0)	0 (0)
Persistent	0 (0)	1 (100.0)	0 (0)	1 (100.0)
Perforation	0 (0)	0 (0)	0 (0)	0 (0)

**Results only showed for number of patients who were reported to have the complications*

Table 4.25 Planned duration of dual antiplatelet therapy in graft PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**174**	**70**	**65**	**135**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Planned duration of dual antiplatelet therapy in graftPCI procedure (months)				
1	4 (2.5)	0 (0)	0 (0)	0 (0)
3	9 (5.7)	2 (3.3)	2 (3.3)	4 (3.3)
6	7 (4.4)	2 (3.3)	5 (8.2)	7 (5.8)
12	136 (85.5)	55 (91.7)	53 (86.9)	108 (89.3)
>12	3 (1.9)	1 (1.7)	1 (1.6)	2 (1.7)
Not available	12	10	3	13
Missing	3	0	1	1
Total	174	70	65	135

PCI of chronic total occlusion (CTO) (>3 months)

Total CTO PCI cases were 2,002, which was an increase of more than 15.0% from the 2017–2018 cohort. The number of CTO PCIs showed an equal distribution between LAD and RCA at 41.6% each. [Table 4.26]

About 47.2% of CTO PCIs were elective cases and about 52.8% were ad hoc PCI. The majority of CTO PCIs were via radial interventions (65.9%), and 81.7% of cases used 6Fr guide catheters. Around 78.3% of cases were successful. [Table 4.27]

The mean fluoroscopy time was 38.8 minutes, and the mean contrast volume was 213.0 ml. The estimated lesion length was 45.3 mm, the mean stent length was 55.5 mm, and the mean stent diameter was 2.8 mm. [Table 4.27] Post-procedural complications include 5.7% dissection (more than 90.0% were non-flow limiting), 1.0% no-reflow and 0.2% perforation. [Table 4.30]

DES remained the mainstay of treatment at 76.1 % of CTO cases. However, DCB usage was on a rising trend, with a significant increase of almost 90% from the two previous years. [Table 4.28] The use of microcatheters had also increased to 45.3% of the CTO PCI cases, compared to 34.9% reported in the previous cohort. [Table 4.29] On the other hand, the use of intracoronary imaging such as IVUS and OCT were still low, although IVUS usage has increased to 7.6% of cases vs. just 3.2% in the previous cohort.

Duration of dual anti-platelet treatment (DAPT) remained the same across the board for LM, graft and CTO PCIs. Approximately 90.0% of cases were prescribed 12-month DAPT following PCI. [Tables 4.20, 4.25 and 4.31]

Table 4.26 Summary of location of lesions treated with percutaneous coronary intervention and for lesion with description of CTO >3 months only, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,739**	**1,105**	**897**	**2,002**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Location of lesion with CTO >3 months				
Left main stem	64 (3.7)	25 (2.3)	26 (2.9)	51 (2.6)
Left anterior descending artery (LAD)	713 (41.0)	459 (41.5)	371 (41.4)	830 (41.6)
LAD proximal	601 (84.3)	380 (82.8)	303 (81.7)	683 (82.3)
LAD mid	90 (12.6)	66 (14.4)	58 (15.6)	124 (14.9)
LAD apical	17 (2.4)	10 (2.2)	4 (1.1)	14 (1.7)
First diagonal	5 (0.7)	2 (0.4)	5 (1.4)	7 (0.8)
First diagonal a	0 (0)	0 (0)	1 (0.3)	1 (0.1)
Second diagonal	0 (0)	1 (0.2)	0 (0)	1 (0.1)
Second diagonal a	0 (0)	0 (0)	0 (0)	0 (0)
Right coronary artery (RCA)	716 (41.2)	479 (43.4)	353 (39.4)	832 (41.6)
RCA proximal	426 (59.5)	292 (61.1)	200 (56.7)	492 (59.2)
RCA mid	195 (27.2)	141 (29.5)	104 (29.5)	245 (29.5)
RCA distal	75 (10.5)	38 (8.0)	35 (9.9)	73 (8.8)
Posterior descending	8 (1.1)	5 (1.1)	5 (1.4)	10 (1.2)
Posterolateral from RCA	12 (1.7)	2 (0.4)	9 (2.6)	11 (1.3)
Left circumflex artery (LCx)	245 (14.1)	142 (12.9)	145 (16.2)	287 (14.3)
Proximal circumflex	160 (65.3)	92 (64.8)	94 (64.8)	186 (64.8)
Intermediate/ anterolateral	7 (2.9)	1 (0.7)	1 (0.7)	2 (0.7)
Obtuse marginal a	10 (4.1)	7 (4.9)	6 (4.1)	13 (4.5)
Obtuse marginal b	0 (0)	2 (1.4)	5 (3.5)	7 (2.4)
Distal circumflex	63 (25.7)	39 (27.5)	33 (22.8)	72 (25.1)
Left posterolateral	3 (1.2)	1 (0.7)	4 (2.8)	5 (1.7)
Left posterolateral a	0 (0)	0 (0)	0 (0)	0 (0)
Left posterolateral b	2 (0.8)	1 (0.8)	1 (0.7)	1 (0.4)
Posterior descending	0 (0)	0 (0)	1 (0.7)	1 (0.4)
Graft	1 (0.1)	0 (0)	2 (0.2)	2 (0.1)
LIMA	0 (0)	0 (0)	0 (0)	0 (0)
RIMA	0 (0)	0 (0)	0 (0)	0 (0)
SVG1	1 (100.0)	0 (0.0)	2 (100.0)	2 (100.0)
SVG2	0 (0)	0 (0)	0 (0)	0 (0)
SVG3	0 (0)	0 (0)	0 (0)	0 (0)
RAD1	0 (0)	0 (0)	0 (0)	0 (0)
RAD2	0 (0)	0 (0)	0 (0)	0 (0)
RAD3	0 (0)	0 (0)	0 (0)	0 (0)

Table 4.27 Clinical presentation of PCI procedures performed for lesion with description of CTO >3 months only, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,739**	**1,105**	**897**	**2,002**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
PCI status, No. (%)				
Elective	1,489 (85.6)	937 (84.8)	763 (85.1)	1,700 (84.9)
NSTEMI/UA	150 (8.6)	110 (10.0)	95 (10.6)	205 (10.2)
STEMI	100 (5.8)	58 (5.3)	39 (4.4)	97 (4.9)
Elective, No. (%)	**N=1489**	**N=937**	**N=763**	**N=1,700**
Staged PCI	720 (48.7)	458 (49.0)	477 (51.0)	799 (47.2)
Ad hoc	760 (51.4)	341 (44.9)	418 (55.1)	895 (52.8)
Not available	9	2	4	6
NSTEMI/UA, No. (%)	**N=150**	**N=110**	**N=95**	**N=205**
Urgent (within 24 hrs)	32 (22.1)	20 (18.4)	25 (27.8)	45 (22.6)
Non urgent	NA	NA	NA	NA
In hospital (<24 hrs)	81 (55.9)	52 (47.7)	50 (55.6)	102 (51.3)
PCI within 30 days post event	32 (22.1)	37 (33.9)	15 (16.7)	52 (26.1)
Not available	5	1	5	6
STEMI, No. (%)	**N=100**	**N=58**	**N=39**	**N=97**
Rescue	15 (16.0)	7 (12.7)	6 (15.4)	13 (13.8)
Primary	41 (43.6)	27 (49.1)	14 (35.9)	41 (43.6)
Delayed routine PCI	21 (22.3)	11 (20.0)	11 (28.2)	22 (23.4)
Delayed selective PCI	7 (7.5)	5 (9.1)	3 (7.7)	8 (8.5)
Pharmacoinvasive	10 (10.6)	5 (9.1)	5 (12.8)	10 (10.6)
Not available	6	3	0	3
#Percutaneous entry, No. (%)				
Brachial	13 (0.8)	14 (1.3)	8 (0.9)	22 (1.1)
Radial	1,111 (63.9)	705 (63.8)	615 (68.6)	1,320 (65.9)
Femoral	828 (47.6)	586 (53.0)	447 (49.8)	1,033 (51.6)
French size type				
Guiding catheter	1,567 (90.4)	1,008 (91.5)	858 (95.7)	1,866 (93.4)
Guiding sheath	167 (9.6)	94 (8.5)	39 (4.4)	133 (6.7)
Not available	5	3	0	3

Year	**2017–2018**	**2019**	**2020**	**2019–2020**
Total no. of lesions	**1,739**	**1,105**	**897**	**2,002**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
French size (guiding catheter), No. (%)				
4	1 (0.1)	0 (0)	1 (0.1)	1 (0.1)
5	4 (0.3)	2 (0.2)	1 (0.1)	3 (0.2)
6	1,392 (89.0)	812 (80.6)	712 (83.0)	1,524 (81.7)
7	161 (10.3)	181 (18.0)	134 (15.6)	315 (16.9)
8	5 (0.3)	11 (1.1)	2 (0.2)	13 (0.7)
Others	2 (0.1)	1 (0.1)	8 (0.9)	9 (0.5)
Not available	2	1	0	1
Closure device, No. (%)				
No	1,348 (85.2)	828 (80.9)	654 (80.4)	1,482 (80.7)
Seal	95 (6.0)	102 (10.0)	99 (12.2)	201 (10.9)
Suture	95 (6.0)	54 (5.3)	40 (4.9)	94 (5.1)
Exoseal	10 (0.6)	10 (1.0)	1 (0.1)	11 (0.6)
Others	35 (2.2)	30 (2.9)	19 (2.3)	49 (2.7)
Not available	16	7	8	15
Missing	140	74	76	150
[+]Extent of coronary disease, No. (%)				
Single vessel disease	1,345 (77.3)	856 (77.5)	676 (75.4)	1,532 (76.5)
Multiple vessel disease	364 (20.9)	221 (20.0)	194 (21.6)	415 (20.7)
Graft	26 (1.5)	23 (2.1)	22 (2.5)	45 (2.3)
Left main	4 (0.2)	5 (0.5)	5 (0.6)	10 (0.5)
Fluoroscopy time, min				
N	1,486	988	826	1,814
Mean (SD)	36.6 (23.0)	38.7 (25.7)	38.9 (22.9)	38.8 (24.5)
Median (min, max)	30.8 (1.1, 176.0)	33.1 (1.0, 179.1)	34.5 (1.1, 149.1)	33.6 (1.0, 179.1)
Not available, No. (%)	102 (5.9)	58 (5.3)	37 (4.1)	95 (4.8)
Missing, No. (%)	151 (8.7)	59 (5.3)	34 (3.8)	93 (4.7)
Fluoroscopy total dose, mGy				
N	1,091	722	586	1,358
Mean (SD)	97,635.6 (221,645.3)	61,673.8 (146,652.0)	52,646.9 (133,941.5)	57,778.5 (141,327.5)
Median (min, max)	3,737.4 (10.4, 3,341,015.0)	3,137.5 (21.3, 1,129,050.0)	2,984.0 (29.1, 1,356,510.0)	3,047.5 (21.3, 1,345,410.0)
Not available, No. (%)	314 (18.1)	155 (14.0)	190 (21.2)	345 (17.2)
Missing, No. (%)	334 (19.2)	178 (16.1)	121 (13.5)	299 (14.9)

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,739**	**1,105**	**897**	**2,002**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Contrast volume, ml				
N	1,482	970	821	1,791
Mean (SD)	212.5 (84.3)	205.7 (81.9)	221.6 (90.5)	213.0 (86.3)
Median (min, max)	200.0 (35.0, 500.0)	200.0 (40.0, 500.0)	200.0 (40.0, 500.0)	200.0 (40.0, 500.0)
Not available, No. (%)	92 (5.3)	64 (5.8)	41 (4.6)	105 (5.2)
Missing, No. (%)	165 (9.5)	71 (6.4)	35 (3.9)	106 (5.3)
Thrombolytics prior to PCI procedure in STEMI, No. (%)				
Total no. of procedures among STEMI patients	**N=169**	**N=111**	**N=79**	**N=190**
Yes	27 (16.0)	13 (11.7)	10 (12.7)	23 (12.1)
No	142 (84.0)	98 (88.3)	69 (87.3)	167 (87.9)
Pre-procedure stenosis, %				
N	1,589	938	846	1,784
Mean (SD)	98.5 (9.9)	98.7 (9.3)	98.3 (11.5)	98.5 (10.4)
Median (min, max)	100.0 (0.0, 100.0)	100.0 (0.0, 100.0)	100.0 (0.0, 100.0)	100.0 (0.0, 100.0)
Missing, No. (%)	150 (8.6)	167 (15.1)	51 (5.7)	218 (10.9)
Post-procedure stenosis, %				
N	1,330	807	763	1,570
Mean (SD)	26.9 (42.6)	23.0 (40.5)	20.1 (38.4)	21.6 (39.5)
Median (min, max)	0 (0.0, 100.0)	0 (0.0, 100.0)	0 (0.0, 100.0)	0 (0.0, 100.0)
Missing, No. (%)	409 (23.5)	298 (27.0)	132 (14.9)	432 (21.6)
Estimated lesion length, mm				
N	1,319	867	744	1,611
Mean (SD)	44.5 (23.4)	45.8 (24.2)	44.7 (23.9)	45.3 (24.0)
Median (min, max)	40.0 (2.0, 150.0)	40.0 (6.0, 120.0)	40.0 (5.0, 130.0)	40.0 (5.0, 130.0)
Missing, No. (%)	420 (24.2)	238 (21.5)	153 (17.1)	391 (19.5)
Lesion result, No. (%)				
Successful	1327 (76.4)	846 (76.7)	719 (80.3)	1565 (78.3)
Unsuccessful	409 (23.6)	257 (23.3)	177 (19.8)	434 (21.7)
Not available	3	2	1	3
*Stent length, mm				
N	1262	809	692	1501
Mean (SD)	51.7 (26.3)	56.3 (27.7)	54.5 (27.1)	55.5 (27.4)
Median (min, max)	48.0 (9.0, 161.0)	48.0 (12.0, 150.0)	50.0 (8.0, 156.0)	49.0 (8.0, 156.0)
Not available, No. (%)	477 (27.4)	296 (26.8)	205 (22.9)	501 (25.0)

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,739**	**1,105**	**897**	**2,002**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
**Stent diameter, mm				
N	1,253	811	693	1,504
Mean (SD)	2.8 (0.4)	2.8 (0.4)	2.8 (0.4)	2.8 (0.4)
Median (min, max)	2.8 (2.0, 4.7)	2.8 (2.0, 4.5)	2.8 (2.0, 5.0)	2.8 (2.0, 5.0)
Not available, No. (%)	486 (28.0)	294 (26.6)	204 (22.7)	498 (24.9)
Maximum balloon size used (predilatation), mm				
N	1,264	855	724	1,579
Mean (SD)	2.3 (0.5)	2.3 (0.5)	2.4 (0.5)	2.3 (0.5)
Median (min, max)	2.5 (1.0, 4.5)	2.5 (1.0, 4.5)	2.5 (1.0, 4.5)	2.5 (1.0, 4.5)
Not available, No. (%)	475 (27.3)	250 (22.6)	173 (19.3)	423 (21.1)
Maximum balloon size used (postdilatation), mm				
N	1,004	592	497	1,089
Mean (SD)	3.2 (0.5)	3.3 (0.5)	3.2 (0.5)	3.3 (0.5)
Median (min, max)	3.0 (1.0, 5.0)	3.3 (1.3, 5.1)	3.3 (1.5, 5.0)	3.3 (1.3, 5.1)
Not available, No. (%)	735 (42.3)	513 (46.4)	400 (44.6)	913 (45.6)
Maximum stent/balloon deploy pressure, atm				
N	1,001	588	491	1,079
Mean (SD)	17.1 (5.0)	17.8 (4.8)	18.1 (5.0)	17.9 (4.9)
Median (min, max)	18.0 (4.0, 40.0)	18.0 (6.0, 40.0)	18.0 (4.0, 30.0)	18.0 (4.0, 40.0)
Not available, No. (%)	738 (42.4)	517 (46.8)	406 (45.3)	923 (46.1)

#Patients can be in more than one type of category

[+] Extent of coronary disease referring to:

Single vessel disease refers to patients with single vessel disease information (old CRF)/ patients with only one information of either LAD, LCx or RCA

Multiple vessel disease refers to patients with multiple vessel disease information (old CRF)/patients with more than one information of LAD, LCx or RCA

Left main stem (LMS) refers to patients with information on LMS (LMS alone or in combination with LAD, LCx, RCA or single vessel disease)

Graft refers to patients with information on graft (graft alone or in combination with LAD, LCx, RCA, single vessel disease, multiple vessel disease or LMS)

**Summation of stent length was used for lesions which were treated with more than one stent*

***Average of stent diameter was used for lesions which were treated with more than one stent*

Table 4.28 Treatment strategy used for lesion with description of CTO >3 months only, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of stents/balloons used	**2,092**	**1,428**	**1,227**	**2,655**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Drug eluting stent	1,638 (79.2)	1,120 (78.4)	901 (73.4)	2,021 (76.1)
Bare metal stent	2 (0.1)	0 (0)	0 (0)	0 (0)
Bio-absorbable stent	1 (0.1)	0 (0)	0 (0)	0 (0)
Antibody coated stent	0 (0)	0 (0)	0 (0)	0 (0)
*Others	2 (0.1)	2 (0.1)	0 (0)	2 (0.1)
Drug coated balloon	294 (14.2)	262 (18.4)	295 (24.0)	557 (21.0)
Bifurcated stent	2 (0.1)	0 (0)	0 (0)	0 (0)
Covered stent	0 (0.0)	1 (0.1)	4 (0.3)	5 (0.2)
Combo stent	129 (6.2)	43 (3.0)	27 (2.2)	70 (2.6)
Missing	24	0	0	0
Total	2,092	1,428	1,227	2,655

**Stents which are not listed in the NCVD-PCI Stent List*

Table 4.29 Types of devices used during percutaneous coronary intervention for lesion with description of CTO >3 months only, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,739**	**1,105**	**897**	**2,002**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
#Intracoronary devices used for lesion with CTO> 3 months				
Aspiration/aspiration catheter	22 (1.3)	19 (1.7)	16 (1.8)	35 (1.8)
Balloon only/POBA	221 (12.7)	244 (22.1)	236 (26.3)	480 (24.0)
Drug coated balloon	225 (12.9)	197 (17.8)	222 (24.8)	419 (20.9)
Drug eluting stent	1,030 (59.2)	693 (62.7)	568 (63.3)	1,261 (63.0)
Cutting balloon/scoring balloon	NA	NA	NA	NA
Coil	1 (0.7)	1 (0.1)	2 (0.2)	3 (0.2)
OCT	1 (0.1)	1 (0.1)	5 (0.6)	6 (0.3)
Mother and child	NA	NA	NA	NA
Micro catheter	606 (34.9)	479 (43.4)	428 (47.7)	907 (45.3)
Angiojet	1 (0.1)	0 (0)	0 (0)	0 (0)
IVUS	56 (3.2)	82 (7.4)	71 (7.9)	153 (7.6)
Flowire/FFR	3 (0.2)	2 (0.2)	3 (0.3)	5 (0.3)
Rotablator	15 (0.9)	12 (1.1)	12 (1.3)	24 (1.2)
Bare metal stent	2 (0.1)	0 (0)	0 (0)	0 (0)
Embolic protection	0 (0)	1 (0.1)	1 (0.1)	2 (0.1)
Extension catheter	6 (0.4)	17 (1.5)	31 (3.5)	48 (2.4)
Double lumen micro catheter	9 (0.5)	11 (1.0)	13 (1.5)	24 (1.2)
Others	38 (2.2)	10 (0.9)	12 (1.3)	22 (1.0)
Embolic protection status	**N=0**	**N=1**	**N=1**	**N=2**
Filter	0 (0)	0 (0)	1 (100.0)	1 (100.0)
Balloon/distal	0 (0)	0 (0)	0 (0)	0 (0)
Proximal	0 (0)	1 (100.0)	0 (0)	1 (100.0)

#Patients *can be in more than one type of category*

Table 4.30 Types of post procedure complications for lesion with description of CTO >3 months only, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of lesions	**1,739**	**1,103**	**894**	**1,997**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
***Types of complication for lesion with CTO >3 months**				
Dissection	63 (3.6)	49 (4.4)	65 (7.3)	114 (5.7)
Flow limiting	10 (16.4)	6 (12.2)	5 (8.1)	11 (9.9)
Non-flow limiting	51 (83.6)	43 (87.8)	57 (91.9)	100 (90.1)
Not available	2	0	3	3
No reflow	27 (1.6)	13 (1.2)	7 (0.8)	20 (1.0)
Transient	14 (53.9)	9 (75.0)	5 (83.3)	14 (77.8)
Persistent	12 (46.2)	3 (25.0)	1 (16.7)	4 (22.2)
Not available	1	1	1	2
Perforation	2 (0.1)	2 (0.2)	2 (0.2)	4 (0.2)

**Results only showed for number of patients who were reported to have the complications*

Table 4.31 Duration of thienopyridine in patients who underwent PCI and lesion with description of CTO >3 months only, NCVD-PCI Registry, 2019–2020

Year	Duration of clopidogrel/ ticlopidine (months)	#Intracoronary devices used		
		Balloon only/POBA	Drug eluting stent	Bare metal stent
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of lesions = 1,739	1	3 (1.4)	5 (0.5)	1 (50.0)
	3	1 (0.5)	3 (0.3)	0 (0)
	6	3 (1.4)	8 (0.8)	0 (0)
	12	193 (92.8)	953 (96.4)	1 (50.0)
	>12	8 (3.9)	20 (2.0)	0 (0)
	Not available	9	26	0
	Missing	4	15	0
	Total	**221**	**1,030**	**2**
2019 Total no. of lesions = 1,105	1	1 (0.4)	5 (0.8)	0
	3	5 (2.2)	4 (0.6)	0
	6	21 (9.2)	21 (3.2)	0
	12	188 (82.6)	608 (92.7)	0
	>12	13 (5.7)	18 (2.7)	0
	Not available	9	27	0
	Missing	7	10	0
	Total	**244**	**693**	**0**
2020 Total no. of lesions = 897	1	1 (0.5)	2 (0.4)	0
	3	1 (0.5)	1 (0.2)	0
	6	29 (13.0)	27 (5.0)	0
	12	192 (86.1)	505 (93.7)	0
	>12	0 (0.0)	4 (0.7)	0
	Not available	2	12	0
	Missing	11	17	0
	Total	**236**	**568**	**0**
2019–2020 Total no. of lesions = 2,002	1	2 (0.4)	7 (0.6)	0
	3	6 (1.3)	5 (0.4)	0
	6	50 (11.1)	48 (4.0)	0
	12	380 (84.3)	1,113 (93.1)	0
	>12	13 (2.9)	22 (1.8)	0
	Not available	11	39	0
	Missing	18	27	0
	Total	**480**	**1,261**	**0**

#Patients can be in more than one type of category

OUTCOMES

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Summary

1. Complication rate was low at 0.5%.
2. In-hospital, 30-day, six-month, and one-year mortality rates were 1.4%, 2.4%, 4.6%, and 6.6% respectively. The mortality rates were almost similar to the previous cohort. Of note, the one-year mortality remained high. This underscores the importance of optimising secondary prevention treatment.
3. The predictors of poor outcomes in patients who underwent PCI were diabetes, history of stroke, heart rate of more than 80 mmHg, reduced ejection fraction, the extent of coronary artery disease, and serum creatinine of more than 200 µmol/L.
4. Patients at an advanced age and female patients had worse outcomes.
5. There was an observed better outcome in dyslipidaemia. This is probably due to the treatment effect of statin in patients with dyslipidaemia.
6. About 1/3 of PCI was done in the non-elective setting, and this was associated with higher mortality.
7. Patients that were in cardiogenic shock peri-procedure had a mortality rate of 71.0%.
8. STEMI had the highest mortality rate, but after 6 months, NSTEMI mortality rate increased and was similar to STEMI at 1 year. Killip 3 and 4 were poor prognostic markers but seem to taper with time.

Outcome and basic demographics

Age is an important predictor of outcome. [Table 5.3]

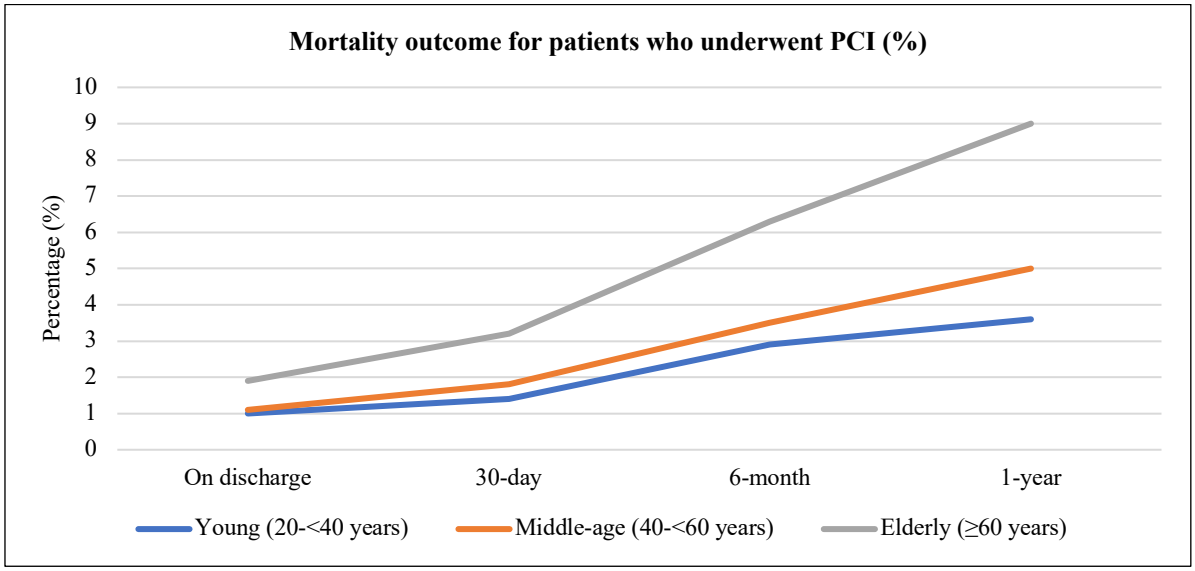


Figure 1: Comparison of mortality outcome for patients who underwent PCI between age groups (in percentage), NCVD-PCI Registry, 2019–2020

Most of the patients were male (male: female ratio of 5:1). There was an observed higher mortality in females, but this was likely skewed by the sample size. [Table 5.4]

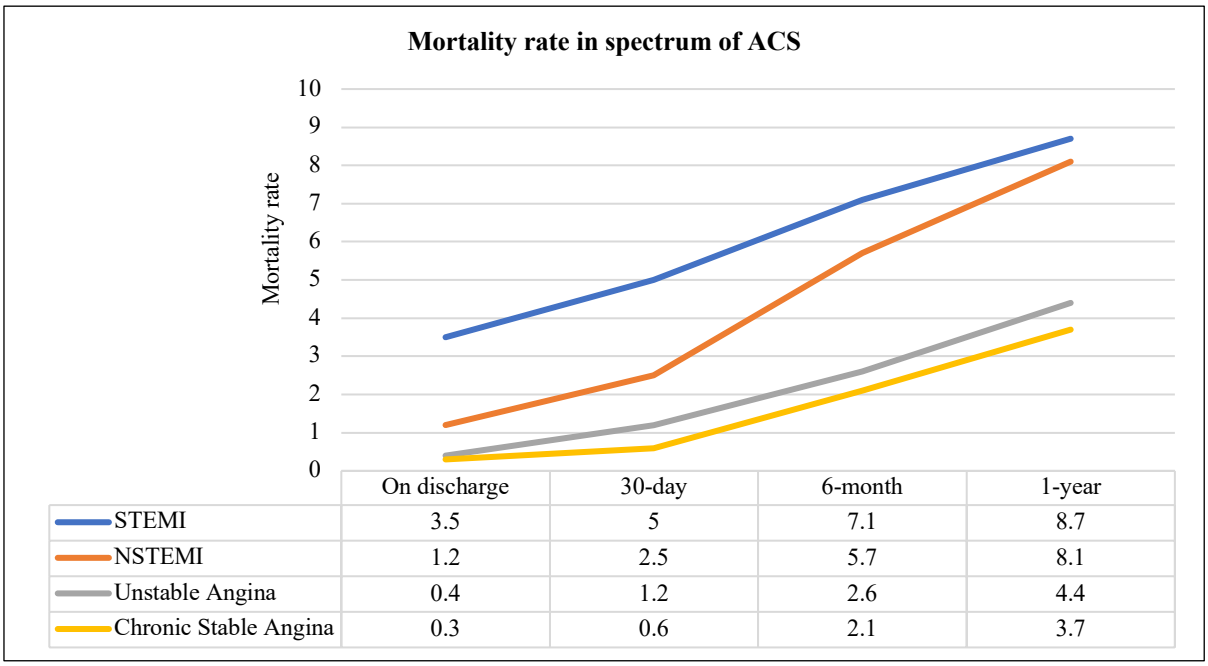
Outcome and conventional risk factors
For this present cohort, hypertension was not a predictor of mortality. The data in 2017–2018 noted a hazard ratio of 1.26 but did not achieve statistical significance. [Table 5.6] However, we noticed that the mortality among hypertensive patients was similar on discharge, but increased at 6 months and 1 year.

Mortality data showed worse outcomes among patients without dyslipidaemia. This was consistent with 2017–2018 data, attributing to the effect of statin in patients known to have dyslipidaemia. [Table 5.7]

Outcome in ACS
About one-third of PCI was done in the non-elective setting, resulting in a worse mortality outcome. This was expected as urgent PCIs such as rescue PCI in STEMI and in high risk NSTEMI were performed in emergency settings. [Table 5.8]

In the non-elective setting, 60% of PCI were performed in patients with STEMI and NSTEMI. [Table 5.8]

The mortality rate for patients with NSTEMI, UA, and chronic stable angina showed increases at 6 months and 1 year of the procedure. [Table 5.9]



	On discharge	30-day	6-month	1-year
STEMI	3.5	5	7.1	8.7
NSTEMI	1.2	2.5	5.7	8.1
Unstable Angina	0.4	1.2	2.6	4.4
Chronic Stable Angina	0.3	0.6	2.1	3.7

Figure 2: Comparison of mortality outcome for patients who underwent PCI across ACS spectrum (in percentage), NCVD-PCI Registry, 2019–2020

After 1 year, the mortality rate of NSTEMI was similar to STEMI as patients with NSTEMI had more co-morbidities. [Table 5.9]

There was less than 0.1% of patients with cardiogenic shock peri procedure. However, 71% of patients that were in cardiogenic shock peri-procedure had a mortality outcome. [Table 5.9]

Post PCI medication
Although only a few patients were on ticlopidine, it was surprising to see the drug was still in use. [Table 5.10]

About 86 percent of patients were discharged with dual antiplatelet. The possible cause for single antiplatelet post-PCI was concomitant use of anticoagulation, but only about 4 percent was on NOAC/warfarin.

The default duration for dual antiplatelet therapy for a patient with acute coronary syndrome (ACS) treated by PCI was 12 months.[1,2]

Recent trials showed that dual antiplatelet duration could be personalised, with the shortest DAPT study duration being 1 month, based on a patient's thrombotic and bleeding risk.[3-7] There is very limited data to advocate the usage of single antiplatelet post-PCI; hence DAPT should be the standard of treatment in all post-PCI patients.

In our data, 11.6% of patients were on non-conventional antiplatelets. We postulated this was due to listing of glyprin as a separate compound to aspirin.

The percentage of patients discharged with beta-blockers and ACE/ARB was about 80%, in keeping with most randomised trials.

Outcome at discharge

Mortality rate during the PCI procedure was 0.01%. The main cause of death for PCI procedures was cardiac death, with a 3% increase compared to 2017–2018 cohort. Ninety-one percent of the patients succumbed outside of the cardiac lab. [Tables 5.11 and 5.12]

Ninety-seven percent of post-PCI patients achieved TIMI 3 flow. However, post-PCI TIMI flow did not confer a better prognosis in our data. [Table 5.14]

The contrast usage in PCI cases was mostly less than 300 (99.0%) and the contrast amount was not associated with adverse outcomes in 2019–2020 data as compared with 2017–2018. [Table 5.15] There is currently no recommended maximal contrast usage in both the American and European Society of Cardiology guidelines.

Current evidence indicates that the risk of contrast-induced nephropathy can be predicted and anticipated using simple risk score models, and is associated with poorer mortality and morbidity outcomes.[8-10] Hence, using contrast amount alone is not an accurate predictor of outcome.

Post PCI readmission rate within 30 days, excluding staged revascularisation, was low at three percent, and readmission was predominantly due to non-cardiac causes (19.0%). [Table 5.16]

Prognostic risk factors in post PCI patients

There was an observed increased hazard ratio for advanced age, achieving statistical significance at age more than 60 years with an unadjusted hazard ratio of 2.33 (95% CI: 1.48, 3.65) at 30 days. However, it did not achieve statistical significance to be a prognostic factor. [Table 5.21]

Females had worse prognosis at discharge, 30 days, 6 months, and 1 year with hazard ratios of 1.46 (95% CI: 1.14, 1.88), 1.47 (95% CI: 1.22,1.79), 1.42 (95% CI: 1.24, 1.64), and 1.52 (95% CI: 1.35, 1.71), respectively, achieving statistical significance on the unadjusted hazard ratio. On computing using an adjusted hazard ratio, it was 1.37 (95% CI: 0.97, 1.94) at 1 year and almost reached statistical significance with a p-value of 0.07. [Tables 5.20, 5.21, 5.22 and 5.23]

Diabetes mellitus was a poor prognostic factor, with adjusted hazard ratios of 1.46 (95% CI: 0.69, 3.09), 1.84 (95% CI: 1.35, 2.51), and 1.81 (95% CI: 1.38, 1.94) at discharge, 6 months, and 1 year, respectively. Of note, the hazard ratio on discharge achieved statistical significance on the unadjusted hazard ratio but did not achieve statistical significance for the adjusted hazard ratio. [Tables 5.20, 5.22 and 5.23]

Indication of PCI was subdivided into elective, NSTEMI/UA, and AMI/STEMI. On adjusted hazard ratio, it did not achieve statistical significance as a prognostic marker. But on unadjusted hazard ratio, it did achieve statistical significance, with AMI/STEMI having the worst prognostic factor, with hazard ratios of 6.23 (95% CI: 5.15, 7.55), 2.75 (95% CI: 2.41, 3.14), and 2.03 (95% CI: 1.81, 2.27), followed by NSTEMI/UA with hazard ratios of 2.86 (95% CI: 2.25, 3.63), 1.80 (95% CI: 1.54, 2.11) and 1.63 (95% CI: 1.43, 1.86) at 30-day, 6- month and 1-year, respectively. [Tables 5.21, 5.22 and 5.23]

Patients with a history of myocardial infarction had better unadjusted hazard ratios of 0.70 (95% CI: 0.56, 0.80), 0.81 (95% CI: 0.72, 0.92), and 0.89 (95% CI: 0.80, 0.99) at 30 days, 6 months, and 1 year respectively. This could be attributed to medical therapy and monitoring. However, it did not achieve statistical significance in the adjusted hazard ratio. [Tables 5.21, 5.22 and 5.23]

Serum creatinine >200 μmol/L was the worst prognostic factor with adjusted hazard ratios of 3.18 (95% CI: 1.40, 7.24), 2.74 (95% CI: 1.59, 4.74), 4.14 (95% CI: 3.00, 5.77), and 4.17 (95% CI: 3.05, 5.69) at discharge, 30 days, 6 months, and 1 year, respectively. [Tables 5.20, 5.21, 5.22 and 5.23]

A history of stroke was an adverse prognostic factor with unadjusted hazard ratios of 2.16 (95% CI: 1.45, 3.23), 1.95 (95% CI: 1.46, 2.64), and 1.92 (95% CI: 1.48, 2.49) at 30 days, 6 months, and 1 year respectively. On analysis with adjusted hazard ratio, it only achieved statistical significance at 6 months with a hazard ratio of 2.32 (95% CI: 1.28, 4.21). [Tables 5.21, 5.22 and 5.23]

Our registry showed that heart rate is an important predictor. Using a heart rate of 60–80 as reference, a heart rate of 80–100 increased the adjusted hazard ratios to 1.68 (95% CI: 1.23, 2.29) at 6 months and 1.47 (95% CI: 1.12, 1.92) at 1 year. [Tables 5.22 and 5.23]

A heart rate of more than 100 increased the adjusted hazard ratios further to 3.54 (95% CI: 2.01, 6.26), 2.62 (95% CI: 1.71, 4.02), and 2.00 (95% CI: 1.32, 3.05) at 30 days, 6 months, and 1 year, respectively. [Tables 5.21, 5.22 and 5.23] A heart rate of less than 40 increased the adjusted hazard ratio to 7.23 (95% CI: 1.75, 29.89) at 1 year but did not achieve statistical significance at 30 days and 6 months. [Tables 5.21, 5.22 and 5.23] This registry substantiated the current evidence of an increased resting heart rate of more than 80 beats per minute is associated with poor cardiovascular outcomes.[11-13]

However, heart rate did not affect the length of stay. [Table 5.19]

Pharmacological heart rate reduction is not indicated in the primary prevention of cardiovascular disease. However, the evidence showed that beta blockers and heart rate reduction are recommended in patients with ischaemic heart disease with reduced ejection fraction.[14-17]

Poor left ventricular ejection fraction was a poor prognostic risk factor. EF <30% had adjusted hazard ratios of 4.73 (95% CI: 1.76, 12.69), 4.71 (95% CI: 2.44, 9.07), 5.50 (95% CI: 3.51, 8.61), and 4.97 (95% CI: 3.34, 7.41) at discharge, 30 days, 6 months, and 1 year, respectively. [Tables 5.20, 5.21, 5.22 and 5.23] EF 30–50% had adjusted hazard ratios of 1.81 (95% CI: 1.11, 2.94), 2.33 (95% CI: 1.68, 3.25), and 2.31 (95% CI: 1.74, 3.06) at 30 days, 6 months, and 1 year, respectively. [Tables 5.21, 5.22 and 5.23] This highlights the importance of heart failure monitoring and treatments.

Smoking was not a statistically significant prognostic factor for post PCI patients. [Tables 5.20 and 5.23]

Prognostic STEMI factors in post PCI patients

Killip III and IV had poor prognostic compared to Killip I and II with anadjusted hazard ratios of 7.34 (95% CI: 3.45, 15.62), 3.85 (95% CI: 2.27, 6.53), 2.59 (95% CI: 1.72, 3.89), and 2.06 (95% CI: 1.37, 3.10) at discharge, 30 days, 6 months, and 1 year, respectively. [Tables 5.20, 5.21, 5.22 and 5.23]

The extent of coronary artery disease showed varying statistical significance. Using single vessel disease as a reference, multivessel disease only achieved statistical significance in the adjusted hazard ratio of 1.95 (95% CI: 1.27, 3.01) at 30 days. [Table 5.21] However, it increased the unadjusted hazard ratios to 1.31 (95% CI: 1.15, 1.50) and 1.29 (95% CI: 1.16, 1.45) at 6 months and 1 year, respectively. [Tables 5.22 and 5.23] Left main disease increased the adjusted hazard ratio to 3.55 (95% CI: 1.59, 7.90) at 30 days. [Table 5.21] At 6 months and 1 year, left main disease only achieved a significant P value for unadjusted hazard ratios to 2.57 (95% CI: 2.01, 3.30) and 2.43 (95% CI: 1.96, 3.01), respectively. [Table 5.22 and 5.23]

Graft disease only achieved statistical significance in unadjusted hazard ratio of 2.20 (95% CI: 1.47, 3.29) at 1 year. [Table 5.23] We suspected that it was difficult to capture the correlation due to the vast variability in the severity of coronary artery disease.

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Table 5.1 Summary of in-hospital outcome for patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Periprocedural MI, No. (%) (based on clinical diagnosis) /Significant Periprocedural MI, No. (%)				
Yes	61 (0.3)	20 (0.1)	42 (0.3)	62 (0.2)
No	23,421 (99.0)	14,183 (99.1)	12,573 (99.4)	26,756 (99.2)
Not available	172 (0.7)	115 (0.8)	30 (0.2)	145 (0.5)
Not applicable	NA	0	1	1
Missing	75	3	0	3
Emergency reintervention/PCI, No. (%)				
Yes	51 (0.2)	22 (0.2)	27 (0.2)	49 (0.2)
No	23,462 (99.2)	14,182 (99.0)	12,593 (99.6)	26,775 (99.3)
Not available	145 (0.6)	117 (0.8)	26 (0.2)	143 (0.5)
Missing	71	0	0	0
Bail-out CABG, No. (%)				
Yes	8 (0.0)	4 (0.0)	5 (0.0)	9 (0.0)
No	23,652 (100.0)	14,314 (100.0)	12,641 (100.0)	26,955 (100.0)
Missing	69	3	0	3
Other complications				
Cardiogenic shock (after procedure), No. (%)				
Yes	65 (0.3)	33 (0.2)	30 (0.2)	63 (0.2)
No	23,598 (99.7)	14,288 (99.8)	12,616 (99.8)	26,904 (99.8)
Missing	66	0	0	0
Arrhythmia (VT/VF/Brady), No. (%)				
Yes	48 (0.2)	41 (0.3)	67 (0.5)	108 (0.4)
No	23,615 (99.8)	14,280 (99.7)	12,579 (99.5)	26,859 (99.6)
Missing	66	0	0	0
TIA/Stroke, No. (%)				
Yes	3 (0.0)	2 (0.0)	2 (0.0)	3 (0.0)
No	23,661 (100.0)	14,319 (100.0)	12,645 (100.0)	26,964 (100.0)
Missing	65	0	0	0
Tamponade, No. (%)				
Yes	9 (0.0)	4 (0.0)	6 (0.1)	10 (0.0)
No	23,655 (100.0)	14,316 (100.0)	12,640 (100.0)	26,956 (100.0)
Missing	65	1	0	1
Contrast reaction, No. (%)				
Yes	6 (0.0)	3 (0.0)	3 (0.0)	6 (0.0)
No	23,656 (100.0)	14,317 (100.0)	12,643 (100.0)	26,960 (100.0)
Missing	67	1	0	1

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
New onset/worsened heart failure, No. (%)				
Yes	22 (0.1)	8 (0.1)	6 (0.1)	14 (0.1)
No	23,643 (99.9)	14,312 (99.9)	12,640 (100.0)	26,952 (99.0)
Missing	64	1	0	1
New renal impairment, No. (%)				
Yes	34 (0.1)	11 (0.1)	10 (0.1)	21 (0.1)
No	23,521 (99.4)	14,230 (99.4)	12,629 (99.9)	26,859 (99.6)
Not available	103 (0.4)	80 (0.6)	7 (0.1)	87 (0.3)
Missing	71	0	0	0
Vascular complications				
Bleeding, No. (%)				
Yes	19 (0.1)	7 (0.1)	7 (0.1)	14 (0.1)
No	23,640 (99.9)	14,313 (100.0)	12,639 (99.9)	26,952 (100.0)
Missing	70	1	0	1
Type of bleeding, No. (%)				
Total no. of procedures who had bleeding	**N=19**	**N=7**	**N=7**	**N=14**
Major	2 (12.5)	1 (20.0)	2 (40.0)	3 (30.0)
Minor	6 (37.5)	1 (20.0)	2 (40.0)	3 (30.0)
Minimal	8 (50.0)	3 (60.0)	1 (20.0)	4 (40.0)
Not available	3	2	2	4
Bleeding site, No. (%)				
Total no. of procedures who had bleeding	**N=19**	**N=7**	**N=7**	**N=14**
Retroperitoneal	1 (5.9)	0 (0)	1 (16.7)	1 (9.1)
Percutaneous entry site	11 (64.7)	4 (80.0)	4 (66.7)	8 (72.7)
Others	5 (29.4)	1 (20.0)	1 (16.7)	2 (18.2)
Not available	2	2	1	3
Access site occlusion, No. (%)				
Yes	5 (0.0)	2 (0.0)	1 (0.0)	3 (0.0)
No	23,659 (100.0)	14,319 (100.0)	12,645 (100.0)	26,964 (100.0)
Missing	65	0	0	0
Loss of radial pulse, No. (%)				
Yes	2 (0.0)	0 (0)	0 (0)	0 (0)
No	23,662 (100.0)	14,321 (100.0)	12,646 (100.0)	26,967 (100.0)
Missing	65	0	0	0
Dissection, No. (%)				
Yes	7 (0.0)	6 (0.0)	9 (0.1)	15 (0.1)
No	23,655 (100.0)	14,315 (100.0)	12,637 (99.9)	26,952 (99.9)
Missing	67	0	0	0

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**23,729**	**14,321**	**12,646**	**26,967**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Pseudoaneurysm, No. (%)				
Yes	8 (0.0)	4 (0.0)	5 (0.0)	9 (0.0)
No	23,650 (100.0)	14,317 (100.0)	12,641 (100.0)	26,958 (100.0)
Missing	71	0	0	0
Management of pseudoaneurysm, No. (%)				
Total no. of procedures who had pseudoaneurysm	**N=8**	**N=4**	**N=5**	**N=9**
Ultrasound compression	3 (42.9)	4 (100.0)	3 (60.0)	7 (77.8)
Surgery	1 (14.3)	0 (0)	1 (20.0)	1 (11.1)
Others	3 (42.9)	0 (0)	1 (20.0)	1 (11.1)
Not available	1	0	0	0
Perforation, No. (%)				
Yes	12 (0.1)	12 (0.1)	5 (0.0)	17 (0.1)
No	23,637 (100.0)	14,308 (100.0)	12,641 (100.0)	26,949 (100.0)
Missing	80	1	0	1

Table 5.2 Overall outcome of patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge	**30-day	***6-month	****1-year
		No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
2017–2018 Total no. of patients = 21,618	Death	345 (1.6)	546 (2.6)	959 (4.5)	1371 (6.4)
	Alive	21,273 (98.4)	20,886 (97.5)	20,453 (95.5)	20,025 (93.6)
	Missing[#]	0	186	206	222
	Total	**21,618**	**21,618**	**21,618**	**21,618**
2019 Total no. of patients = 12,885	Death	194 (1.5)	328 (2.6)	631 (5.0)	865 (6.8)
	Alive	12,691 (98.5)	12,459 (97.4)	12,114 (95.1)	11,868 (93.2)
	Missing[#]	0	98	140	152
	Total	**12,885**	**12,885**	**12,885**	**12,885**
2020 Total no. of patients = 11,424	Death	147 (1.3)	248 (2.2)	483 (4.3)	728 (6.4)
	Alive	11,277 (98.7)	11,104 (97.8)	10,845 (95.7)	10,598 (93.6)
	Missing[#]	0	72	96	98
	Total	**11,424**	**11,424**	**11,424**	**11,424**
2019–2020 Total no. of patients = 24,309	Death	341 (1.4)	576 (2.4)	1114 (4.6)	1593 (6.6)
	Alive	23,968 (98.6)	23,563 (97.6)	22,959 (95.4)	22,466 (93.4)
	Missing[#]	0	170	236	250
	Total	**24,309**	**24,309**	**24,309**	**24,309**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with the National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
Note: Patients with the status "lost to follow-up" at 30 days, six months and one-year were categorised as "alive" or "missing" based on data matching with National Death Register

Table 5.3 Overall outcome for patients who underwent PCI, by age group (years), NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge			**30-day			***6-month			****1-year		
		Young	Middle-aged	Elderly	Young	Middle-aged	Elderly	Young	Middle-aged	Elderly	Young	Middle-aged	Elderly
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	13 (1.0)	125 (1.1)	207 (2.3)	22 (1.8)	203 (1.8)	321 (3.5)	31 (2.5)	359 (3.2)	569 (6.2)	44 (3.6)	510 (4.6)	817 (9.0)
	Alive	1,233 (99.0)	11,051 (98.9)	8,989 (97.8)	1,205 (98.2)	10,873 (98.2)	8,808 (96.5)	1,193 (97.5)	10,705 (96.8)	8,555 (93.8)	1,180 (96.4)	10,546 (95.4)	8,299 (91.0)
	Missing#	0	0	0	19	100	67	22	112	72	22	120	80
	Total	**1,246**	**11,176**	**9,196**	**1,246**	**11,176**	**9,196**	**1,246**	**11,176**	**9,196**	**1,246**	**11,176**	**9,196**
2019 Total no. of patients = 12,885	Death	9 (1.2)	71 (1.1)	114 (2.1)	11 (1.5)	122 (1.9)	195 (3.5)	24 (3.3)	243 (3.7)	364 (6.6)	32 (4.3)	329 (5.1)	504 (9.2)
	Alive	739 (98.8)	6,491 (98.9)	5,454 (98.0)	729 (98.5)	6,389 (98.1)	5,341 (96.5)	715 (96.8)	6,249 (96.3)	5,150 (93.4)	707 (95.7)	6,159 (94.9)	5,002 (90.9)
	Missing#	0	0	0	15	51	32	16	70	54	16	74	62
	Total	**755**	**6,562**	**5,568**	**755**	**6,562**	**5,568**	**755**	**6,562**	**5,568**	**755**	**6,562**	**5,568**
2020 Total no. of patients = 11,424	Death	6 (0.8)	58 (1.0)	83 (1.7)	9 (1.3)	103 (1.8)	136 (2.8)	18 (2.5)	178 (3.1)	287 (5.9)	20 (2.8)	281 (4.9)	427 (8.7)
	Alive	720 (99.2)	5,710 (99.0)	4,847 (98.3)	712 (98.8)	5,620 (98.2)	4,772 (97.2)	702 (97.5)	5,532 (96.9)	4,611 (94.1)	700 (97.2)	5,428 (95.1)	4,470 (91.3)
	Missing#	0	0	0	5	45	22	6	58	32	6	59	33
	Total	**726**	**5,768**	**4,930**	**726**	**5,768**	**4,930**	**726**	**5,768**	**4,930**	**726**	**5,768**	**4,930**
2019–2020 Total no. of patients = 24,309	Death	15 (1.0)	129 (1.1)	197 (1.9)	20 (1.4)	225 (1.8)	331 (3.2)	42 (2.9)	421 (3.5)	651 (6.3)	52 (3.6)	610 (5.0)	931 (9.0)
	Alive	1,466 (99.0)	12,201 (99.0)	10,301 (98.1)	1,441 (98.6)	12,009 (98.2)	10,113 (96.8)	1,417 (97.1)	11,781 (96.6)	9,761 (93.8)	1,407 (96.4)	11,587 (95.0)	9,472 (91.1)
	Missing#	0	0	0	20	96	54	22	128	86	22	133	95
	Total	**1,481**	**12,330**	**10,498**	**1,481**	**12,330**	**10,498**	**1,481**	**12,330**	**10,498**	**1,481**	**12,330**	**10,498**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
Note: Patients with the status "lost to follow-up" at 30 days, six months and one-year were categorised as "alive" or "missing" based on data matching with National Death Register
Note: Young was defined as age from 20 to less than 40 years, middle-aged was defined as age between 40 to less than 60 years and elderly was defined as 60 years and above

Table 5.4 Overall outcome of patients who underwent PCI, by gender, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge		**30-day		***6-month		****1-year	
		Male	Female	Male	Female	Male	Female	Male	Female
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	254 (1.4)	91 (2.5)	409 (2.3)	137 (3.7)	746 (4.2)	213 (5.8)	1,040 (5.9)	331 (9.1)
	Alive	17,679 (98.6)	3,594 (97.5)	17,361 (97.7)	3,525 (96.3)	17,006 (95.8)	3,447 (94.2)	16, 698 (94.1)	3,327 (91.0)
	Missing#	0	0	163	23	181	25	195	27
	Total	**17,933**	**3,685**	**17,933**	**3,685**	**17,933**	**3,685**	**17,933**	**3,685**
2019 Total no. of patients = 12,885	Death	151 (1.4)	43 (1.9)	249 (2.4)	79 (3.5)	486 (4.6)	144 (6.6)	658 (6.3)	207 (9.3)
	Alive	10,483 (98.6)	2,208 (98.1)	10,299 (97.6)	2,160 (96.5)	10,034 (95.4)	2,080 (93.5)	9,855 (93.7)	2,013 (90.7)
	Missing#	0	0	86	12	114	26	121	31
	Total	**10,634**	**2,251**	**10,634**	**2,251**	**10,634**	**2,251**	**10,634**	**2,251**
2020 Total no. of patients = 11,424	Death	110 (1.2)	37 (1.9)	190 (2.0)	58 (2.9)	372 (4.0)	111 (5.6)	552 (5.9)	176 (8.9)
	Alive	9,333 (98.8)	1,944 (98.1)	9,187 (98.0)	1,917 (97.1)	8,985 (96.0)	1,860 (94.4)	8,803 (94.1)	1,795 (91.1)
	Missing#	0	0	66	6	86	10	88	10
	Total	**9,443**	**1,981**	**9,443**	**1,981**	**9,443**	**1,981**	**9,443**	**1,981**
2019–2020 Total no. of patients = 24,309	Death	261 (1.3)	80 (1.9)	439 (2.2)	137 (3.3)	858 (4.3)	256 (6.1)	1210 (6.1)	383 (9.1)
	Alive	19,816 (98.7)	4,152 (98.1)	19,486 (97.8)	4,077 (96.8)	19,019 (95.7)	3,940 (93.9)	18,658 (93.9)	3,808 (90.9)
	Missing#	0	0	152	18	200	36	209	41
	Total	**20,077**	**4,232**	**20,077**	**4,232**	**20,077**	**4,232**	**20,077**	**4,232**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
Note: Patients with the status "lost to follow-up" at 30 days, six months and one-year were categorised as "alive" or "missing" based on data matching with National Death Register

Table 5.5 Overall outcome of patients who underwent PCI, by pre-morbid diabetes, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge			**30-day			***6-month			****1-year		
		Diabetic	Non-diabetic	Not known	Diabetic	Non-diabetic	Not known	Diabetic	Non-diabetic	Not known	Diabetic	Non-diabetic	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	180 (1.9)	130 (1.2)	35 (3.0)	289 (3.1)	207 (1.9)	50 (4.4)	547 (5.9)	344 (3.1)	68 (6.0)	787 (8.5)	491 (4.5)	93 (8.2)
	Alive	9,143 (98.1)	11,013 (98.8)	1,117 (97.0)	8, 972 (96.9)	10,827 (98.1)	1,087 (95.6)	8,704 (94.1)	10,680 (96.9)	1,069 (94.0)	8,459 (91.5)	10,522 (95.5)	1,044 (91.8)
	Missing#	0	0	0	62	109	15	72	119	15	77	130	15
	Total	**9,323**	**11,143**	**1,152**	**9,323**	**11,143**	**1,152**	**9,323**	**11,143**	**1,152**	**9,323**	**11,143**	**1,152**
2019 Total no. of patients = 12,885	Death	93 (1.6)	79 (1.2)	22 (3.1)	169 (3.0)	127 (2.0)	32 (4.6)	351 (6.3)	231 (3.6)	49 (7.0)	506 (9.0)	302 (4.7)	57 (8.3)
	Alive	5,565 (98.4)	6,447 (98.8)	679 (96.9)	5,464 (97.0)	6,336 (98.0)	659 (95.4)	5,264 (93.8)	6,209 (96.4)	641 (92.9)	5,103 (91.0)	6,132 (95.3)	633 (91.7)
	Missing#	0	0	0	25	63	10	43	86	11	49	92	11
	Total	**5,658**	**6,526**	**701**	**5,658**	**6,526**	**701**	**5,658**	**6,526**	**701**	**5,658**	**6,526**	**701**
2020 Total no. of patients = 11,424	Death	82 (1.6)	52 (0.9)	13 (1.9)	136 (2.7)	92 (1.6)	20 (2.9)	261 (5.2)	187 (3.3)	35 (5.1)	425 (8.5)	261 (4.6)	42 (6.1)
	Alive	4,963 (98.4)	5,634 (99.1)	680 (98.1)	4,887 (97.3)	5,547 (98.4)	670 (97.1)	4,760 (94.8)	5,432 (96.7)	65 3 (94.9)	4,594 (91.5)	5,358 (95.4)	646 (93.9)
	Missing#	0	0	0	22	47	3	24	67	5	26	67	5
	Total	**5,045**	**5,686**	**693**	**5,045**	**5,686**	**693**	**5,045**	**5,686**	**693**	**5,045**	**5,686**	**693**
2019–2020 Total no. of patients = 24,309	Death	175 (1.6)	131 (1.1)	35 (2.5)	305 (2.9)	219 (1.8)	52 (3.8)	612 (5.8)	418 (3.5)	84 (6.1)	931 (8.8)	563 (4.7)	99 (7.2)
	Alive	10,528 (98.4)	12,081 (98.9)	1,359 (97.5)	10,351 (97.1)	11,883 (98.2)	1,329 (96.2)	10,024 (94.3)	11,641 (96.5)	1,294 (93.9)	9,697 (91.2)	11,490 (95.3)	1,279 (92.8)
	Missing#	0	0	0	47	110	13	67	153	16	75	159	16
	Total	**10,703**	**12,212**	**1,394**	**10,703**	**12,212**	**1,394**	**10,703**	**12,212**	**1,394**	**10,703**	**12,212**	**1,394**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
Note: Patients with the status "lost to follow-up" at 30 days, six months and one-year were categorised as "alive" or "missing" based on data matching with National Death Register

Table 5.6 Overall outcome of patients who underwent PCI, by pre-morbid hypertension, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge			**30-day			***6-month			****1-year		
		Hypertensive	Non-hypertensive	Not known	Hypertensive	Non-hypertensive	Not known	Hypertensive	Non-hypertensive	Not known	Hypertensive	Non-hypertensive	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No (%)
2017–2018 Total no. of patients = 21,618	Death	198 (1.4)	103 (1.5)	44 (4.5)	332 (2.4)	158 (2.3)	56 (5.8)	640 (4.7)	247 (3.6)	72 (7.5)	964 (7.1)	321 (4.7)	86 (8.9)
	Alive	13,568 (98.6)	6,769 (98.5)	936 (95.5)	13,341 (97.6)	6,635 (97.7)	910 (94.2)	13,025 (95.3)	6,534 (96.4)	894 (92.6)	12,691 (92.9)	6,454 (95.3)	880 (91.1)
	Missing#	0	0	0	93	79	14	101	91	14	111	97	14
	Total	**13,766**	**6,872**	**980**	**13,766**	**6,872**	**980**	**13,766**	**6,872**	**980**	**13,766**	**6,872**	**980**
2019 Total no. of patients = 12,885	Death	112 (1.3)	59 (1.5)	23 (3.7)	202 (2.4)	98 (2.6)	28 (4.6)	424 (5.1)	167 (4.4)	40 (6.6)	602 (7.2)	216 (5.7)	47 (7.8)
	Alive	8,306 (98.7)	3,791 (98.5)	594 (96.3)	8,177 (97.6)	3,704 (97.4)	578 (95.4)	7,928 (94.9)	3,621 (95.6)	565 (93.4)	7,746 (92.8)	3,564 (94.3)	558 (92.2)
	Missing#	0	0	0	39	48	11	66	62	12	70	70	12
	Total	**8,418**	**3,835**	**617**	**8,418**	**3,850**	**617**	**8,418**	**3,850**	**617**	**8,418**	**3,850**	**617**
2020 Total no. of patients = 11,424	Death	100 (1.3)	34 (1.1)	13 (2.4)	169 (2.2)	58 (1.9)	21 (3.9)	348 (4.5)	102 (3.3)	33 (6.1)	556 (7.3)	132 (4.2)	40 (7.4)
	Alive	7,607 (98.7)	3,133 (98.9)	537 (97.6)	7,504 (97.8)	3,076 (98.2)	524 (96.2)	7,312 (95.5)	3,023 (96.7)	510 (93.9)	7,103 (92.7)	2,992 (95.8)	503 (92.6)
	Missing#	0	0	0	34	33	5	47	42	7	48	43	7
	Total	**7,707**	**3,167**	**550**	**7,707**	**3,167**	**550**	**7,707**	**3,167**	**550**	**7,707**	**3,167**	**550**
2019–2020 Total no. of patients = 24,309	Death	212 (1.3)	93 (1.3)	36 (3.1)	371 (2.3)	156 (2.3)	47 (4.3)	772 (4.8)	269 (3.9)	73 (6.4)	1158 (7.2)	348 (5.0)	87 (7.6)
	Alive	15,913 (98.7)	6,924 (98.7)	1,131 (96.9)	15,681 (97.7)	6,780 (97.8)	1,102 (95.7)	15,240 (95.2)	6,644 (96.1)	1,075 (93.6)	14,849 (92.8)	6,556 (95.0)	1,061 (92.4)
	Missing#	0	0	0	73	81	16	113	104	19	118	113	19
	Total	**16,125**	**7,017**	**1,167**	**16,125**	**7,017**	**1,167**	**16,125**	**7,017**	**1,167**	**16,125**	**7,017**	**1,167**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
Note: Patients with the status "lost to follow-up" at 30 days, six months and one-year were categorised as "alive" or "missing" based on data matching with National Death Register

Table 5.7 Overall outcome of patients who underwent PCI, by pre-morbid dyslipidaemia, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge			**30-day			***6-month			****1-year		
		Dyslipidaemia	Non-dyslipidaemia	Not known	Dyslipidaemia	Non-dyslipidaemia	Not known	Dyslipidaemia	Non-dyslipidaemia	Not known	Dyslipidaemia	Non-dyslipidaemia	Not known
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	129 (1.2)	165 (1.7)	51 (3.5)	210 (2.0)	261 (2.7)	75 (5.3)	403 (3.9)	454 (4.8)	102 (7.2)	615 (5.9)	625 (6.6)	131 (9.2)
	Alive	10,417 (98.8)	9,467 (98.3)	1,389 (96.5)	10,254 (98.0)	9,288 (97.3)	1,344 (94.7)	10,050 (96.1)	9,086 (95.2)	1,317 (92.8)	9,831 (94.1)	8,906 (93.4)	1,288 (90.8)
	Missing#	0	0	0	82	83	21	93	92	21	100	101	21
	Total	**10,546**	**9,632**	**1,440**	**10,546**	**9,632**	**1,440**	**10,546**	**9,632**	**1,440**	**10,546**	**9,632**	**1,440**
2019 Total no. of patients = 12,885	Death	68 (1.0)	100 (1.9)	26 (3.0)	131 (2.0)	163 (3.1)	34 (4.0)	280 (4.2)	296 (5.6)	55 (6.5)	415 (6.3)	382 (7.2)	68 (8.0)
	Alive	6,617 (99.0)	5,239 (98.1)	835 (97.0)	6,506 (98.0)	5,136 (96.9)	817 (96.0)	6,327 (95.8)	4,992 (94.4)	795 (93.5)	6,185 (93.7)	4,901 (92.8)	782 (92.0)
	Missing#	0	0	0	48	40	10	78	51	11	85	56	11
	Total	**6,685**	**5,339**	**861**	**6,685**	**5,339**	**861**	**6,685**	**5,339**	**861**	**6,685**	**5,339**	**861**
2020 Total no. of patients = 11,424	Death	71 (1.1)	61 (1.5)	15 (1.9)	124 (1.9)	102 (2.6)	22 (2.7)	259 (3.9)	182 (4.6)	42 (5.2)	407 (6.2)	265 (6.7)	56 (7.0)
	Alive	6,557 (98.9)	3,926 (98.5)	794 (98.2)	6,466 (98.1)	3,857 (97.4)	781 (97.3)	6,314 (96.1)	3,770 (95.4)	761 (94.8)	6,164 (93.8)	3,687 (93.3)	747 (93.0)
	Missing#	0	0	0	38	28	6	55	35	6	57	35	6
	Total	**6,628**	**3,987**	**809**	**6,628**	**3,987**	**809**	**6,628**	**3,987**	**809**	**6,628**	**3,987**	**809**
2019–2020 Total no. of patients = 24,309	Death	139 (1.0)	161 (1.7)	41 (2.5)	255 (1.9)	265 (2.9)	56 (3.4)	539 (4.1)	478 (5.2)	97 (5.9)	822 (6.2)	647 (7.0)	124 (7.5)
	Alive	13,174 (99.0)	9,165 (98.3)	1,629 (97.5)	12,972 (98.1)	8,993 (97.1)	1,598 (96.6)	12,641 (95.9)	8,762 (94.8)	1,556 (94.1)	12,349 (93.8)	8,588 (93.0)	1,529 (92.5)
	Missing#	0	0	0	86	68	16	133	86	17	142	91	17
	Total	**13,313**	**9,326**	**1,670**	**13,313**	**9,326**	**1,670**	**13,313**	**9,326**	**1,670**	**13,313**	**9,326**	**1,670**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
Note: Patients with the status "lost to follow-up" at 30 days, six months and one-year were categorised as "alive" or "missing" based on data matching with National Death Register

Table 5.8 Overall outcome of patients who underwent PCI, by PCI status, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge		**30-day		***6-month		****1-year	
		Elective	Non-elective	Elective	Non-elective	Elective	Non-elective	Elective	Non-elective
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	83 (0.6)	262 (3.5)	179 (1.3)	367 (5.0)	422 (3.0)	537 (7.3)	684 (4.9)	687 (9.4)
	Alive	14,115 (99.4)	7,158 (96.5)	13,910 (98.7)	6,976 (95.0)	13,656 (97.0)	6,797 (92.7)	13,383 (95.1)	6,642 (90.6)
	Missing#	0	0	109	77	120	86	131	91
	Total	**14,198**	**7,420**	**14,198**	**7,420**	**14,198**	**7,420**	**14,198**	**7,420**
2019 Total no. of patients = 12,885	Death	28 (0.3)	166 (3.5)	79 (1.0)	249 (5.3)	256 (3.2)	375 (8.0)	405 (5.0)	460 (9.9)
	Alive	8,126 (99.7)	4,565 (96.5)	8,031 (99.0)	4,428 (94.7)	7,822 (96.8)	4,292 (92.0)	7,663 (95.0)	4,205 (90.1)
	Missing#	0	0	44	54	76	64	86	66
	Total	**8,154**	**4,731**	**8,154**	**4,731**	**8,154**	**4,731**	**8,154**	**4,731**
2020 Total no. of patients = 11,424	Death	39 (0.5)	108 (2.7)	83 (1.1)	165 (4.2)	239 (3.2)	244 (6.2)	394 (5.3)	334 (8.5)
	Alive	7,405 (99.5)	3,872 (97.3)	7,324 (98.9)	3,780 (95.8)	7,152 (96.8)	3,693 (93.8)	6,995 (94.7)	3,603 (91.5)
	Missing#	0	0	37	35	53	43	55	43
	Total	**7,444**	**3,980**	**7,444**	**3,980**	**7,444**	**3,980**	**7,444**	**3,980**
2019–2020 Total no. of patients = 24,309	Death	67 (0.4)	274 (3.2)	162 (1.0)	414 (4.8)	495 (3.2)	619 (7.2)	799 (5.2)	794 (9.2)
	Alive	15,531 (99.6)	8,437 (96.9)	15,355 (99.0)	8,208 (95.2)	14,974 (96.8)	7,985 (92.8)	14,658 (94.8)	7,808 (90.8)
	Missing#	0	0	81	89	129	107	141	109
	Total	**15,598**	**8,711**	**15,598**	**8,711**	**15,598**	**8,711**	**15,598**	**8,711**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
Note: Patients with the status "lost to follow-up" at 30 days, six months and one-year were categorised as "alive" or "missing" based on data matching with National Death Register

Table 5.9 Overall outcome of patients who underwent PCI, by acute coronary syndrome, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Discharge				**30-day				***6-month				****1-year			
		STEMI	NSTEMI	UA	Chronic stable angina	STEMI	NSTEMI	UA	Chronic stable angina	STEMI	NSTEMI	UA	Chronic stable angina	STEMI	NSTEMI	UA	Chronic stable angina
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	213 (4.1)	61 (1.7)	12 (0.6)	12 (0.3)	278 (5.4)	110 (3.1)	29 (1.4)	30 (0.8)	383 (7.4)	198 (5.5)	58 (2.7)	88 (2.4)	476 (9.3)	285 (8.0)	100 (4.7)	138 (3.8)
	Alive	4,992 (95.9)	3,540 (98.3)	2,120 (99.4)	3,639 (99.7)	4,873 (94.6)	3,465 (96.9)	2,088 (98.6)	3,596 (99.2)	4,763 (92.6)	3,375 (94.5)	2,057 (97.3)	3,534 (97.6)	4,667 (90.7)	3,287 (92.0)	2,014 (95.3)	3,483 (96.2)
	Missing#	0	0	0	0	54	26	15	25	59	28	17	29	62	29	18	30
	Total	**5,205**	**3,601**	**2,132**	**3,651**	**5,205**	**3,601**	**2,132**	**3,651**	**5,205**	**3,601**	**2,132**	**3,651**	**5,205**	**3,601**	**2,132**	**3,651**
2019 Total no. of patients = 12,885	Death	123 (4.0)	42 (1.3)	4 (0.2)	2 (0.1)	170 (5.6)	88 (2.7)	17 (1.0)	11 (0.5)	243 (7.9)	204 (6.4)	41 (2.5)	38 (1.8)	288 (9.5)	267 (8.4)	72 (4.5)	71 (3.4)
	Alive	2,966 (96.0)	3,199 (98.7)	1,648 (99.8)	2,151 (99.9)	2,895 (94.5)	3,131 (97.3)	1,614 (99.0)	2,129 (99.5)	2,820 (92.1)	3,005 (93.6)	1,581 (97.5)	2,089 (98.2)	2,753 (90.5)	2,924 (91.6)	1,533 (95.5)	2,045 (96.6)
	Missing#	0	0	0	0	24	22	21	13	26	32	30	26	48	50	47	37
	Total	**3,089**	**3,241**	**1,652**	**2,153**	**3,089**	**3,241**	**1,652**	**2,153**	**3,089**	**3,241**	**1,652**	**2,153**	**3,089**	**3,241**	**1,652**	**2,153**
2020 Total no. of patients = 11,424	Death	79 (2.9)	39 (1.1)	10 (0.6)	9 (0.4)	119 (4.4)	76 (2.2)	22 (1.3)	15 (0.7)	167 (6.1)	173 (5.0)	43 (2.6)	47 (2.3)	209 (7.7)	269 (7.9)	70 (4.3)	84 (4.2)
	Alive	2,669 (97.1)	3,428 (98.9)	1,659 (99.4)	2,025 (99.6)	2,607 (95.6)	3,364 (97.8)	1,637 (98.7)	2,010 (99.3)	2,552 (93.9)	3,267 (95.0)	1,607 (97.4)	1,972 (97.7)	2,492 (92.3)	3,153 (92.1)	1,570 (95.7)	1,926 (95.8)
	Missing#	0	0	0	0	22	27	10	9	29	27	19	15	47	45	29	24
	Total	**2,748**	**3,467**	**1,669**	**2,034**	**2,748**	**3,467**	**1,669**	**2,034**	**2,748**	**3,467**	**1,669**	**2,034**	**2,748**	**3,467**	**1,669**	**2,034**
2019–2020 Total no. of patients = 24,309	Death	202 (3.5)	81 (1.2)	14 (0.4)	11 (0.3)	289 (5.0)	164 (2.5)	39 (1.2)	26 (0.6)	410 (7.1)	377 (5.7)	84 (2.6)	85 (2.1)	501 (8.7)	541 (8.1)	143 (4.4)	155 (3.7)
	Alive	5,635 (96.5)	6,627 (98.8)	3,307 (99.6)	4,176 (99.7)	5,502 (95.0)	6,495 (97.5)	3,251 (98.8)	4,139 (99.4)	5,372 (92.9)	6,272 (94.3)	3,188 (97.4)	4,061 (98.0)	5,280 (91.3)	6,107 (91.9)	3,123 (95.6)	3,988 (96.3)
	Missing#	0	0	0	0	46	49	31	22	55	59	49	41	56	60	55	44
	Total	**5,837**	**6,708**	**3,321**	**4,187**	**5,837**	**6,708**	**3,321**	**4,187**	**5,837**	**6,708**	**3,321**	**4,187**	**5,837**	**6,708**	**3,321**	**4,187**

**The outcome data was derived based on National Death Register data*
***Including patients who died in-hospital*
****Including patients who died in-hospital and at 30 days*
*****Including patients who died in-hospital, at 30 days, and six months*
#For foreigners and those with incomplete identification (NRIC), mortality status cannot be matched with National Death Register
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients
***Note:** Patients with the status "lost to follow-up" **at** 30 days, six months **and one-year** were categorised as "alive" **or** "missing" based on data matching with National Death Register*

Table 5.10 Medication at discharge for patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
#*Medication	**N=21,273**	**N=12,691**	**N=11,277**	**N=23,968**
Aspirin	18,284 (89.0)	10,564 (88.4)	9,259 (86.8)	19,823 (87.7)
Clopidogrel	16,866 (82.5)	9,698 (81.3)	9,285 (85.9)	18,983 (83.5)
Ticlopidine	88 (0.5)	42 (0.4)	68 (0.7)	110 (0.6)
**Dual antiplatelet	18,050 (87.9)	10,424 (87.2)	9,118 (85.5)	19,542 (86.4)
Statin	19,292 (94.1)	11,049 (92.9)	10,144 (93.9)	21,193 (93.4)
Beta blocker	15,031 (75.0)	8,709 (74.6)	8,000 (75.7)	16,709 (75.1)
Ace inhibitor	11,814 (59.5)	6,807 (59.4)	6,284 (61.6)	13,091 (60.4)
ARB	1,561 (8.3)	861 (8.1)	944 (10.2)	1,805 (9.1)
Warfarin	195 (1.0)	96 (0.9)	72 (0.8)	168 (0.9)
Prasugrel	68 (0.4)	12 (0.1)	15 (0.2)	27 (0.1)
Ticagrelor	4,181 (22.0)	2,489 (23.2)	1,749 (18.7)	4,238 (21.1)
NOAC	293 (1.6)	188 (1.8)	338 (3.7)	526 (2.7)
Other antiplatelet	1,042 (5.5)	984 (9.3)	1,337 (14.2)	2,321 (11.6)
Others	10,698 (55.5)	5,202 (48.5)	3,469 (37.4)	8,671 (43.4)

**Available for those who were alive*
***Dual antiplatelet defined as the use of a P2Y12 receptor inhibitor (clopidogrel, ticlopidine, ticagrelor or prasugrel) and aspirin*
#Patients can be in more than one type of category
Others – medication not listed in the CRF

Table 5.11 Cause of death of patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Cause of death				
Cardiac	272 (90.7)	163 (93.1)	124 (93.2)	287 (93.2)
Renal	7 (2.3)	1 (0.6)	2 (1.5)	3 (1.0)
Other	11 (3.7)	7 (4.0)	4 (3.1)	11 (3.6)
Infection	5 (1.7)	3 (1.7)	1 (0.8)	4 (1.3)
Neurological	2 (0.7)	1 (0.6)	0 (0)	1 (0.3)
Vascular	1 (0.3)	0 (0)	1 (0.8)	1 (0.3)
Pulmonary	2 (0.7)	0 (0)	1 (0.8)	1 (0.3)
Non-cardiac	0 (0)	0 (0)	0 (0)	0 (0)
Not available	16	9	8	17
Missing	29	10	6	16
Total	**345 (100.0)**	**194 (100.0)**	**147 (100.0)**	**341 (100.0)**

Table 5.12 Location of death of patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Year	2017–2018	2019	2020	2019–2020
Total no. of patients	**21,618**	**12,885**	**11,424**	**24,309**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Location of death				
In lab	34 (11.6)	13 (7.7)	13 (10.4)	26 (8.8)
Out of lab	258 (88.4)	156 (92.3)	112 (89.6)	268 (91.2)
Not available	12	7	2	9
Missing	41	18	20	38
Total	**345 (100.0)**	**194 (100.0)**	**147 (100.0)**	**341 (100.0)**

Table 5.13 Outcome at discharge of patients who developed cardiogenic shock peri-procedure, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Cardiogenic shock peri-procedure		
		Yes	No	Missing
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	48 (82.8)	297 (1.4)	0 (0)
	Alive	10 (17.2)	21,208 (98.6)	55 (100.0)
	Total	**58 (100.0)**	**21,505 (100.0)**	**55 (100.0)**
2019 Total no. of patients = 12,885	Death	26 (81.3)	168 (1.3)	194 (1.5)
	Alive	6 (18.8)	12,685 (98.7)	12,691 (98.5)
	Total	**32 (100.0)**	**12,853 (100.0)**	**12,885 (100.0)**
2020 Total no. of patients = 11,424	Death	18 (60.0)	129 (1.1)	145 (1.3)
	Alive	12 (40.0)	11,265 (98.9)	11,277 (98.7)
	Total	**30 (100.0)**	**11,394 (100.0)**	**11,424 (100.0)**
2019–2020 Total no. of patients = 24,309	Death	44 (71.0)	297 (1.2)	341 (1.4)
	Alive	18 (29.0)	23,950 (98.8)	23,968 (98.6)
	Total	**62 (100.0)**	**24,247 (100.0)**	**24,309 (100.0)**

**The outcome data was derived based on National Death Register data*

Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients

Table 5.14 Outcome at discharge, by post PCI TIMI flow, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Post PCI TIMI flow					
		0	1	2	3	Not available	Missing
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	24 (6.5)	14 (12.2)	18 (6.3)	272 (1.3)	31 (1.7)	78 (1.6)
	Alive	343 (93.5)	101 (87.8)	267 (93.7)	20,684 (98.7)	1,754 (98.3)	4,728 (98.4)
	Total	**367 (100.0)**	**115 (100.0)**	**285 (100.0)**	**20,956 (100.0)**	**1,785 (100.0)**	**4,806 (100.0)**
2019 Total no. of patients = 12,885	Death	10 (5.7)	7 (9.3)	14 (7.6)	142 (1.1)	17 (1.7)	49 (1.5)
	Alive	165 (94.3)	68 (90.7)	171 (92.4)	12,639 (98.9)	993 (98.3)	3,122 (98.5)
	Total	**175 (100.0)**	**75 (100.0)**	**185 (100.0)**	**12,781 (100.0)**	**1,010 (100.0)**	**3,171 (100.0)**
2020 Total no. of patients = 11,424	Death	6 (4.0)	2 (5.4)	10 (5.7)	87 (0.8)	22 (2.6)	57 (1.6)
	Alive	145 (96.0)	36 (94.7)	165 (94.3)	11,174 (99.2)	831 (97.4)	3,452 (98.4)
	Total	**151 (100.0)**	**38 (100.0)**	**175 (100.0)**	**11,261 (100.0)**	**853 (100.0)**	**3,509 (100.0)**
2019–2020 Total no. of patients = 24,309	Death	16 (4.9)	9 (8.0)	24 (6.7)	229 (1.0)	39 (2.1)	106 (1.6)
	Alive	310 (95.1)	104 (92.9)	336 (93.6)	23,813 (99.1)	1,824 (97.9)	6,574 (98.4)
	Total	**326 (100.0)**	**112 (100.0)**	**359 (100.0)**	**24,042 (100.0)**	**1,863 (100.0)**	**6,679 (100.0)**

**The outcome data was derived based on National Death Register data*
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients

Table 5.15 Outcome at discharge, by contrast volume used, NCVD-PCI Registry, 2019–2020

Year	*Outcome	Contrast volume, ml			
		≥300	<300	Not available	Missing
		No. (%)	No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	Death	20 (2.7)	262 (1.6)	22 (2.4)	41 (1.2)
	Alive	711 (97.3)	16,397 (98.4)	894 (97.6)	3,271 (98.8)
	Total	**731 (100.0)**	**16,659 (100.0)**	**916 (100.0)**	**3,312 (100.0)**
2019 Total no. of patients = 12,885	Death	9 (1.8)	145 (1.4)	27 (3.1)	13 (1.4)
	Alive	493 (98.2)	10,437 (98.6)	848 (96.9)	913 (98.6)
	Total	**502 (100.0)**	**10,582 (100.0)**	**875 (100.0)**	**926 (100.0)**
2020 Total no. of patients = 11,424	Death	8 (1.5)	109 (1.1)	19 (3.0)	11 (2.2)
	Alive	525 (98.5)	9,659 (98.9)	609 (97.0)	484 (97.8)
	Total	**533 (100.0)**	**9,768 (100.0)**	**628 (100.0)**	**495 (100.0)**
2019–2020 Total no. of patients = 24,309	Death	17 (1.6)	254 (1.3)	46 (3.1)	24 (1.7)
	Alive	1,018 (98.4)	20,096 (98.8)	1,457 (96.9)	1,397 (98.3)
	Total	**1,035 (100.0)**	**20,350 (100.0)**	**1,503 (100.0)**	**1,421 (100.0)**

**The outcome data was derived based on National Death Register data*
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients

Table 5.16 Summary of 30-day readmission status of patients who underwent PCI, NCVD-PCI Registry, 2019–2020 (N=total no. of procedures for 30-day follow- up)

Year	2017–2018	2019	2020	2019–2020
Total no. of procedures	**7,895**	**4,447**	**3,174**	**7,621**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**
Readmission, No. (%)				
Yes	457 (7.0)	187 (5.5)	137 (5.2)	324 (5.4)
No	6,037 (93.0)	3,200 (94.5)	2,491 (94.8)	5,691 (94.6)
Missing	1,386	991	478	1,469
Readmission reason, No. (%)				
Non-cardiac	36 (11.2)	27 (14.7)	33 (24.4)	60 (18.8)
CHF	14 (4.4)	10 (5.4)	10 (7.4)	20 (6.3)
Recurrent angina	14 (4.4)	20 (10.9)	24 (17.8)	44 (13.8)
Arrhythmia	1 (0.3)	6 (3.3)	1 (0.7)	7 (2.2)
ACS	26 (8.1)	17 (9.2)	16 (11.9)	33 (10.3)
STEMI	5 (21.7)	0 (0.0)	1 (11.1)	1 (4.8)
NSTEMI	4 (17.4)	5 (41.7)	3 (33.3)	8 (38.1)
UA	14 (60.9)	7 (58.3)	5 (55.6)	12 (57.1)
Not available	2	0	1	1
Missing	1	4	5	9
Staged revascularisation	231 (71.7)	104 (56.5)	51 (37.8)	155 (48.6)
PCI	220 (99.6)	96 (97.0)	39 (95.1)	135 (96.4)
CABG	1 (0.5)	3 (3.0)	2 (4.9)	5 (3.6)
Not available	1	1	0	1
Missing	9	4	10	14
Not available	101	2	1	3
Missing	34	1	1	2
Total	**457**	**187**	**137**	**324**

Table 5.17 Procedural complications and clinical outcomes, according to PCI status, NCVD-PCI Registry, 2019–2020

Year	2017–2018			2019			2020			2019–2020		
Total no. of patients	**21,618**			**12,885**			**11,424**			**24,309**		
***Complications and clinical outcomes**	**Elective**	**NSTEMI /UA**	**STEMI**	**Elective**	**NSTEMI /UA**	**STEMI**	**Elective**	**NSTEMI /UA**	**STEMI**	**Elective**	**NSTEMI /UA**	**STEMI**
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**
Procedural complications												
Periprocedural MI/Significant periprocedural MI	19 (0.1)	12 (0.4)	25 (0.6)	7 (0.1)	6 (0.3)	7 (0.3)	16 (0.2)	14 (0.8)	9 (0.4)	23 (0.2)	20 (0.5)	16 (0.3)
Emergency reintervention/PCI	18 (0.1)	6 (0.2)	16 (0.4)	11 (0.1)	2 (0.1)	7 (0.3)	13 (0.2)	5 (0.3)	6 (0.3)	24 (0.2)	7 (0.2)	13 (0.3)
Stent thrombosis	6 (37.5)	3 (75.0)	4 (28.6)	2 (25.0)	1 (100.0)	3 (33.3)	4 (36.4)	1 (50.0)	3 (21.4)	6 (31.6)	2 (66.7)	6 (26.1)
Dissection	3 (18.8)	1 (33.3)	2 (13.3)	1 (14.3)	1 (50.0)	2 (28.6)	2 (20.0)	0 (0)	1 (7.7)	3 (17.7)	1 (25.0)	3 (15.0)
Cardiac perforation	0 (0)	1 (25.0)	0 (0)	1 (16.7)	0 (0)	0 (0)	0 (0)	0 (0)	2 (14.3)	1 (6.3)	0 (0)	2 (9.5)
Coronary perforation	3 (20.0)	1 (25.0)	0 (0)	3 (42.9)	0 (0)	0 (0)	6 (54.6)	1 (50.0)	1 (7.1)	9 (50.0)	1 (33.3)	1 (4.8)
New ischaemia	5 (31.3)	3 (60.0)	6 (37.5)	3 (50.0)	0 (0)	2 (25.0)	1 (9.1)	0 (0)	1 (7.1)	4 (23.5)	0 (0)	3 (13.6)
Cardiac tamponade	1 (6.7)	1 (25.0)	1 (6.7)	0 (0)	0 (0)	0 (0)	5 (45.5)	1 (50.0)	1 (7.1)	5 (29.4)	1 (33.3)	1 (4.8)
Bail-out CABG	2 (0.0)	2 (0.1)	2 (0.0)	2 (0.0)	0 (0)	1 (0.0)	4 (0.1)	0 (0)	1 (0.1)	6 (0.0)	0 (0)	2 (0.0)
Cardiogenic shock	7 (0.1)	17 (0.6)	34 (0.8)	4 (0.1)	6 (0.3)	22 (0.8)	6 (0.1)	5 (0.3)	19 (0.9)	10 (0.1)	11 (0.3)	41 (0.9)
Arrhythmia	6 (0.0)	9 (0.3)	28 (0.6)	13 (0.2)	5 (0.2)	17 (0.7)	40 (0.5)	12 (0.7)	13 (0.6)	53 (0.3)	17 (0.4)	30 (0.6)
TIA/stroke	3 (0.0)	0 (0)	0 (0)	2 (0.0)	0 (0)	0 (0)	1 (0.0)	0 (0)	0 (0)	3 (0.0)	0 (0)	0 (0)
Tamponade	4 (0.0)	3 (0.1)	0 (0)	3 (0.0)	1 (0.1)	0 (0)	5 (0.1)	1 (0.1)	0 (0)	8 (0.1)	2 (0.1)	0 (0)
Contrast reaction	4 (0.0)	0 (0)	2 (0.0)	2 (0.0)	1 (0.1)	0 (0)	3 (0.0)	0 (0)	0 (0)	5 (0.0)	1 (0.0)	0 (0)
New onset/worsen heart failure	4 (0.0)	6 (0.2)	8 (0.2)	1 (0.0)	3 (0.1)	4 (0.2)	3 (0.0)	1 (0.1)	2 (0.1)	4 (0.0)	4 (0.1)	6 (0.1)
New renal impairment	9 (0.1)	9 (0.3)	11 (0.3)	3 (0.0)	4 (0.2)	3 (0.1)	5 (0.1)	1 (0.1)	2 (0.1)	8 (0.1)	5 (0.1)	5 (0.1)
Bleeding	7 (0.1)	2 (0.1)	7 (0.2)	6 (0.1)	0 (0)	1 (0.0)	4 (0.1)	2 (0.1)	0 (0)	10 (0.1)	2 (0.1)	1 (0.0)
Access site occlusion	2 (0.0)	2 (0.1)	1 (0.0)	0 (0)	0 (0)	2 (0.1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0.0)
Loss of distal/radial pulse	2 (0.0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Dissection	5 (0.0)	2 (0.1)	0 (0)	4 (0.1)	0 (0)	0 (0)	5 (0.1)	1 (0.1)	0 (0)	9 (0.1)	1 (0.0)	0 (0)
Pseudoaneurysm	4 (0.0)	3 (0.1)	1 (0.0)	2 (0.0)	2 (0.1)	0 (0)	3 (0.0)	1 (0.1)	1 (0.1)	5 (0.0)	3 (0.1)	1 (0.0)
Vascular perforation	7 (0.1)	2 (0.1)	2 (0.0)	7 (0.1)	4 (0.2)	1 (0.0)	3 (0.0)	1 (0.1)	1 (0.1)	10 (0.1)	5 (0.1)	2 (0.0)

** Results only presented for patients who have the complications or clinical outcomes*

Table 5.18 Heart rate at presentation versus outcome, NCVD-PCI Registry, 2019–2020

Year	Heart rate at presentation (beats/minute)	*Outcome	
		Death	Alive
		No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	<90	148 (51.6)	14,736 (85.1)
	≥90	139 (48.4)	2,586 (14.9)
	Missing	58	3,951
	Total	**345**	**21,273**
2019 Total no. of patients = 12,885	<90	74 (44.9)	9,624 (85.4)
	≥90	91 (55.2)	1,652 (14.7)
	Missing	29	1,415
	Total	**194**	**12,691**
2020 Total no. of patients = 11,424	<90	66 (52.0)	8,910 (87.0)
	≥90	61 (48.0)	1,334 (13.0)
	Missing	20	1,033
	Total	**147**	**11,277**
2019–2020 Total no. of patients = 24,309	<90	140 (48.0)	18,534 (86.1)
	≥90	152 (52.1)	2,986 (13.9)
	Missing	49	2,448
	Total	**341**	**23,968**

**The outcome data was derived based on National Death Register data*
Note: Patients with the status "transferred to other centre" at in-hospital outcome were categorised as "alive" patients

Table 5.19 Heart rate at presentation versus length of stay, NCVD-PCI Registry, 2019–2020

Year	Length of stay	Heart rate at presentation (beats/minute)		
		<90	≥90	Missing
		No. (%)	No. (%)	No. (%)
2017–2018 Total no. of patients = 21,618	**N**	**14,851**	**2,717**	**3,993**
	Mean (SD)	4.2 (4.4)	4.9 (5.6)	4.5 (4.4)
	Median (min, max)	3.0 (1.0, 98.0)	3.0 (1.0, 99.0)	3.0 (1.0, 96.0)
	Missing, No. (%)	33 (0.2)	8 (0.3)	16 (0.4)
2019 Total no. of patients = 12,885	**N**	**9,632**	**1,726**	**1,434**
	Mean (SD)	4.6 (7.6)	4.9 (6.9)	4.4 (5.7)
	Median (min, max)	3.0 (1.0, 100.0)	3.0 (1.0, 93.0)	3.0 (1.0, 100.0)
	Missing, No. (%)	66 (0.7)	17 (1.0)	10 (0.7)
2020 Total no. of patients = 11,424	**N**	**8,931**	**1,388**	**1,047**
	Mean (SD)	4.1 (4.9)	4.6 (5.1)	4.7 (5.7)
	Median (min, max)	3.0 (1.0, 95.0)	3.0 (1.0, 71.0)	3.0 (1.0, 94.0)
	Missing, No. (%)	45 (0.5)	7 (0.5)	6 (0.6)
2019–2020 Total no. of patients = 24,309	**N**	**18,563**	**3,114**	**2,481**
	Mean (SD)	4.4 (6.4)	4.7 (6.1)	4.5 (5.7)
	Median (min, max)	3.0 (1.0, 100.0)	3.0 (1.0, 93.0)	3.0 (1.0, 100.0)
	Missing, No. (%)	111 (0.6)	24 (0.8)	16 (0.6)

Table 5.20 Prognostic factors for in-hospital mortality among patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Age	21,618	1.05	1.04	1.06	<0.001	1.07	1.03	1.10	<0.001	24,309	1.03	1.02	1.04	<0.001	1.02	0.98	1.05	0.380
Gender																		
Male (ref)	17,933	1.00				1.00				20,077	1.00				1.00			
Female	3,685	1.78	1.40	2.26	<0.001	2.30	1.04	5.08	0.039	4,232	1.46	1.14	1.88	0.003	2.03	0.80	5.12	0.134
PCI status																		
Elective (ref)	14,198	1.00				1.00				15,598	1.00				1.00			
NSTEMI/UA	2,931	3.39	2.42	4.76	<0.001	2.22	0.90	5.51	0.084	3,961	3.67	2.60	5.18	<0.001	1.73	0.71	4.21	0.224
AMI/STEMI	4,489	7.97	6.17	10.30	<0.001	4.54	2.09	9.86	<0.001	4,750	10.60	8.06	13.96	<0.001	2.47	1.09	5.58	0.030
Diabetes mellitus																		
No (ref)	11,143	1.00				1.00				12,212	1.00				1.00			
Yes	9,323	1.67	1.33	2.10	<0.001	1.70	0.86	3.36	0.126	10,703	1.53	1.22	1.92	<0.001	1.46	0.69	3.09	0.318
Hypertension																		
No (ref)	6,872	1.00				1.00				7,017	1.00				1.00			
Yes	13,766	0.95	0.75	1.21	0.695	1.15	0.53	2.52	0.718	16,125	0.99	0.78	1.27	0.949	1.69	0.64	4.45	0.287

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Killip class																		
I&II (ref)	10,344	1.00				1.00				13,656	1.00				1.00			
III&IV	3,685	15.32	11.94	19.65	<0.001	3.02	1.45	6.29	0.003	644	17.94	14.11	22.81	<0.001	7.34	3.45	15.62	<0.001
Smoking status																		
Never (ref)	6,628	1.00				1.00				8,547	1.00				1.00			
Former smokers	4,647	0.48	0.33	0.69	< 0.001	0.68	0.26	1.80	0.441	5,376	0.80	0.58	1.12	0.195	1.39	0.54	3.62	0.496
Current smokers	5,454	0.95	0.72	1.25	0.706	1.71	0.74	3.98	0.212	6,290	1.16	0.87	1.54	0.303	1.12	0.38	3.29	0.844
Left ventricular ejection fraction																		
<30	389	8.26	4.59	14.87	<0.001	3.14	1.15	8.57	0.026	463	8.65	4.89	16.67	<0.001	4.73	1.76	12.69	0.002
30–50	3,471	2.25	1.39	3.63	0.001	1.72	0.83	3.60	0.147	4,397	2.64	1.58	4.40	<0.001	1.36	0.63	2.91	0.430
>50 (ref)	3,872	1.00				1.00				5,780	1.00				1.00			
Serum creatinine >200 µmol/L																		
No (ref)	14,946	1.00				1.00				18,200	1.00				1.00			
Yes	831	5.22	3.80	7.17	<0.001	3.23	1.48	7.09	0.003	1,029	6.06	4.40	8.34	<0.001	3.18	1.40	7.24	0.006

**Using Cox regression with forced model analysis*

Table 5.21 Prognostic factors for 30-days mortality among patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Factor	2017–2018 Total no. of patients = 21,618								2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Age group																		
20–<40 (ref)	1,246	1.00				1.00				1,481	1.00				1.00			
40–<60	11,176	1.01	0.65	1.56	0.975	1.95	0.46	8.18	0.364	12,330	1.35	0.85	2.13	0.204	1.11	0.39	3.12	0.847
≥60	9,196	1.97	1.28	3.03	0.002	3.60	0.86	15.07	0.079	10,498	2.33	1.48	3.65	<0.001	1.76	0.63	4.93	0.280
Gender																		
Male (ref)	17,933	1.00				1.00				20,077	1.00				1.00			
Female	3,685	1.65	1.36	2.01	<0.001	1.53	0.90	2.62	0.119	4,232	1.47	1.22	1.79	<0.001	1.44	0.88	2.34	0.146
PCI status																		
Elective (ref)	14,198	1.00				1.00				15,598	1.00				1.00			
NSTEMI/UA	2,931	2.70	2.11	3.45	<0.001	2.29	1.19	4.39	0.013	3,961	2.86	2.25	3.63	<0.001	1.13	0.65	1.99	0.667
AMI/STEMI	4,489	4.88	4.03	5.90	<0.001	2.43	1.35	4.38	0.003	4,750	6.23	5.15	7.55	<0.001	1.21	0.73	1.99	0.464
Myocardial infarction history																		
No (ref)	12,785	1.00				1.00				13,922	1.00				1.00			
Yes	7,781	0.75	0.62	0.90	0.002	0.91	0.56	1.46	0.686	9,250	0.70	0.56	0.80	<0.001	1.02	0.67	1.57	0.911
Killip class																		
I&II (ref)	10,344	1.00				1.00				13,656	1.00				1.00			
III&IV	522	10.84	8.72	13.47	<0.001	3.54	2.05	6.10	<0.001	644	11.03	9.03	13.46	<0.001	3.85	2.27	6.53	<0.001

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Heart rate																		
60–<80 (ref)	9,201	1.00				1.00				11,757	1.00				1.00			
<40	30	0.00	0.00	0.00	0.927	0.00	0.00	0.00	0.986	39	1.77	0.25	12.64	0.569	0.00	0.00	0.00	0.962
40–<60	2,568	0.85	0.89	1.23	0.394	0.74	0.25	2.15	0.574	3,127	0.80	0.56	1.15	0.230	0.69	0.29	1.63	0.392
80–<100	4,696	1.83	1.45	2.31	<0.001	2.02	1.13	3.59	0.018	5,582	1.69	1.35	2.11	<0.001	1.50	0.93	2.42	0.096
≥100	1,114	8.11	6.42	10.24	<0.001	5.55	3.00	10.28	<0.001	1,307	8.41	6.76	10.46	<0.001	3.54	2.01	6.26	<0.001
Extent of coronary artery disease																		
Single vessel disease (ref)	17,023	1.00				1.00				17,642	1.00				1.00			
Multi vessels disease	3,859	0.87	0.69	1.11	0.265	1.07	0.60	1.93	0.812	5,805	1.53	1.28	1.83	<0.001	1.95	1.27	3.01	0.002
Left main/LMS	510	3.93	2.90	5.33	<0.001	0.95	0.32	2.80	0.932	673	3.02	2.18	4.19	<0.001	3.55	1.59	7.90	0.002
Graft	224	0.73	0.27	1.97	0.539	0.00	0.00	0.00	0.964	189	1.05	0.39	2.82	0.921	1.05	0.14	8.02	0.966
Left ventricular ejection fraction																		
>50 (ref)	3,872	1.00				1.00				5,780	1.00				1.00			
<30	389	6.60	4.21	10.35	<0.001	3.68	1.79	7.55	<0.001	463	7.96	4.96	12.75	<0.001	4.71	2.44	9.07	<0.001
30–50	3,471	1.93	1.36	2.75	<0.001	1.30	0.74	2.28	0.360	4,397	2.70	1.89	3.85	<0.001	1.81	1.11	2.94	0.017

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Serum creatinine >200 µmol/L																		
No (ref)	14,946	1.00				1.00				18,200	1.00				1.00			
Yes	831	5.01	3.90	6.44	<0.001	3.07	1.67	5.62	<0.001	1,029	4.93	3.86	6.30	<0.001	2.74	1.59	4.74	<0.001
Cerebrovascular disease																		
No (ref)	20,263	1.00				1.00				22,733	1.00				1.00			
Yes	469	1.61	1.01	2.58	0.047	1.65	0.52	5.30	0.396	502	2.16	1.45	3.23	<0.001	2.32	1.00	5.39	0.051
Previous PCI																		
No (ref)	17,788	1.00				1.00				19,156	1.00				1.00			
Yes	3,830	0.60	0.46	0.78	<0.001	0.81	0.41	1.61	0.808	5,153	0.61	0.48	0.77	<0.001	0.89	0.51	1.55	0.688

*Using Cox regression with forced model analysis

Table 5.22 Prognostic factors for 6-months mortality among patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Age	21,618	1.04	1.04	1.05	<0.001	1.04	1.02	1.06	<0.001	24,309	1.03	1.03	1.04	<0.001	1.04	1.02	1.05	<0.001
Gender																		
Male (ref)	17,933	1.00				1.00				20,077	1.00				1.00			
Female	3,685	1.41	1.21	1.64	<0.001	0.98	0.65	1.49	0.938	4,232	1.42	1.24	1.64	<0.001	0.96	0.68	1.35	0.812
PCI status																		
Elective (ref)	14,198	1.00				1.00				15,598	1.00				1.00			
NSTEMI/UA	2,931	2.04	1.71	2.43	<0.001	1.75	1.16	2.65	0.008	3,961	1.80	1.54	2.11	<0.001	1.15	0.80	1.64	0.450
AMI/STEMI	4,489	2.86	2.49	3.29	<0.001	1.46	0.97	2.20	0.073	4,750	2.75	2.41	3.14	<0.001	0.96	0.67	1.36	0.808
Diabetes mellitus																		
No (ref)	12,295	1.00				1.00				12,212	1.00				1.00			
Yes	9,323	0.84	0.73	0.96	0.012	1.54	1.06	2.24	0.023	10,703	1.68	1.49	1.91	<0.001	1.84	1.35	2.51	<0.001
Hypertension																		
No (ref)	6,872	1.00				1.00				7,017	1.00				1.00			
Yes	13,766	1.29	1.11	1.49	0.001	1.18	0.78	1.80	0.437	16,125	1.25	1.09	1.43	0.002	1.02	0.70	1.48	0.931

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Myocardial Infraction history																		
No (ref)	12,785	1.00				1.00				13,922	1.00				1.00			
Yes	7,781	0.84	0.73	0.96	0.012	0.86	0.61	1.20	0.363	9,250	0.81	0.72	0.92	0.001	0.70	0.52	0.93	0.015
Killip class																		
I&II (ref)	10,344	1.00				1.00				13,656	1.00				1.00			
III&IV	522	7.56	6.26	9.14	<0.001	2.36	1.48	3.75	<0.001	644	6.87	5.80	8.15	<0.001	2.59	1.72	3.89	<0.001
Heart Rate																		
<40	30	4.37	1.63	11.71	0.003	1.60	0.18	13.92	0.672	39	2.38	0.76	7.40	0.135	5.20	0.71	37.90	0.104
40–<60	2,568	0.74	0.56	0.98	0.032	0.70	0.35	1.37	0.295	3,127	0.87	0.69	1.10	0.239	0.86	0.51	1.46	0.584
60–<80 (ref)	9,201	1.00				1.00				11,757	1.00				1.00			
80–<100	4,696	1.83	1.55	2.17	<0.001	1.77	1.20	2.62	0.004	5,582	1.65	1.42	1.92	<0.001	1.68	1.23	2.29	0.001
≥100	1,114	5.79	4.81	6.70	<0.001	4.00	2.52	6.35	<0.001	1,307	5.28	4.46	6.25	<0.001	2.62	1.71	4.02	<0.001

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309									
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Extent of coronary artery disease																		
Single vessel disease (ref)	17,023	1.00				1.00				17,642	1.00				1.00			
Multi vessels disease	3,859	0.94	0.79	1.12	0.489	1.21	0.81	1.81	0.355	5,805	1.31	1.15	1.50	<0.001	1.35	0.99	1.83	0.054
Left main/LMS	510	3.38	2.63	4.33	<0.001	0.82	0.34	1.98	0.661	673	2.57	2.01	3.30	<0.001	1.96	1.02	3.78	0.043
Graft	224	1.58	0.95	2.63	0.081	1.27	0.42	3.87	0.674	189	1.55	0.87	2.74	0.134	0.71	0.17	2.97	0.641
Left ventricular ejection fraction																		
<30	389	5.88	4.25	8.15	<0.001	3.85	2.34	6.36	<0.001	463	7.44	5.52	10.04	<0.001	5.50	3.51	8.61	<0.001
30–50	3,471	2.03	1.59	2.58	<0.001	1.38	0.94	2.03	0.099	4,397	2.56	2.05	3.19	<0.001	2.33	1.68	3.25	<0.001
>50 (ref)	3,872	1.00				1.00				5,780	1.00				1.00			
Serum creatinine >200 µmol/L																		
No (ref)	14,946	1.00				1.00				18,200	1.00				1.00			
Yes	831	5.39	4.48	6.48	<0.001	3.62	2.41	5.41	<0.001	1,029	6.47	5.51	7.59	<0.001	4.14	3.00	5.77	<0.001

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Cerebrovascular disease																		
No (ref)	21,149	1.00				1.00				22,733	1.00				1.00			
Yes	469	2.00	1.45	2.75	<0.001	1.10	0.45	2.69	0.843	502	1.95	1.46	2.64	<0.001	2.32	1.28	4.21	0.006
Previous PCI																		
No (ref)	17,788	1.00				1.00				19,156	1.00				1.00			
Yes	3,830	0.78	0.65	0.94	0.008	0.85	0.54	1.33	0.468	5,153	0.83	0.71	0.96	0.013	0.79	0.55	1.15	0.223

**Using Cox regression with forced model analysis*

Table 5.23 Prognostic factors for 12-months mortality among patients who underwent PCI, NCVD-PCI Registry, 2019–2020

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Age	21,618	1.04	1.04	1.05	<0.001	1.04	1.04	1.02	<0.001	24,309	1.04	1.03	1.04	<0.001	1.04	1.02	1.05	<0.001
Gender																		
Male (ref)	16,230	1.00				1.00				20,077	1.00				1.00			
Female	3,264	1.57	1.39	1.78	<0.001	1.06	0.71	1.60	0.774	4,232	1.52	1.35	1.71	<0.001	1.37	0.97	1.94	0.073
PCI status																		
Elective (ref)	14,198	1.00				1.00				15,598	1.00				1.00			
NSTEMI/UA	2,931	1.80	1.55	2.08	<0.001	1.89	1.32	2.71	0.001	3,961	1.63	1.43	1.86	<0.001	1.14	0.83	1.56	0.412
AMI/STEMI	4,489	2.13	1.89	2.40	<0.001	1.43	0.99	2.07	0.057	4,750	2.03	1.81	2.27	<0.001	0.86	0.62	1.20	0.368
Diabetes mellitus																		
No (ref)	11,143	1.00				1.00				12,212	1.00				1.00			
Yes	9,323	1.95	1.74	2.19	<0.001	1.51	1.09	2.10	0.013	10,703	1.91	1.72	2.12	<0.001	1.81	1.38	2.38	<0.001
Hypertension																		
No (ref)	6,872	1.00				1.00				7,017	1.00				1.00			
Yes	13,766	1.51	1.33	1.71	<0.001	1.54	1.03	2.29	0.034	16,125	1.45	1.29	1.63	<0.001	1.11	0.79	1.54	0.550

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Myocardial Infraction history																		
No (ref)	12,785	1.00				1.00				13,922	1.00				1.00			
Yes	7,781	0.67	0.78	0.98	0.017	0.98	0.73	1.32	0.917	9,250	0.89	0.80	0.99	0.029	0.85	0.66	1.09	0.197
Heart Rate																		
<40	30	2.95	1.10	7.89	0.031	1.56	0.18	13.50	0.689	39	3.54	1.68	7.46	0.001	7.23	1.75	29.89	0.006
40–<60	2,568	0.76	0.61	0.95	0.016	0.90	0.53	1.54	0.703	3,127	0.76	0.63	0.92	0.006	0.70	0.44	1.10	0.119
60–<80 (ref)	9,201	1.00				1.00				11,757	1.00				1.00			
80–<100	4,696	1.70	1.48	1.96	<0.001	1.80	1.29	2.52	0.001	5,582	1.48	1.31	1.67	<0.001	1.47	1.12	1.92	0.005
≥100	1,114	4.66	3.96	5.48	<0.001	3.13	2.02	4.84	<0.001	1,307	3.89	3.35	4.52	<0.001	2.00	1.32	3.05	0.001
Extent of coronary artery disease																		
Single vessel disease (ref)	17,023	1.00				1.00				17,642	1.00				1.00			
Multi vessels disease	3,859	0.99	0.86	1.14	0.891	1.10	0.77	1.57	0.601	5,805	1.29	1.16	1.45	<0.001	1.12	0.85	1.47	0.411
Left main/LMS	510	3.22	2.60	3.99	<0.001	1.19	0.58	2.44	0.629	673	2.43	1.96	3.01	<0.001	1.29	0.66	2.54	0.462
Graft	224	1.49	0.96	2.31	0.079	0.60	0.17	2.11	0.422	189	2.20	1.47	3.29	<0.001	1.81	0.77	4.30	0.176

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Killip class																		
I&II (ref)	10,344	1.00				1.00				13,656	1.00				1.00			
III&IV	522	5.89	4.94	7.02	< 0.001	1.82	1.17	2.83	0.008	644	5.34	4.55	6.27	< 0.001	2.06	1.37	3.10	< 0.001
Smoking status																		
Never (ref)	6,628	1.00				1.00				8,547	1.00				1.00			
Former smokers	4,647	0.81	0.70	0.95	0.009	0.98	0.67	1.43	0.923	5,376	0.89	0.77	1.02	0.093	1.38	1.00	1.92	0.053
Current smokers	5,454	0.74	0.64	0.86	<0.001	1.02	0.67	1.55	0.921	6,290	0.77	0.67	0.88	<0.001	1.37	0.94	1.98	0.103
Left ventricular ejection fraction																		
<30	389	5.44	4.12	7.19	<0.001	3.98	2.53	6.26	<0.001	463	6.48	5.05	8.32	<0.001	4.97	3.34	7.41	<0.001
30–50	3,471	2.00	1.64	2.44	<0.001	1.63	1.17	2.28	0.004	4,397	2.43	2.04	2.90	<0.001	2.31	1.74	3.06	<0.001
>50 (ref)	3,872	1.00				1.00				5,780	1.00				1.00			
Cerebrovascular disease																		
No (ref)	21,149	1.00				1.00				22,733	1.00				1.00			
Yes	469	1.98	1.51	2.59	<0.001	1.09	0.51	2.34	0.822	502	1.92	1.48	2.49	<0.001	1.61	8.53	3.05	0.141

Factor	2017–2018 Total no. of patients = 21,618									2019–2020 Total no. of patients = 24,309								
	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value	N	Unadjusted Hazard ratio	95% CI		*p-value	Adjusted Hazard ratio	95% CI		*p-value
Previous PCI																		
No (ref)	17,788	1.00				1.00				19,156	1.00				1.00			
Yes	3,830	0.87	0.75	1.00	0.053	0.84	0.56	1.26	0.397	5,153	0.97	0.86	1.09	0.612	0.92	0.68	1.25	0.599
Serum creatinine >200 µmol/L																		
No (ref)	14,946	1.00				1.00				18,200	1.00				1.00			
Yes	831	5.80	4.98	6.75	<0.001	4.07	2.84	5.82	< 0.001	1,029	7.03	6.17	8.01	<0.001	4.17	3.05	5.69	<0.001

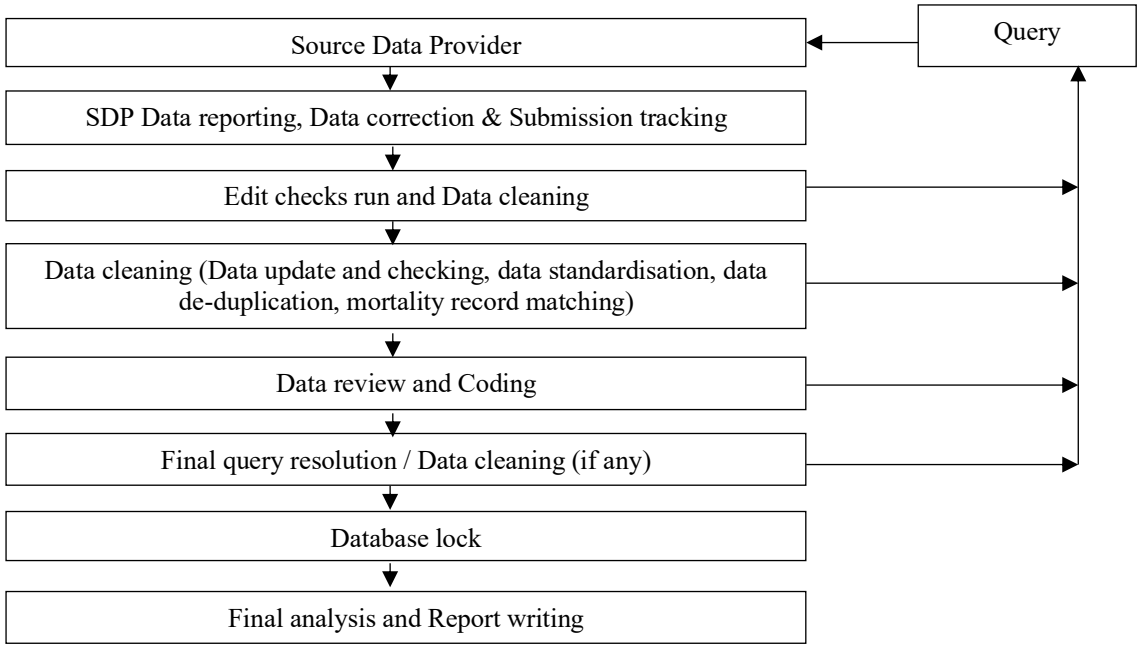
**Using Cox regression with forced model analysis*

APPENDIX A: DATA MANAGEMENT

The National Cardiovascular Disease Database (NCVD) Registry maintains two different databases for cardiovascular diseases, i.e. for Acute Coronary Syndrome and Percutaneous Coronary Intervention. Data is stored in SQL Server due to the high volume of data accumulated throughout the years.

Data sources
Source Data Providers (SDPs) of NCVD-PCI registry comprises all major hospitals who have participated in the registry, throughout Malaysia.

Data Flow Process
This section describes the data management flow process of the National Cardiovascular Disease Database.



SDP Data reporting, Data correction and Submission tracking
Data reporting by SDP is done via Web Applications e-Case Report Forms.

There are a number of data security features that are designed into the NCVD web application (eCRF) such as web owner authentication, 2-level user authentication (username and password authentication and a Short Messaging System (SMS) of authorisation code of mobile phone authentication), access control, data encryption, session management to automatically log off the application, audit trail and data backup and disaster recovery plan.

For PCI, SDP submits the NCVD-PCI Notification form on an ad-hoc basis whenever a procedure is performed. The SDP also submits follow-up data at 30-day, 6-month and 12-month post notification date intervals. An alert page containing all the overdue submissions for follow-up at 30-day, 6-month and 12-month post notification date is available to users to ease them for submissions tracking.

Prior to registering a patient record, a verification process is done by using the search functionality to search if the patient already exists in the entire registry. The application will still detect a duplicate record if the same MyKad number is keyed in, should the step of searching patient be left out. This step is done to avoid duplicate records. For patients whose records already exist in the database, SDP needs only to

add a new PCI notification with basic patient particulars pre-filled, based on existing patient information in the database. The PCI and ACS registries share the same patient list.

There are a few in-built functionalities at the data entry page that serve to improve data quality. One such function is auto calculation functionality to reduce human error, in calculations. There is also an inconsistency check functionality that disables certain fields and prompts the user, if the value entered is out of range.

A real time data query page is also available via the web application to enable users to check which non-compulsory data is missing, out of range and inconsistent. A link is provided on the data query page for user to click on to resolve the query for the particular patient.

Real time reports are also provided in the web application. The aggregated data reports are presented as tables and graphs. The aggregated data reports are typically presented in two manners, one as centre's own data aggregated data report and another as the registry's overall aggregated data report. In this way, the centre is able to compare itself against the overall registry's average.

Data download function is also available in the web application to allow users to download their own centre's data of all the forms entered, for their own further analyses. The data are downloadable as Text - tab delimited (.txt) format, Microsoft excel workbook (.xls) and as Comma separated value (.csv) format.

Edit checks run and Data cleaning
Edit checks are performed periodically by the registry manager to identify missing compulsory data, out of range values, inconsistency of data, invalid values and errors with de-duplication. Data cleaning is then performed based on the results of the edit checks. Data update and data checking of the dataset are performed when there is a query on certain fields as and when necessary. It could be due to request by user, correction of data based on checking via data query in eCRF or after receiving results for preliminary data analysis. During data standardisation, missing data are handled based on derivation from existing data. Data de-duplication is also performed to identify duplicate records in the database that might have been missed out by SDPs. Finally, record matching against the National Death Register *(Jabatan Pendaftaran Negara)* database is performed to verify the mortality status of the patient.

Final query resolution / Data cleaning / Database lock
A final edit check run is performed to ensure that the data is clean. All queries will be resolved before the database is locked, to ensure data quality and integrity. The final dataset is subsequently locked and exported to the statistician for analysis.
Data analysis
Please refer to Statistical Analysis Method section for further details.

Data release policy
One of the primary objectives of the Registry is to make data available to the cardiovascular healthcare providers, policy makers and researchers. The Registry would appreciate that users acknowledge the Registry for the use of the data. Any request for data that requires a computer run must be made in writing (by e-mail, fax, or registered mail) accompanied with a Data Release Application Form and signed Data Release Agreement Form. These requests need prior approval by the Advisory Board before data can be released.

Registry ICT Infrastructure and Data Centre

The operation of the NCVD is supported by an extensive ICT infrastructure to ensure operational efficiency and effectiveness.

NCVD subscribes to co-location service with a high availability and highly secured Internet Data Centre at Cyberjaya in order to provide NCVD with quality assured Internet Hosting services and state-of-the-art physical and logical security features without having to invest in costly data centre setup internally. Physical security features implemented includes state-of-the-art security features such as anti-static raised flooring, fire protection with smoke and heat alarm warning system, biometric security access, video camera surveillance system, uninterrupted power supply, environmental control, etc.

Other managed security services include patch management of the servers, antivirus signature monitoring and update, firewall traffic monitoring and intrusion detection, security incidence response, data backup service done on a daily, weekly and monthly basis, data recovery simulation to verify that the backup works, which is done at least once yearly, network security scan and penetration test done on a half-yearly basis, security policy maintenance, maintenance and monitoring of audit trail of user access, etc. Managed system services such as usage and performance report, operating system maintenance and monitoring, bandwidth monitoring and systems health monitoring are also provided.

APPENDIX B: STATISTICAL METHODS

The analysis described below was conducted on data collected in the NCVD-PCI registry for 2019 and 2020. Inclusion criteria were all patients who had PCI procedures performed in 2019 or 2020 and were aged 20 years and above. In general, the unit of analysis was PCI procedures performed or treated lesions. However, for some results, a patient level analysis was conducted.

Statistical methods used mainly descriptive analysis. We calculated frequency and percentages for discrete data, while for continuous data, the mean, standard deviation (SD), median, minimum and maximum values were calculated. The survival analyses were performed to evaluate prognostic factors for in-hospital mortality, 30-day mortality, six months mortality and 1-year mortality in Chapter 5. In univariate analysis, variables with the p value less than 0.25 and clinical significance were included in the models. Forced model analysis was used to obtain the final model. An unadjusted and adjusted hazard ratio with a 95% confidence interval was presented in Chapter 5. A p value of less than 0.05 is considered statistically significant.

Missing data was reported for both discrete and continuous data. No statistical imputation was applied to replace any missing data. Acceptable ranges for different characteristics are presented in the table below:

Name of the field	Acceptable range
Age	≥20 years old
Height	130–250 cm
Weight	40–200 kg
Body Mass Index (BMI)	14–50 kgm^{-2}
Creatinine	44–2000 micromol/L
Glomerular Filtration Rate (GFR), MDRD	1–200 $mL/min/1.73m^2$
Total Cholesterol (TC)	2.0–25.0 mmol/L
Low-Density Lipoprotein (LDL)	0.7–20.0 mmol/L
Heart rate	25–200 beats/min
Systolic blood pressure	60–230 mmHg
Diastolic blood pressure	10–120 mmHg
Ejection fraction status	10–80 %
Mean arterial pressure	26–157 mmHg
TIMI risk index	1–145
HbA1c	4.0–32.0 %
Symptom-to-door time	10–1440 minutes
Door-to-balloon time	10–720 minutes
Transfer time	10–720 minutes
Symptom-to-balloon time	10–1440 minutes
Fluoroscopy time	1.0–180.0 minutes
Contrast volume	15.0–500.0 mL
Pre-procedure stenosis	0–100 %
Post-procedure stenosis	0–100 %
Estimated lesion length	1.0–150.0 mm

Name of the field	Acceptable range
Stent length (total)	8.0–160.0 mm
Stent diameter (average)	2.0–6.0 mm
Maximum balloon size used	1.0–6.0 mm
Maximum stent/balloon deploy pressure	1.0–40.0 mm
Length of stay	1–100 days

Analysis performed for each report chapter is described below:

Chapter 1: Patient characteristics
Patient characteristics are summarised in Chapter 1. Numbers of patients in each year were determined based on their PCI procedure year. The results presented the patients' age, gender, ethnicity, coronary risk factors, comorbidities, lab investigations, previous interventions and other variables contained in the CRF.

Chapter 2: Clinical presentations & investigations
Chapter 2 included an analysis of clinical presentation, baseline investigations, cardiac status such as NYHA and Killip class, Canadian Cardiovascular Score and IABP use at PCI procedure. An analysis of STEMI time-to-treatment was performed in which we excluded any illogical values for time-to-treatment (such as negative values for symptom-to-door and door-to-balloon time). In this chapter, the total number cases are based on number of procedures instead of number of patients.

Chapter 3: Procedural setting
Chapter 3 included an analysis of the procedural details and treatment received by the patients. This chapter includes results for PCI procedure characteristics, duration of thienopyridine use and access site.

Chapter 4: Lesion characteristics
Lesion characteristics are summarised in Chapter 4. This chapter included location of lesion, types of lesions, types of stents, types of intracoronary devices used, stent diameter, stent length and TIMI flow. Sub-group analyses were performed for PCI to left main stem, in stent restenosis and graft lesion and CTO. In this chapter, numbers of lesions in each year were used as the denominator in the results. This was unlike other chapters where numbers of patients were the denominator. In this report, the types of dominance were added; the types of intracoronary devices used and stent code were revised according to the latest CRF (PCI version 1.6).

Chapter 5: Outcome
The overall in-hospital mortality, all-cause mortality, post-procedural complications, medications and patient outcome at discharge and follow-up (30-days, 6-month and 1-year) are presented in Chapter 5. In order to evaluate the status of patients (whether alive or deceased), individual patients were matched against the status provided by the Malaysian National Registration Department (NRD). Patients were considered as alive at the time of follow-up if the death date was not provided in the NRD dataset.

APPENDIX C: PARTICIPATING CENTRE DIRECTORY

SDP Code: 1001
Pusat Perubatan Universiti Malaya
Jalan Universiti
59100 KUALA LUMPUR

SDP Code: 1002
Institut Jantung Negara
145 Jalan Tun Razak
50400 KUALA LUMPUR

SDP Code: 1004
Hospital Pulau Pinang
Jalan Residensi
10990 PULAU PINANG

SDP Code: 1005
Pusat Jantung Sarawak
Kota Samarahan Expressway
94300 Kuching, SARAWAK

SDP Code: 1006
Hospital Sultanah Aminah
Jalan Persiaran Abu Bakar Sultan
80100 Johor Bahru, JOHOR

SDP Code: 1009
Hospital Sultanah Bahiyah
KM 6, Jalan Langgar
05460 Alor Setar, KEDAH

SDP Code: 1012
Hospital Raja Permaisuri Bainun
Jalan Raja Ashman Shah
30450 Ipoh, PERAK

SDP Code: 1013
Hospital Sultanah Nur Zahirah
Jalan Sultan Mahmud
20400 Kuala Terengganu, TERENGGANU

SDP Code: 1014
Hospital Raja Perempuan Zainab II
Jalan Hospital
15586 Kota Bharu, KELANTAN

SDP Code: 1016
Hospital Tengku Ampuan Afzan
Jalan Tanah Putih
25100 Kuantan, PAHANG

SDP Code: 1020
Hospital Sultan Idris Shah
Jalan Puchong
43000 Kajang, SELANGOR

SDP code: 1021
Hospital Canselor Tuanku Muhriz UKM
Jalan Yaacob Latif, Bandar Tun Razak
56000 Cheras, KUALA LUMPUR

SDP Code: 1024
Subang Jaya Medical Centre
No. 1, Jalan SS 12/1A, Ss 12, 47500 Subang Jaya, SELANGOR

SDP Code: 1027
KPJ Seremban Specialist Hospital
Lot 6219 & 6220, Jalan Toman 1, Kemayan Square, 70200 Seremban, NEGERI SEMBILAN

SDP Code: 1028
Hospital Queen Elizabeth II
Lorong Bersatu, Off Jalan Damai, Luyang Commercial Centre, 88300 Kota Kinabalu, SABAH

SDP Code: 1033
Pusat Perubatan UiTM
UiTM Sg Buloh Campus, Jalan Hospital
47000 Sungai Buloh, SELANGOR

SDP Code: 1035
Oriental Melaka Straits Medical Centre
Pusat Perubatan Klebang
75200 MELAKA

SDP Code: 1038
KPJ Tawakkal Specialist Hospital
1, Jalan Pahang Barat, Pekeliling
53000 KUALA LUMPUR

SDP Code: 1047
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102, Persiaran Rajawali/KU1, Bandar Baru Klang
41150 Klang, SELANGOR

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Jalan Stesen Sentral 5, Kuala Lumpur Sentral 50470 KUALA LUMPUR

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Pantai Hospital Penang

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SDP Code: 1053

Gleneagles Hospital Penang

1, Jalan Pangkor, 10050 George Town, PULAU PINANG

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2, Jalan Medini Utara 4, 79250 Iskandar Puteri, JOHOR

SDP Code: 1055

Gleneagles Hospital Kota Kinabalu

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APPENDIX D: NOTE OF APPRECIATION

A heart-felt appreciation is extended to everyone who has contributed to the successful publication of this report.

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Mohd Suhairi Mohamad
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Noor Fatin Izzati Abu Hashim
Nor Fairuz Husna Alias
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Nor Faiqah Ahmad
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Muhammad Faris Abdullah
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Nur Fadhilah Mohamad Sahid
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Noor Farhan Che Kamarudin
Yanti Kartika Abdullah
Muzalliyana Mustafa
Norlailatulhani Shaari
Rodziah Hassim
Nur Kamalia Oswald Abdullah
Anis Nabila Mohd Kamal
Nor Ain Zulkepli
Amar Che Mohamed
Masliza Mohamed
Wan Norisa Wan Abdullah

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Dr Anwar Irawan Ruhani
Dr Siti Khairani Zainal Abidin
Dr Norfarahdina Ramli
Dr Ng Kwang How
Dr Dhani Darshan Francis
Dr Selva Kumar Sivan
Chooi Lee Ling
Khairos Karim
Noor Fauziah Muhammad
Hasnah Hamat
Wan Norfaizah Wan Abdullah
Issa Norhafizza Tajuddin
Siti Nor Ashraf Ahmad Nori
Marina Mohd Nawi
Norlailatu Laili Mansor
Siti Nur Aishah Ismail
Irna Shakiera Md Zaid
Yosmita Enisuryati Jumadi
Yusniral Kadir
Norlida Mohamad
Nor Amieza Abu Samah
Aainaa Nazihah Muhamaddin
Khairul Ikhsan Mazlan
Mohd Azleey Mu'az Mohd Shapiai
Hamizan Zakaria
Mohammad Khodori Shafiei
Tengku Ahmad Suhaili Tengku Sukarnordin
DK Mella Mohd Ali
Roslan Azali
Mohammad Azhar Mat Saman
Syed Yusri Sayed Ibrahim

Mohd Khairlani Abdul Rahman
Mohd Saiful Izad Shafuddin
Nor Suriana Abdulla
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Dr Mohd Shahrizan Ismail
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Hidayah Omar

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Dr Hazleena Mohamed Hasnan
Dr Kwan Yew Fung
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Sh. Noor Hidayah Mohd Zamani
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Mohamad Al Walid Ramlee
Nor Ain Zulkepli
Mohammad Syamil Mohd Hanifiah
Noraini Narawi
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Dr Muhammad Hanis Hamidi
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Dr Zubin Othman Ibrahim
Dr Rizmy Najme Khir
Dr Abdul Wahab Undok
Mohd Harfizzaq Anuar
Rosazelah Mansor
Salehah Ab Rahim
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Hanina Asmoin
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Dr Goh Chong Aik
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APPENDIX E: GLOSSARY

Access site occlusion	Indicates whether an access site occlusion occurred at the site of percutaneous entry during the procedure or after the laboratory visit, but before any subsequent laboratory visits. This is defined as total obstruction of the artery usually by thrombus (but may have other causes) usually at the site of access, requiring surgical repair. Occlusions may be accompanied by absence of palpable pulse or Doppler.
Acute Coronary Syndrome (ACS)	Indicates if the patient is suffering from an ACS event. ACS encompasses clinical features comprising chest pain or overwhelming shortness of breath, defined by accompanying clinical, ECG and biochemical features. ACS comprises the following: - Unstable Angina Pectoris (UAP) - NSTEMI - STEMI
Bail-out CABG	Urgent / emergent CABG as a complication related to the index PCI (e.g. secondary to stent thrombosis, left main or TVR dissection, coronary perforation, unsuccessful INDEX PCI). This also applies to where the CABG was precipitated due to worsening, sudden chest pain, CHF, AMI or anatomy.
Bleeding	The person's episode of bleeding as described by the thrombolysis in myocardial infarction (TIMI) criteria. Indicates if bleeding occurred during or after the cath. lab visit until discharge. The bleeding should require a transfusion and/or prolonged hospital stay and/or cause a drop in haemoglobin > 3.0 gm/dl.
Body Mass Index (BMI)	A measurement of the relative percentages of fat and muscle mass in the human body, in which weight in kilogrammes is divided by height in metres and the result used as an index of obesity (kgm-2). This will be autocalculated by the system.
Canadian Cardiovascular Score (CCS)	Indicates the Canadian Cardiovascular Angina Classification Score (CCS) of a patient which is categorised as: Class 0; Asymptomatic Class 1; Ordinary physical activity, such as walking or climbing the stairs does not cause angina. Angina may occur with strenuous, rapid or prolonged exertion at work or recreation. Class 2; There is slight limitation of ordinary activity. Angina may occur with moderate activity such as walking or climbing stairs rapidly, walking uphill, walking or climbing stairs after meals, in the cold, in the wind, or under emotional stress, or walking more than two blocks on the level, and climbing more than one flight of stairs at normal pace under normal conditions. Class 3; There is marked limitation of ordinary physical activity. Angina may occur after walking one or two blocks on the level or climbing one flight of stairs under normal conditions at a normal pace. Class 4; There is inability to carry on any physical activity without discomfort; angina may be present at rest.

Cardiogenic shock	Indicates if the patient fulfilled the clinical criteria for cardiogenic shock as follows: a. hypotension (a systolic BP of <90 mmHg for at least 30 minutes or the need for supportive measures to maintain a systolic BP of >90 mmHg). b. end-organ hypoperfusion (cool extremities or a urine output of less than 30 ml/h, and a heart rate >60 beats per minute). c. the haemodynamic criteria are a cardiac index of no more than 2.2l/min per square meter of body-surface area and a pulmonary-capillary wedge pressure of at least 15 mmHg.
Chronic renal failure	Indicates if the patient has a history and/or documented evidence and/or have undergone treatment for chronic renal failure. Includes all patients with creatinine 200 micromol/L.
Contralateral Injections	Injection of contrast injected in the opposite non-occluded vessel.
Current smoker	Patient who regularly smokes a tobacco product / products one or more times per day or has smoked within the 30 days prior to this admission.
Diabetes	Indicates if the patient has diabetes as documented by the following: 1. A history of diabetes, regardless of duration of disease, or need for antidiabetic agents, or 2. Fasting blood glucose >7.0 mmol/L, or 3. HbA1c >6.5 mmol/L
Direct stenting	Stent deployment without prior treatment of stenotic segment.
Dissection (post procedure)	Indicates for the treated segment (or for a significant side branch) if a dissection >5 mm was observed during the PCI procedure. Dissection is defined as the appearance of contrast materials outside of the expected luminal dimensions of the target vessel and extending longitudinally beyond the length of the lesion.
Dissection (vascular)	Indicates whether a dissection occurred at the site of percutaneous entry during the procedure or after lab visit but before any subsequent lab visits. A dissection is defined as a disruption of an arterial wall resulting in splitting and separation of the intimal (subintimal) layers.
Documented CAD	Indicates if the patient has angiographically-proven coronary disease (stenosis > 50%) or has undergone percutaneous angioplasty (PCI) or coronary artery bypass graft (CABG) prior to this admission to the hospital.
Door-to-balloon time	The duration between time patient presented to the reporting centre to time of first intracoronary device used performed by the same centre. Applicable only to patients with STEMI undergoing urgent PCI.
Door to needle time	The duration between time patients presented to the reporting centre to time intravenous fibrinolytic therapy was administered or initiated by that same centre. Applicable only to STEMI patients receiving thrombolysis at the reporting centre.
Elective PCI	PCI performed for patients with stable CAD.
Emergency Reintervention/PCI	Indicates if the patient required an UNPLANNED PCI during hospitalisation and prior to discharge that occurs as a complication related to the index PCI e.g., – stent thrombosis, dissection with target vessel occlusion).
French size	The French size of the guiding catheter or guiding sheath used to cannulate the ostium of the coronary artery. The largest size used should be indicated.

Functional ischaemia	Indicates if the patient has functional ischaemia as indicated by a non-invasive test such as exercise or pharmacological stress test, radionuclide, echo, CT scan which was done to rule out ischaemia. The test could be performed at this admission (prior to the PCI), or it could be a test that resulted in the admission.
Glomerular Filtration Rate (MDRD)	Glomerular filtration rate (GFR) is the volume of fluid filtered from the renal (kidney) glomerular capillaries into the Bowman's capsule per unit time calculated using the Modification of Diet in Renal Disease (MDRD) formula. GFR MDRD = 186 x (serum creatinine (µmol/L) / 88.4)$^{-1.154}$ x AGE$^{-0.203}$ x (0.742 if female). The unit is mL/min/1.73m2.
Intra-Aortic Balloon Pump (IABP)	Indicates if an Intra-Aortic Balloon Pump has been used during the procedure.
Killip classification	Identifies the Killip class, as a measure of haemodynamics compromise, of the person at the time of presentation **Class I** includes individuals with no clinical signs of heart failure **Class II** includes individuals with rales in the lungs, an S3 gallop, and elevated jugular venous pressure **Class III** describes individuals with frank pulmonary oedema **Class IV** describes individuals in cardiogenic shock
Lesion code	Indicates the sites of lesion treated by PCI.
Lesion result	Indicates for the treated lesion whether the treatment was successful or unsuccessful.
Lesion type	The lesion type according to ACC/AHA guidelines that determines the complexity of the lesions thus determining the success rate and complication rates following PCI.
Loss of radial pulse	Indicates whether an acute loss of the pulse radial to the arterial access site occurred either by dissection, thrombus or distal embolisation.
LVEF	The left ventricular ejection fraction as measured by the percentage of the blood emptied from the left ventricle at the end of the contraction. Indicates the EF status at time of PCI procedure. The most recent test within the last 6 months, including the current procedure and up to discharge following the procedure.
Medina Classification	It involves assigning a binary value (1,0) to each of the three components of a bifurcation (proximal region of main branch, distal region of main branch, and the side branch) depending on whether there is more than (1) or less than (0) fifty percent lesion stenosis. If only proximal segment of the main branch has a significant lesion, it becomes Medina 1,0,0. If distal segment of main branch alone is involved, it becomes 0,1,0. Sole involvement of side branch is designated 0,0,1 and involvement of all the three is designated 1,1,1 and so on.
No reflow	Indicates for the treated segment if there was a period where no flow was noted during the PCI procedure.

New York Heart Association	Indicates the patient's NYHA classification as follows: I. Patient has cardiac disease but without resulting limitations of ordinary physical activity; ordinary physical activity (e.g. walking several blocks or climbing stairs) does not cause undue fatigue or dyspnoea. Limiting symptoms may occur with marked exertion. II. Patient has cardiac disease resulting in slight limitation of ordinary physical activity. Patient is comfortable at rest. Ordinary physical activity such as walking more than 2 blocks or climbing more than one flight of stairs results in limiting symptoms (e.g., fatigue or dyspnoea). III. Patient has cardiac disease resulting in marked limitation of physical activity. Patient is comfortable at rest. Less than ordinary physical activity (e.g., walking one to two level blocks or climbing one flight of stairs) causes fatigue or dyspnoea. IV. Patient has dyspnoea at rest that increases with any physical activity. Patient has cardiac disease resulting in inability to perform any physical activity without discomfort. Symptoms may be present even at rest. If any physical activity is undertaken, discomfort is increased.
Percutaneous entry	Indicates the percutaneous entry location used to provide vascular access for the procedure.
Perforation	Indicates for the treated segment if a perforation occurred during the procedure.
Pre-stenosis	Indicates the % of most severe pre-procedure stenosis assessed. This does not include collateral circulation.
Pseudoaneurysm	Indicates whether a pseudoaneurysm occurred at the site of percutaneous entry during the procedure or after the laboratory visit but before any subsequent laboratory visits. This does not account for pseudoaneurysms noted after discharge. Pseudoaneurysm is defined as the occurrence of a disruption and dilation of the arterial wall without identification of the arterial wall layers at the site of the catheter entry, as demonstrated by arteriography or ultrasound.
Smoking status	Indicates if the patient has a history confirming any form of tobacco use in the past. This includes use of cigarettes / cigars / pipes/ tobacco chewing.
Status - Elective	PCI performed in patient with stable CAD either planned/staged PCI following coronary angiogram done earlier or PCI performed during the time of angiogram (ad-hoc).
Status - NSTEMI/UA	PCI for patients admitted with NSTEMI/UA.
Status - STEMI	PCI for patient admitted with STEMI following different treatment strategies.
TIA / Stroke	Indicates if the patient experienced a Cerebrovascular Accident (CVA) noted during the cath lab visit or after lab visit until discharge (or before any subsequent lab visits), as documented by CT/MRI confirmation.
Time of first balloon inflation / stent / aspiration	Indicates the time of the intracoronary treatment device deployment.
TIMI Flow (Post)	Indicates the post-procedure TIMI flow down the treated vessel.
TIMI Flow (Pre)	Indicates the pre-procedure TIMI flow down the treated vessel.
Vascular perforation	Perforation of the peripheral vessel where the catheter/sheath/wire is being tracked.

APPENDIX F: CASE REPORT FORM

NATIONAL CARDIOVASCULAR DISEASE DATABASE (PCI REGISTRY) NOTIFICATION FORM

For NCVD Use only:
Centre:
ID:

Instruction: Complete this form to notify all PCI admissions at your centre to NCVD PCI Registry. Where check boxes ☐ are provided, please check (√) one or more boxes. Where radio buttons ◯ are provided, check (√) only one option.

A. Date of Admission (dd/mm/yy): ☐☐☐☐☐☐ **B. Time of Admission (hh:mm):** ☐☐ : ☐☐ *(in 24hr clock)*

SECTION 1: DEMOGRAPHICS

1. Patient Name: *(as per MyKad / Other Document ID)*		**2. Hospital RN :**	
3. Identification Card Number:	**MyKad:** ☐☐☐☐☐☐ - ☐☐ - ☐☐☐☐	**Old IC No.**	
	Other ID Document No. →	***Specify type :*** (eg. passport, armed force ID)	
4. Gender:	◯ Male ◯ Female	**5. Nationality:**	◯ Malaysian ◯ Non Malaysian
6a. Date of Birth:	☐☐☐☐☐☐ (write DOB as 01/01/yy if age is known)	**6b. Age on admission:**	☐☐ *(auto calculate)*
7. Ethnic Group:	◯ Malay ◯ Punjabi ◯ Melanau ◯ Bidayuh ◯ Foreigner, specify ◯ Chinese ◯ Orang Asli ◯ Murut ◯ Iban country of origin: …….. ◯ Indian ◯ Kadazan Dusun ◯ Bajau ◯ Other Malaysian, specify: ……..		
8. Contact Number:	*(1):*	*(2):*	

SECTION 2 : STATUS BEFORE EVENT

1. Smoking status: ◯ Never ◯ Former (quit >30 days) ◯ Current (any tobacco use within last 30 days) ◯ Not Available

2. Medical history:

a) Dyslipidaemia ◯ Yes ◯ No ◯ Not known

b) Hypertension ◯ Yes ◯ No ◯ Not known

c) Diabetes ◯ Yes ◯ No ◯ Not known
- ☐ OHA ☐ Insulin ☐ Non pharmacology therapy/diet therapy

d) Family history of premature cardiovascular disease ◯ Yes ◯ No ◯ Not known
(1st degree relative with either MI or stroke; <55 y/old if Male & <65 y/old if Female)

e) Myocardial infarction history ◯ Yes ◯ No ◯ Not known

f) Documented Significant CAD ◯ Yes ◯ No ◯ Not known
(Presence of >50 % stenosis on CTA, angiogram, ischaemia on functional cardiac imaging such as nuclear, MRI, echo or positive treadmill test. High calcium score alone is not sufficient)

g) New onset angina (<2 weeks) ◯ Yes ◯ No ◯ Not known

h) History of heart failure ◯ Yes ◯ No ◯ Not known

i) Cerebrovascular disease ◯ Yes ◯ No ◯ Not known

j) Peripheral vascular disease ◯ Yes ◯ No ◯ Not known

k) Chronic renal failure ◯ Yes ◯ No ◯ Not known
(>200 µmol/L serum creatinine)
- On dialysis? ◯ Yes ◯ No

SECTION 3 : CLINICAL EXAMINATION and BASELINE INVESTIGATION

1. Anthropometric:	**a. Height:** ☐.☐☐ (m) ☐ Not Available	**b. Weight:** ☐☐☐.☐ (kg) ☐ Not Available	**c. BMI:** ☐ *(auto calculate)*
2. Heart rate (at start of PCI):	☐☐☐ beats/min	**3. Blood pressure (at start of PCI):**	**a. Systolic:** (mmHg) **b. Diastolic:** (mmHg)
4. Fasting Blood Glucose:	☐☐☐.☐ mmol/L ☐ Not Available	**5. Hb A1c:**	☐☐☐.☐ % ☐ Not Available
6a. Total cholesterol:	☐☐☐.☐ mmol/L ☐ Not Available	**6b. LDL Levels:**	☐☐☐.☐ mmol/L ☐ Not Available
7. Baseline creatinine:	☐☐☐.☐ µmol/L ☐ Not Available	**8. Baseline ECG:**	☐ Sinus rhythm ☐ 2nd/3rd AVB ☐ RBBB ☐ Atrial Fibrillation ☐ LBBB ☐ ST Deviation *(for GRACE Score)*
9. Non Invasive Test:	i) ◯ Done → ☐ Stress/ Exercise Test ☐ Nuclear ☐ MRI ☐ Stress Echo ☐ DSE ☐ CT Scan ◯ Not Done	ii) Functional Ischaemia ◯ Positive ◯ Negative ◯ Equivocal	
10. Glomerular Filtration Rate (GFR):	**a. MDRD:** ☐☐☐.☐ mL/min/1.73m² *(auto calculate)*	**b. Cockcroft-Gault:** ☐☐☐.☐ mL/min *(auto calculate)*	

Formula: GFR (Modification of Diet in Renal Disease (MDRD) : 186 x (serum creatinine [micromol/L] / 88.4) $^{-1.154}$ x (age) $^{-0.203}$ x (0.742 if female)
GFR (Cockcroft-Gault formula) : Male : 1.23 x (140 - Age) x Weight (kg) / serum Creatinine (micromol/L)
Female : 1.04 x (140 - Age) x Weight (kg) / serum Creatinine (micromol/L)

SECTION 4 : PREVIOUS INTERVENTIONS

1. Previous PCI: ◯ Yes ◯ No
- Date of most recent PCI (dd/mm/yy): ☐☐ / ☐☐ / ☐☐
- ☐ Not Available

2. Previous CABG: ◯ Yes ◯ No
- Date of most recent CABG (dd/mm/yy): ☐☐ / ☐☐ / ☐☐
- ☐ Not Available

a. Patient Name:		b. MyKad/Other ID No.:		c. Date of Procedure:	

SECTION 5 : CARDIAC STATUS AT PCI PROCEDURE

1. Angina type: ○ None ○ Atypical ○ Typical

2. Canadian Cardiovascular Score (CCS): ○ Asymptomatic ○ CCS 1 ○ CCS 2 ○ CCS 3 ○ CCS 4

3. NYHA: ○ NYHA I ○ NYHA II ○ NYHA III ○ NYHA IV

4. Killip Class (STEMI & NSTEMI)
○ I No clinical signs of HF ○ II Left Heart Failure (LHF) ○ III Acute Pulmonary Oedema (APO) ○ IV Cardiogenic Shock ○ Not Applicable / Not Available

5. Coronary Artery Disease (CAD) Presentation:
○ STEMI ○ NSTEMI ○ UA ○ Chronic Stable Angina
→ ☐ Anterior ☐ Lateral ☐ Inferior ☐ Others, specify: _____
☐ Posterior ☐ Right sided ☐ Left Main Stem

6. STEMI Event: (Please complete if <24 hrs since onset of STEMI symptoms)

a) STEMI onset:	i. Date: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) ☐ Not Applicable	ii. Time: ☐☐ : ☐☐ (in 24hr clock)
b) Arrival at first hospital (non PCI hospital):	i. Date: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) ☐ Not Applicable	ii. Time: ☐☐ : ☐☐ (in 24hr clock)
c) Arrival at PCI hospital:	i. Date: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) ☐ Not Applicable	ii. Time: ☐☐ : ☐☐ (in 24hr clock)
d) First device (balloon inflation/ stent/ aspiration):	i. Date: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) ☐ Not Applicable	ii. Time: ☐☐ : ☐☐ (in 24hr clock)
e) In hospital STEMI:	i. Date: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) ☐ Not Applicable	ii. Time: ☐☐ : ☐☐ (in 24hr clock)

7. EF Status (at time of PCI procedure): ☐☐☐ % (Do not use '>' or '<' symbol) ☐ Not Available

8. Cardiac Arrest: ○ Out of hospital ○ At admission (for GRACE score)

9. GRACE Score: (only for STEMI & NSTEMI) (*auto calculate*)

SECTION 6 : CATH LAB VISIT

1. a) Date of procedure: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) **1. b) Time of procedure:** ☐☐ : ☐☐ *(in 24hr clock)*

2. PCI status
○ Elective → ○ Staged PCI ○ Ad hoc
○ NSTEMI/UA → ○ Urgent (within 24hrs) ○ In hospital(> 24hrs) ○ PCI within 30days post event
○ STEMI → ○ Primary ○ Delayed Routine PCI ○ Rescue ○ Delayed Selective PCI ○ Pharmacoinvasive

3. Medication:

a) Thrombolytics	○ Yes → i) Time duration: ○ <3hrs ○ 3-6hrs ○ 6-12hrs ○ 12-24hrs ○ >24hrs ○ No		ii) Types: ○ Streptokinase ○ tPA ○ Tenecteplase ○ Others, specify:_____	
b) IIb / IIIa Blockade	○ Yes → ○ Prior ○ During ○ After ○ No			
c) Heparin	○ Yes ○ No		d) LMWH	○ Yes ○ No
e) Ticlopidine	○ Yes ○ No		f) Fondaparinux	○ Yes ○ No
g) Bivalirudin	○ Yes ○ No		h) Aspirin	○ Yes ○ No
i) Prasugrel	○ Yes ○ No		k) Clopidogrel	○ Yes ○ No → First/ Load dose: ○ 75mg ○ 300mg ○ 600mg ○ ≥1200mg
j) Ticagrelor	○ Yes ○ No			
l) Others	○ Yes, specify: …….. ○ No			

4. Planned duration of DAPT: ○ 1 month ○ 6 months ○ >12 months ○ 3 months ○ 12 months ○ Not Available

5. Percutaneous entry: ☐ Brachial ☐ Femoral ☐ Radial ☐ Ulnar

6. Closure device: ○ No ○ Suture ○ Exoseal ○ Seal ○ Other, specify: _____

7. Coronary disease >50% stenosis: ☐ LAD ☐ LCx ☐ RCA ☐ Graft ☐ LMS

8. Fluoroscopy time: ☐☐☐ . ☐ minutes ☐ Not Available

9. Total dose: ☐☐☐☐☐ mGy ☐ Not Available

10. Contrast volume: ☐☐☐ ml ☐ Not Available

a. Patient Name:		b. MyKad/Other ID No.:		c. Date of Procedure:	

Instructions:
1. For skip lesion, please document as different lesions. Please check one lesion code per page (i.e. : for 2 lesions, please use 2 separate Section 7).
2. Documented Ramus Intermediate Lesions as lesion code 15.
3. For long lesion, please document as one single lesion.
4. Please document intervention involves side branch as a second lesion.

SECTION 7 : PCI PROCEDURE DETAILS *(Complete for ALL interventions. Please use one form per lesion treated)*

1. Total No. of lesion treated: *(Please use one form for one lesion treated)*

2. Dominance: ○ Left ○ Right ○ Co-dominance

3. Lesion code (1-25): ☐☐ to ☐☐ *(if applicable)*

4. Coronary lesion:
○ De novo ○ Restenosis *(no prior stent)*
○ Stent thrombosis → ○ Acute ○ Late ○ Sub Acute ○ Very Late
○ In stent restenosis
→ i. Duration: ☐☐ Year(s) ☐☐ Month(s) *(*Duration from the known previous procedure)* ○ Not available
ii. Prior stent type:
○ DES ○ BMS ○ BVS ○ Mg
○ Others, specify:……..
iii. Classification:
○ Class I *(Focal ISR)*
○ Class II *('Diffuse intrastent' ISR)*
○ Class III *('Diffuse proliferative' ISR)*
○ Class IV *(ISR with 'total occlusion')*

5. Lesion type: ○ A ○ B1 ○ B2 ○ C

6. Location in graft: (complete for graft PCI only)
○ Ostial ○ Native
○ Body ○ Anastomosis

7. Lesion description: *[if intervention involved bifurcation lesion, please record information of side branch (SB) using a separate form_ Section 7.1 A or B]*
☐ Ostial ☐ CTO>3mo ☐ Calcified lesion
☐ LMS ☐ Thrombus ☐ Not Applicable
☐ Bifurcation → a) ○ SB Treated ○ SB Not treated *(only if SB ≥ 2.0mm)*
b) Medina Classification:

i) MB prox.:	○ 0 ○ 1	ii) MB dist.:	○ 0 ○ 1
iii) SB1:	○ 0 ○ 1	iv) SB2:	○ 0 ○ 1

8. Pre PCI % of stenosis: ☐☐☐ % TIMI Flow (pre): ○ TIMI-0 ○ TIMI-1 ○ TIMI-2 ○ TIMI-3

9. Post PCI % of stenosis: ☐☐☐ % TIMI Flow (post): ○ TIMI-0 ○ TIMI-1 ○ TIMI-2 ○ TIMI-3

10. Estimated Lesion Length: ☐☐☐ mm

11. Perforation:
○ Yes ○ No
→ i) Classification
○ Type I *(extraluminal crater without extravasation)*
○ Type II *(pericardial or myocardial blushing)*
○ Type III *(perforation ≥1mm diameter with contrast streaming)*
○ Cavity spilling

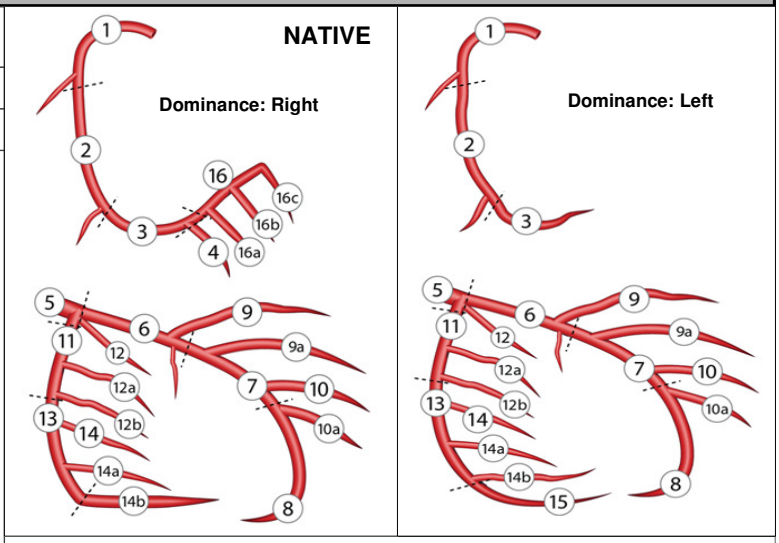
12. French Size:
(i) ○ Guiding catheter (ii) ○ Guiding sheath
(ii) ○ 4 ○ 5 ○ 6 ○ 7 ○ 8
○ Other, specify: …..
(iii) Types of guiding catheter:
……

13. Was lesion treated? ○ Yes ○ No

14. Lesion result: ○ Successful ○ Unsuccessful

15. Dissection: *(Post procedure)*
○ Yes → ○ Flow limiting ○ Non flow limiting
○ No

16. Slow Flow/ No reflow:
○ Yes → ○ Transient ○ Persistent
○ No



GRAFT
Graft PCI lesion codes 18-25. Also record grafted native coronary vessel

Graft	Target vessel	Graft	Target vessel	Graft	Target vessel
☐ 18 LIMA	☐☐	☐ 21 SVG2	☐☐	☐ 24 RAD2	☐☐
☐ 19 RIMA	☐☐	☐ 22 SVG3	☐☐	☐ 25 RAD3	☐☐
☐ 20 SVG1	☐☐	☐ 23 RAD1	☐☐		

17. Stent / DEB details per lesion: *(please refer instruction sheet for stent codes)*

	a. Stent code	Others, specify:	b. Diameter (mm)	c. Length (mm)
#1	☐☐☐	_____	☐.☐☐	☐☐
#2	☐☐☐	_____	☐.☐☐	☐☐
#3	☐☐☐	_____	☐.☐☐	☐☐
#4	☐☐☐	_____	☐.☐☐	☐☐
#5	☐☐☐	_____	☐.☐☐	☐☐
#6	☐☐☐	_____	☐.☐☐	☐☐

18. Maximum balloon:
a) Predilatation:
i) Size: ☐.☐☐ mm
ii) Types: ☐ Regular ☐ NC ☐ Cutting ☐ Scoring
b) Postdilatation:
i) Size: ☐.☐☐ mm
ii) Pressure: ☐☐ atm

19. Intracoronary devices used:
☐ IVUS ☐ OCT ☐ FFR ☐ Aspiration catheter ☐ POBA ☐ Micro catheter
☐ Angiojet ☐ Rotablator ☐ Extension catheter ☐ Coil ☐ Double Lumen micro catheter ☐ Others,specify: _____
☐ Embolic Protection → ○ Filter ○ Proximal

20. Other adjunctive procedure: ○ Yes → ☐ Ventilator ☐ Temporary Cardiac Pacing Wire ○ No

21. Circulatory support: ○ Yes → ☐IABP ☐Impella ☐ECMO ☐PCPS ○ No

22. Direct stenting: ○ Yes ○ No

a. Patient Name:		b. MyKad/Other ID No.:		c. Date of Procedure:	

SECTION 8 : PROCEDURAL COMPLICATION

1. Outcome:

a. Significant Periprocedural MI

○ Yes ○ No ○ Not Available

- ☐ Rise in CK/CKMB > x3 URL
- ☐ Rise in Troponin > x5 URL
- ☐ ECG changes

b. Emergency Reintervention / PCI

○ Yes ○ No ○ Not Available

i) Stent thrombosis	○ Yes ○ No	iv) Coronary perforation	○ Yes ○ No
ii) Dissection	○ Yes ○ No	v) New ischaemia	○ Yes ○ No
iii) Cardiac perforation	○ Yes ○ No	vi) Cardiac tamponade	○ Yes ○ No

c. Bail-out CABG	○ Yes	○ No
d. Cardiogenic shock	○ Yes	○ No
e. Arrhythmia (VT/VF/Brady)	○ Yes	○ No
f. TIA / Stroke	○ Yes	○ No
g. Tamponade	○ Yes	○ No
h. Contrast reaction	○ Yes	○ No
i. New onset / worsened heart failure	○ Yes	○ No
j. Worsening renal impairment *(rise of post procedural creatinine >25% from baseline)*	○ Yes	○ No

2. Vascular complications:

a. Bleeding	○ Yes ○ No ○ Minimal *(non-CNS bleeding, non-overt bleeding, < 3g/dL Hb)* ○ Minor *(non-CNS bleeding with 3-5g/dL Hb drop)* ○ Major *(any intracranial bleed or other bleeding ≥ 5g/dL Hb drop)* Bleeding site: ○ Retroperitoneal ○ Percutaneous entry site ○ Others, specify: ……
b. RBC/ Whole Blood Transfusion	○ Yes ○ No
c. Access site occlusion	○ Yes ○ No
d. Loss of radial pulse	○ Yes ○ No
e. Dissection	○ Yes ○ No
f. Pseudoaneurysm	○ Yes ○ No ○ Ultrasound compression ○ Surgery ○ Others, specify: ……
g. Perforation	○ Yes ○ No

SECTION 9 : IN-HOSPITAL OUTCOME

1. Outcome:

○ Alive →

a) Date of Discharge (dd/mm/yy): ☐☐ / ☐☐ / ☐☐

b) Medication:

	Yes	No		Yes	No
Aspirin	○	○	Statin	○	○
Clopidogrel	○	○	Beta Blocker	○	○
Ticlopidine	○	○	ACE inhibitor	○	○
Warfarin	○	○	ARB	○	○
Prasugrel	○	○	Other antiplatelet, specify:……	○	○
Ticagrelor	○	○	Others, specify: ……	○	○
NOAC	○	○			

○ Death →

a) Date of Death (dd/mm/yy): ☐☐ / ☐☐ / ☐☐

b) Primary cause of death:
○ Cardiac ○ Renal ○ Others, specify: ……
○ Infection ○ Neurological
○ Vascular ○ Pulmonary

c) Location of death: ○ In Lab ○ Out of Lab

○ Transferred to other hospital →

a) Date of Transfer (dd/mm/yy): ☐☐ / ☐☐ / ☐☐

b) Name of hospital: ……

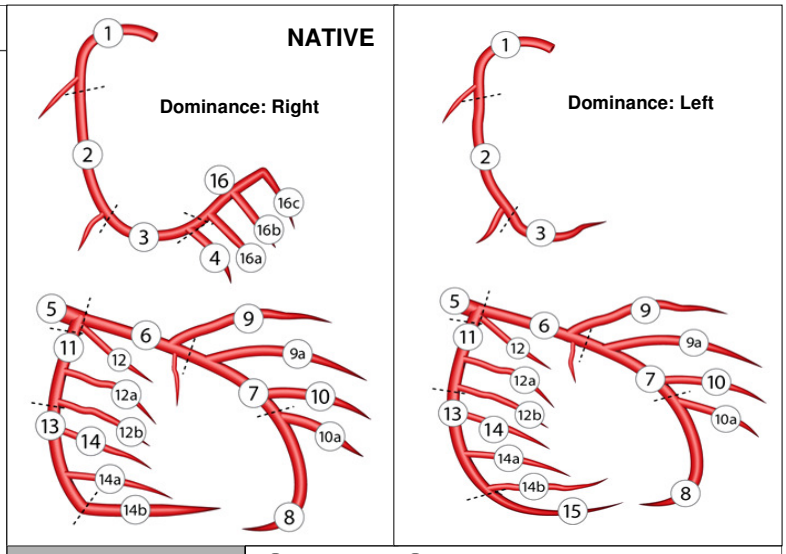
a. Patient Name:		b. MyKad/Other ID No.:		c. Date of Procedure:	

SECTION 7.1 A: ADVANCED PCI PROCEDURE DETAILS (NON LMS BIFURCATION LESION FOR SIDE BRANCH)

Instructions: 1. **Please fill up this section for when non LMS Bifurcation Side Branch treated.**
2. **If non LMS bifurcation side branch is <u>not treated</u>, please <u>fill up no. 1, 2, 3, 5, 7, 8, 9 and 10.</u>**

1. Lesion code (1-25): ☐☐ to ☐☐ *(if applicable)*

2. Coronary lesion:
- ◯ De novo
- ◯ Restenosis *(no prior stent)*
- ◯ Stent thrombosis → ◯ Acute ◯ Late ◯ Sub Acute ◯ Very Late
- ◯ In stent restenosis
  - i. Duration: ☐☐ Year(s) ☐☐ Month(s)
    - ◯ Not available
    - *(*Duration from the known previous procedure)*
  - ii. Prior stent type:
    - ◯ DES ◯ BMS ◯ BVS ◯ Mg
    - ◯ Others, specify:……..
  - iii. Classification:
    - ◯ Class I *(Focal ISR)*
    - ◯ Class II *('Diffuse intrastent' ISR)*
    - ◯ Class III *('Diffuse proliferative' ISR)*
    - ◯ Class IV *(ISR with 'total occlusion')*



3. Lesion description: ☐ CTO>3mo ☐ Calcified lesion ☐ Thrombus ☐ Not Applicable

4. Size SB (mm): ◯ 2.0 - 2.5 ◯ >2.5

5. Estimated lesion length: ☐☐☐ mm

6. Pre PCI % of stenosis: ☐☐☐ % TIMI Flow (pre): ◯ TIMI-0 ◯ TIMI-1 ◯ TIMI-2 ◯ TIMI-3

7. Post PCI % of stenosis: ☐☐☐ % TIMI Flow (post): ◯ TIMI-0 ◯ TIMI-1 ◯ TIMI-2 ◯ TIMI-3

8. Protect with wire: ◯ Yes ◯ No

9. Bifurcation techniques:

◯ 1 stent →
- ◯ Simple cross over
- ◯ Ostial Stenting
- ◯ Simple cross over with kissing balloon
- ◯ Simple cross over with drug eluting balloon side branch
- ☐ Proximal optimisation technique (POT)

◯ 2 stents →
- a. ◯ Planned ◯ Provisional
- b. ◯ Cullote ◯ Double kiss crush ◯ Crush ◯ Reverse crush ◯ Mini crush ◯ T ◯ Double barrel Y ◯ Small protrusion (TAP) ◯ Dedicated bifurcation stent ◯ V
- ☐ Proximal optimisation technique (POT)
- ◯ Others, specify: _____

10. Perforation: ◯ Yes ◯ No
- i) Classification
  - ◯ Type I *(extraluminal crater without extravasation)*
  - ◯ Type II *(pericardial or myocardial blushing)*
  - ◯ Type III *(perforation ≥1mm diameter with contrast streaming)*
  - ◯ Cavity spilling

11. Lesion result: ◯ Successful ◯ Unsuccessful

12. Dissection (Post Procedure): ◯ Yes → ◯ Flow limiting ◯ Non flow limiting ◯ No

13. Slow Flow/ No reflow: ◯ Yes → ◯ Transient ◯ Persistent ◯ No

14. Final Kissing: ◯ Yes ◯ No ◯ Failed

15. Stent / DEB details per lesion: *(please refer instruction sheet for stent codes)*

	a. Stent code	Others, specify:	b. Diameter (mm)	c. Length (mm)
#1	☐☐☐	_____	☐.☐☐	☐☐
#2	☐☐☐	_____	☐.☐☐	☐☐
#3	☐☐☐	_____	☐.☐☐	☐☐

16. Maximum balloon:
- a) Predilatation:
  - i) Size: ☐.☐☐ mm
  - ii) Types: ☐ Regular ☐ NC ☐ Cutting ☐ Scoring
- b) Postdilatation:
  - i) Size: ☐.☐☐ mm
  - ii) Pressure: ☐☐ atm

17. Intracoronary devices used:
- ☐ IVUS
- ☐ OCT
- ☐ FFR
- ☐ Aspiration catheter
- ☐ POBA
- ☐ Micro catheter
- ☐ Angiojet
- ☐ Rotablator
- ☐ Extension catheter
- ☐ Coil
- ☐ Double Lumen micro catheter
- ☐ Others,specify: _____

a. Patient Name:		b. MyKad/Other ID No.:		c. Date of Procedure:	

SECTION 7.1 B: ADVANCED PCI PROCEDURE DETAILS (FOR LEFT MAIN STEM)

1. LMS intervention:	○ Unprotected ○ Protected	**2. Location:**	☐ Ostial ☐ Mid ☐ Distal & Bifurcation
3. IVUS guided:	○ Yes ○ No	**4. OCT guided:**	○ Yes ○ No
5. CSA intervention:	**a. Pre:** ☐☐.☐ mm²	**b. Post:**	☐☐.☐ mm²
6. Side branch wire protected:	○ Yes ○ No	**7. Final kissing:**	○ Yes ○ No ○ Failed

8. Techniques:

○ 1 stent
- ○ Simple cross over
- ○ Ostial Stenting
- ○ Simple cross over with kissing balloon
- ○ Simple cross over with drug eluting balloon SB

○ 2 stents
- a. ○ Planned ○ Provisional
- b. ○ Cullote ○ Crush ○ Mini crush ○ Double barrel Y ○ Dedicated bifurcation stent ○ Others, specify: _____
  ○ Double kiss crush ○ Reverse crush ○ Small protrusion (TAP) ○ T ○ V

Instructions: **1. Please fill up this section for Distal & Bifurcation.**
2. If not treated, please fill up no. 1, 2, 3, 5, 7, 8, 9 and 10.

1. Lesion code (1-25): ☐☐ to ☐☐ *(if applicable)*

2. Coronary lesion:
- ○ De novo
- ○ Restenosis *(no prior stent)*
- ○ Stent thrombosis → ○ Acute ○ Late ○ Sub Acute ○ Very Late
- ○ In stent restenosis
  - i. Duration: ☐ Year(s) ☐ Month(s) *(*Duration from the known previous procedure)* ○ Not available
  - ii. Prior stent type: ○ DES ○ BMS ○ BVS ○ Mg ○ Others, specify:……..
  - iii. Classification:
    - ○ Class I *(Focal ISR)*
    - ○ Class II *('Diffuse intrastent' ISR)*
    - ○ Class III *('Diffuse proliferative' ISR)*
    - ○ Class IV *(ISR with 'total occlusion')*

3. Lesion description: ☐ CTO>3mo ☐ Calcified lesion ☐ Thrombus ☐ Not Applicable

4. Size SB (mm): ○ 2.0 - 2.5 ○ >2.5

5. Estimated lesion length: ☐☐☐ mm

6. Pre PCI % of stenosis: ☐☐☐ % TIMI Flow (pre): ○ TIMI-0 ○ TIMI-1 ○ TIMI-2 ○ TIMI-3

7. Post PCI % of stenosis: ☐☐☐ % TIMI Flow (post): ○ TIMI-0 ○ TIMI-1 ○ TIMI-2 ○ TIMI-3

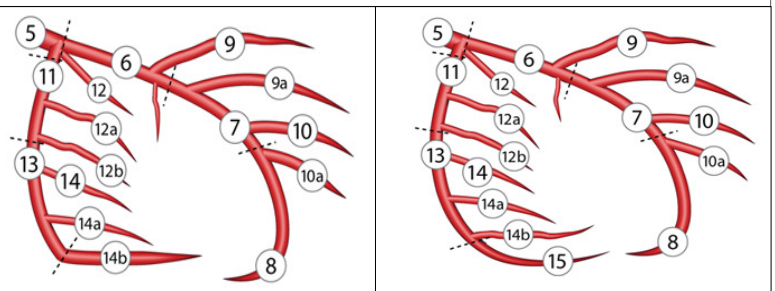
8. Protect with wire: ○ Yes ○ No

9. Bifurcation techniques:

○ 1 stent →
- ○ Simple cross over
- ○ Ostial Stenting
- ○ Simple cross over with kissing balloon
- ○ Simple cross over with drug eluting balloon side branch
- ☐ Proximal optimisation technique (POT)

○ 2 stents →
- a. ○ Planned ○ Provisional
- b. ○ Cullote ○ Crush ○ Mini crush ○ Double barrel Y ○ Dedicated bifurcation stent ○ V ○ Double kiss crush ○ Reverse crush ○ T ○ Small protrusion (TAP)
- ☐ Proximal optimisation technique (POT)
- ○ Others, specify: _____

Dominance: Right **NATIVE** **Dominance: Left**



10. Perforation: ○ Yes ○ No
- i) Classification
  - ○ Type I *(extraluminal crater without extravasation)*
  - ○ Type II *(pericardial or myocardial blushing)*
  - ○ Type III *(perforation ≥1mm diameter with contrast streaming)*
  - ○ Cavity spilling

11. Lesion result: ○ Successful ○ Unsuccessful

12. Dissection: (Post Procedure): ○ Yes → ○ Flow limiting ○ Non flow limiting ○ No

13. Slow Flow/ No Reflow: ○ Yes → ○ Transient ○ Persistent ○ No

14. Final Kissing: ○ Yes ○ No ○ Failed

15. Stent / DEB details for lesion: *(please refer instruction sheet for stent codes)*

	a. Stent code	Others, specify:	b. Diameter (mm)	c. Length (mm)
#1	☐☐☐	_____	☐.☐☐	☐☐
#2	☐☐☐	_____	☐.☐☐	☐☐
#3	☐☐☐	_____	☐.☐☐	☐☐

16. Maximum balloon:
- a) Predilatation:
  - i) Size: ☐.☐☐ mm
  - ii) Types: ☐ Regular ☐ NC ☐ Cutting ☐ Scoring
- b) Postdilatation:
  - i) Size: ☐.☐☐ mm
  - ii) Pressure: ☐☐ atm

17. Intracoronary devices used:
- ☐ IVUS
- ☐ OCT
- ☐ FFR
- ☐ Aspiration catheter
- ☐ POBA
- ☐ Micro catheter
- ☐ Angiojet
- ☐ Rotablator
- ☐ Extension catheter
- ☐ Coil
- ☐ Double Lumen micro catheter
- ☐ Others,specify: _____

a. Patient Name:		b. MyKad/Other ID No.:		c. Date of Procedure:	

SECTION 7.1 C: ADVANCED PCI PROCEDURE DETAILS (FOR CTO >3 months)

1. CTO characteristics:	**i. Estimated length of CTO (mm):**	◯ < 20	◯ ≥ 20	
	ii. Side branches *(within 3mm of entry)*:	◯ Yes	◯ No	
	iii. Entry site:	◯ Blunt	◯ Tapered	
	iv. Calcification:	◯ Yes	◯ No	
	v. Bridging collaterals:	◯ Yes	◯ No	
	vi. Tortuosity/ Bend > 45°:	◯ Yes	◯ No	
	vii. Re-attempt lesion:	◯ Yes	◯ No	
	viii. JCTO Score:		*(autocalculated)*	
	ix. Duration of CTO:		◯ Months or ◯ Years ◯ Not Available	
2. Guide size:	◯ 5F ◯ 6F ◯ 7F ◯ 8F	**3. Contralateral injections:**	◯ Yes ◯ No	
4. IVUS guided:	◯ Yes ◯ No	**5. CTA guided:**	◯ Yes ◯ No	
6. Approach	☐ Antegrade: ☐ Single wire ☐ Parallel wire ☐ Anchor wire ☐ Anchor balloon ☐ STAR ☐ Others, specify: _____	☐ Retrograde:	☐ CART ☐ Reverse CART ☐ Knuckle wire ☐ Kissing wire technique ☐ Others, specify:_____	
7. Name of wires: *(please follow the sequence)*	1) _____ 2) _____ 3) _____ 4) _____	5) _____ 6) _____ 7) _____ 8) _____		
8. Name of wire that crossed:				
9. Other devices:	☐ Over the wire balloon ☐ Rapid exchange balloon ☐ Microcatheter ☐ Extension catheter	☐ Cosair ☐ Tornus ☐ Rotablator ☐ CrossBoss	☐ Re-entry devices: → ◯ Stingray ◯ Double lumen micro catheter ☐ Others, specify:	
10. Result:	◯ Failed attempt	◯ Lesion crossed →	◯ Only wire crossed	◯ Successful PCI
11. Complication:	**i. Perforation:** ◯ Yes → ☐ Wire ☐ Balloon ☐ Stent ☐ Guiding catheter		◯ No	

a. Patient Name:		b. MyKad/Other ID No.:		c. Date of Procedure:	

SECTION 7.1 D: ADVANCED PCI PROCEDURE DETAILS (FOR CALCIFIED LESION)

1. Angiography severity:

- ◉ None *(no radiopacity)*
- ◉ Mild *(densities noted only after contrast injection)*
- ◉ Moderate *(radiopacities noted only during the cardiac cycle before contrast injection)*
- ◉ Severe *(radiopacities noted without cardiac motion before contrast injection)*

2. IVUS assessment:

- ◉ Yes → Findings:
  - i) Arc of calcium (degree): ◉ <90 ◉ 91— 180 ◉ 181— 270 ◉ 271— 360
  - ii) Length of calcium (mm): ◉ ≤ 5 ◉ 6— 10 ◉ ≥ 11
  - iii) Location of calcium: ◉ Superficial only ◉ Deep only ◉ Superficial + Deep
- ◉ No

3. Predilatation:

- ☐ Compliant Balloon
- ☐ Cutting Balloon
- ☐ Tornus
- ☐ Others, specify: ……..
- ☐ Non Compliant Balloon
- ☐ Scoring Balloon
- ☐ Rotablator →
  - a) No of Burr: ☐
  - b) Burr size: i) ☐ . ☐☐ mm
  - ii) ☐ . ☐☐ mm
  - iii) ☐ . ☐☐ mm

NATIONAL CARDIOVASCULAR DISEASE DATABASE (PCI REGISTRY) FOLLOW UP FORM

For NCVD Use only:
Centre: ____
ID: ____

Instruction: This form is to be completed at patient follow up *after* 30 days, 6 months or 12 months of 1st admission. Where check boxes ☐ are provided, please check (√) one or more boxes. Where radio buttons ◯ are provided, check (√) only one option.

A. Reporting Centre			
B. Patient Name:			
C. Identification Card Number:	MyKad: ☐☐☐☐☐☐ - ☐☐ - ☐☐☐☐	Old IC No.	
	Other ID Document No.	*Specify type :* (eg. passport, armed force ID)	
D. Type of Follow Up:	◯ 30 days ◯ 6 months ◯ 12 months	**E. Date of Follow Up:** (dd/mm/yy)	☐☐ / ☐☐ / ☐☐

SECTION 1: OUTCOME

1. Outcome:

◯ Alive →

a) Medication:

	Yes	No		Yes	No		Yes	No
Aspirin	◯	◯	ACE inhibitor	◯	◯	NOAC	◯	◯
Clopidogrel	◯	◯	ARB	◯	◯	Other antiplatelet, specify: ……	◯	◯
Ticlopidine	◯	◯	Warfarin	◯	◯			
Statin	◯	◯	Prasugrel	◯	◯	Others, specify ……	◯	◯
Beta blocker	◯	◯	Ticagrelor	◯	◯			

◯ Death →

a) Date of Death (dd/mm/yy): ☐☐ / ☐☐ / ☐☐

b) Cause of death: ◯ Cardiac ◯ Non cardiac ◯ Others, specify: ……..

◯ Transferred to other hospital →

a) Date of Transfer (dd/mm/yy): ☐☐ / ☐☐ / ☐☐

b) Name of hospital: ……..

◯ Lost to follow up →

a) Date of last follow up (dd/mm/yy): ☐☐ / ☐☐ / ☐☐

2. Has patient stopped smoking? ◯ Yes (quit >30 days) ◯ No ◯ Not Applicable

SECTION 2: READMISSION (within the follow up duration)

1. Has patient been readmitted to hospital? ◯ Yes ◯ No ◯ No information available

1. Date of readmission: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) **Readmission location:**	**Readmission reason:** ◯ Non cardiac ◯ CHF ◯ Recurrent angina ◯ Arrhythmia ◯ ACS → ◯ STEMI ◯ NSTEMI ◯ UA ◯ Staged revascularization → ◯ PCI ◯ CABG	**CCS:** ◯ Asymptomatic ◯ CCS 1 ◯ CCS 2 ◯ CCS 3 ◯ CCS 4 ◯ Not Available	**Angiography:** ◯ Yes ◯ No ◯ Not Applicable
2. Date of readmission: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) **Readmission location:**	**Readmission reason:** ◯ Non cardiac ◯ CHF ◯ Recurrent angina ◯ Arrhythmia ◯ ACS → ◯ STEMI ◯ NSTEMI ◯ UA ◯ Staged revascularization → ◯ PCI ◯ CABG	**CCS:** ◯ Asymptomatic ◯ CCS 1 ◯ CCS 2 ◯ CCS 3 ◯ CCS 4 ◯ Not Available	**Angiography:** ◯ Yes ◯ No ◯ Not Applicable
3. Date of readmission: ☐☐ / ☐☐ / ☐☐ (dd/mm/yy) **Readmission location:**	**Readmission reason:** ◯ Non cardiac ◯ CHF ◯ Recurrent angina ◯ Arrhythmia ◯ ACS → ◯ STEMI ◯ NSTEMI ◯ UA ◯ Staged revascularization → ◯ PCI ◯ CABG	**CCS:** ◯ Asymptomatic ◯ CCS 1 ◯ CCS 2 ◯ CCS 3 ◯ CCS 4 ◯ Not Available	**Angiography:** ◯ Yes ◯ No ◯ Not Applicable