



STEMI IN INDONESIA: **Social-Economics & Demographic Challenges**

Ismir Fahri, MD
Indonesian Heart Association/
Indonesian Society of Interventional Cardiology
Indonesia

Disclosure

- No disclosure

INDONESIA

SOCIAL-ECONOMIC AND DEMOGRAPHIC

INDONESIAN POPULATION IN 2020

INDONESIA



34 Provinces
514 Regencies
More than
82,000 Villages
Spread over more than
17,000 island

273,523,621 Population
69,438,887 Household
1,815 Ethnic
2,542 Language

- MIDDLE INCOME COUNTRY
- 60% POPULATION LIVES IN JAVA
- TRANSITION FROM CD TO NCD
- HEALTH STATUS IMPROVEMENT

HEALTH SYSTEM IN INDONESIA : Challenges

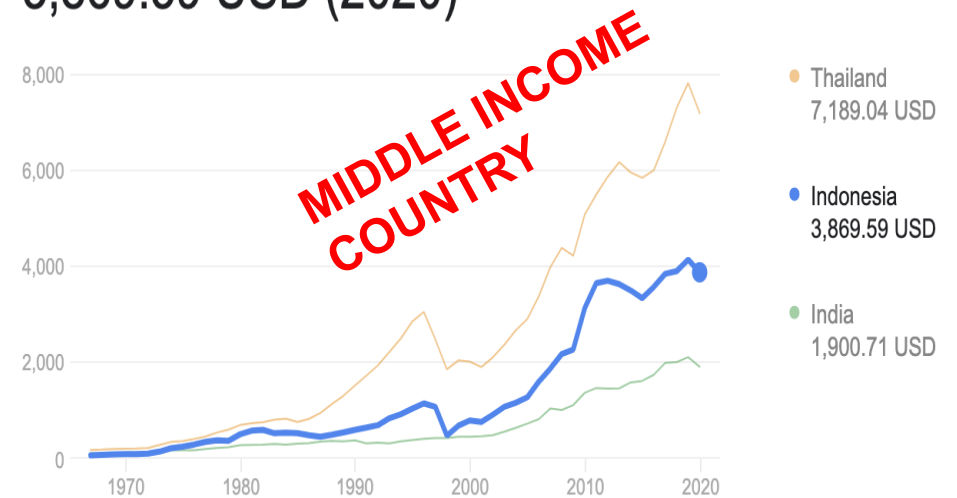
Geographic & Infrastructure



Economic / GDP :

Indonesia / GDP per capita

3,869.59 USD (2020)

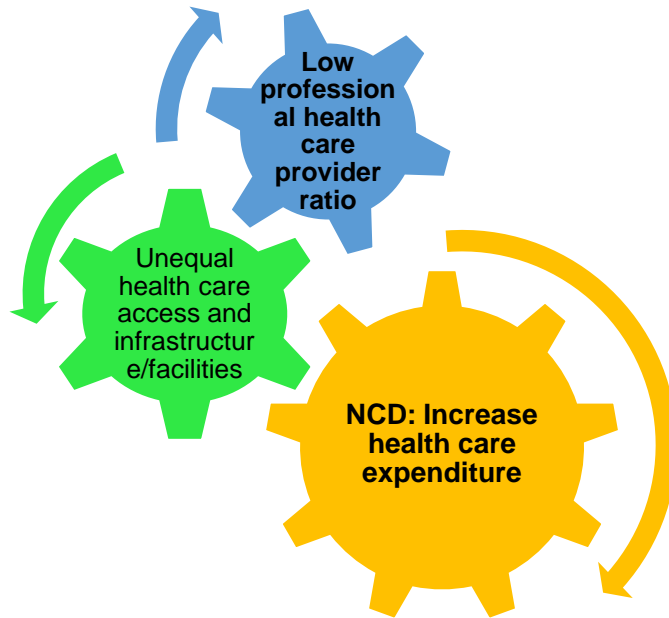


Sources include: World Bank

Feedback

Improving Health Care System in Indonesia

Challenges:



Strategy:

**Universal Health Program :
The National Health Insurance program**

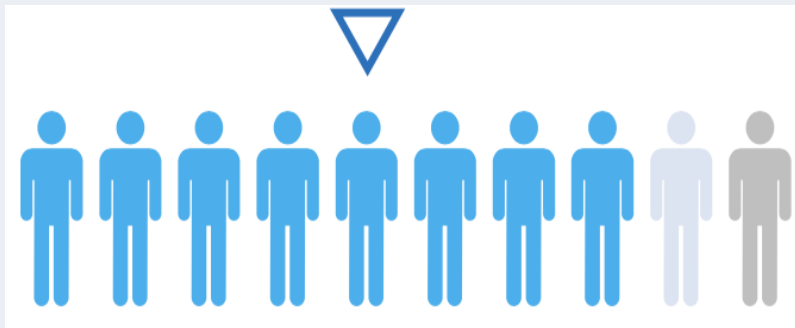


UNIVERSAL HEALTH PROGRAM IN INDONESIA

Coverage of universal health program participation

(until Dec 2021)

Milion inhabitants



86,59% of the total population

* Total population in Indonesia: 273,523,621 inhabitants

The National Health Insurance Fee :

- Class III : 2.97 USD/month
- Class II : 6.97 USD/month
- Class I : 10.45 USD/month

Healthcare cost proportion



2,810
Hospital



23,608
Primary healthcare provider



UNIVERSAL HEALTH PROGRAM IN INDONESIA

Number of Cases and Cost of Catastrophic Diseases:
Inpatient January-June 2014 (6 months)

Case Number	Cost (USD)	Disease
232,010	134,821,667	Cardiac
172,303	55,600,810	Stroke
138,779	55,600,810	Kidney
70,584	23,232,524	Diabetes
56,033	23,192,193	Cancer
53,948	12,951,916	Thalassemia
12,170	5,277,811	Hemophilia

Catastrophic Inpatient
735,827 case

Main NCD
6 billion USD/year

ACS estimation :
222.3/100.000/year :
608.043 cases/year

STEMI Cases estimation:
296.725 cases/year

↓

STEMI direct cost est:
3,426 ± 875 USD/Case

=

GDP:
3,869 USD

Ref: Singapore Myocardial Infarction Registry Report No.2, Trends in Acute Myocardial Infarction in Singapore 2007-2012
One ACS Registry, Indonesia 2019

National Health Coverage Reimbursement

Reimbursement depend on case severity and hospital level of services

Primary PCI

Primary PCI Reimbursement (Procedure & Admission)	National Cardio-vascular Center	Type B Private Hospital
Minimum Reimbursement	3,414 USD	2,555 USD
Maximum Reimbursement	7,343 USD	3,476 USD

Fibrinolytics

Fibrinolysis Reimbursement (Procedure & Hospitalization)	National Cardio-vascular Center	Type B Private Hospital	Type C Private Hospital	Type D Private Hospital
Minimum Reimbursement	829 USD	481 USD	414 USD	249 USD
Maximum Reimbursement	1,629 USD	1,025 USD	644 USD	493 USD

PCI: Percutaneous Coronary Intervention

Streptokinase (drug only): 280 USD; Alteplase (drug only): 560 USD

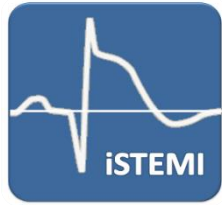
Permenkes 59/2014 on the Healthcare Standard Tariff, Universal Health Coverage/National Health Insurance (JKN) Indonesia Case Based Groups (INA-CBGs), Social Security Management Agency (BPJS)

Cardiac Catheterization Lab in Indonesia (2019)



● Number of Cardiac Catheterization Lab
Total: 292 Cath Labs in 250 hospitals

■ Number of Cardiologist & Interventional
Total : Cardiologist : 1245 (2019)
Interventional : 208 (2019)



Global STEMI & NCC-HK Meeting

April 2014

**Jakarta ACS Registry
(2008-2010)**

24 hours Call center –

Preliminary Survey- Jakarta
Area: 740.3 km² /Population: 11 million (15.000/km²)



Estimated AMI in Jakarta

24,453 case per-year

Late presenter (> 12 hours) :
53.1%

Inter-hospital Referral: 61%

Dharma S, Juzar DA, Firdaus I et al. Neth Heart J 2012;20: 254-259)

Population: 2,260,825
Area: 127.11 km²

- AMI Incidence Rate 222.3/100.000 per-year
= $2.260.825/100.000 \times 222,3 = 5026$
- Approximately 5026 AMI case per-year

Ref: Singapore Myocardial Infarction Registry Report No.2,
Trends in Acute Myocardial Infarction in Singapore 2007-2012

Increasing Awareness with Standardized Local Protocol



Langkah Penanganan Nyeri Dada iSTEMI

Puskesmas / Rumah Sakit: _____

Tanggal: ____/____/2014 Pulut: _____ Nama DPJP: _____

Nama Pasien: _____ No. RM: _____

Alamat: _____ Tanggal Lahir: ____/____/____

No. Telepon: _____ Laki-laki Perempuan

- KONFIRMASI DIAGNOSIS SKA**
 - Nyeri dada sifat timbul/dada terasa tidak nyaman
 - Lama 20 menit
 - Timbul saat istirahat
 - Nyeri dada pertama kali dengan aktivitas ringan
 - Perasaan tidak nyaman/tegang/tekanan/tekanan/tekanan
 - Disertai keringat dingin/mual
- TATALAKSANA URGSI DAN PEMBERIAN TERAPI ANTITROMBOTIK**
 - Tekanan Darah: _____ mmHg
 - Gula Darah: _____ mmol/L
 - Hb: _____ g/dl
 - Kreatinin: _____ mg/dl
 - Asam Urat: _____ mg/dl
 - Analisis Urin: _____
 - EKG: _____
 - Aspirin 100-320 mg (kecuali alergi)
 - Clopidogrel 300 mg awal
 - Prasugrel 100 mg
 - Nitroglycerin 1-2 mg
- KONFIRMASI INDIKSI UNTUK RPP BRUJUS**
 - Awitan < 12 jam
 - Elevasi segmen ST persoran 2 mm di 2 leadapan beradialis
 - QRS disosiasi
- PEMILIHAN**

Waktu Pengiriman EKG: _____

Waktu Konfirmasi EKG: _____

Heartline: _____

Tel: 021-2942474 / Fax: 021-2942474

istemi@istemi.com

PIN IS: 25485881

Hentikan Serangan Jantung Setiap Detik Berharga.

30 menit atau kurang - Tatalaksana harus dimulai sejak awal gejala serangan jantung

3 jam atau kurang - Jika pembuluh darah tersumbat total, tindakan reperfusi harus segera dilakukan di rumah sakit untuk membuka kembali pembuluh darah tersebut.

3 jam atau kurang - Jika pembuluh darah tersumbat total, tindakan reperfusi harus segera dilakukan di rumah sakit untuk membuka kembali pembuluh darah tersebut.

• Trombolisis ("panghancu bekuhan darah") - Obat pelen yang diberikan untuk menghancurkan bekuhan darah

• Angioplasti Koroner - prosedur invasif minimal untuk mengevakuasi kondisi jantung, pembuluh

Block in Artery

Muscle Damage

Heart Attack

Trombolisis

Angioplasti

Hentikan Serangan Jantung Selamatkan Nyawa Orang Terdekat Anda

Gejala serangan jantung bervariasi, antara lain:

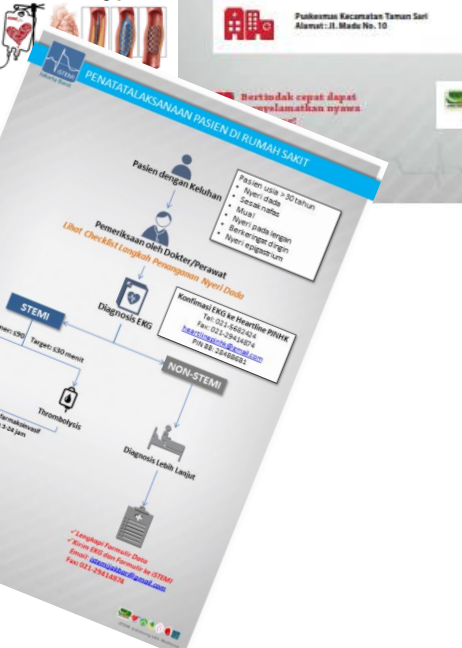
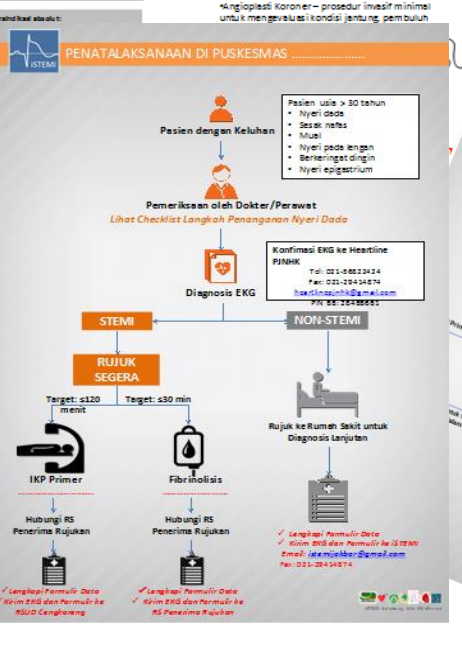
- Rasa tertindih yang tidak nyaman, demam, rasa penuh atau nyeri di tengah dada yang berlangsung lebih dari beberapa menit atau hilang timbul
- Nyeri menjalar atau rasa tidak nyaman di salah satu atau kedua lengan, punggung, leher, rahang atau perut
- Sesak nafas, mungkin disertai rasa tidak nyaman di dada
- Keringat dingin, mual atau pusing
- Rasa lelah yang tidak biasa tanpa sebab, terkadang selama beberapa hari

PERTOLONGAN:

- Pasokan Kacamata Tamam Sari
- Alamat: Jl. Meda No. 10

• Bertindak cepat dapat menyelamatkan nyawa

istemi didukung oleh Medtronic

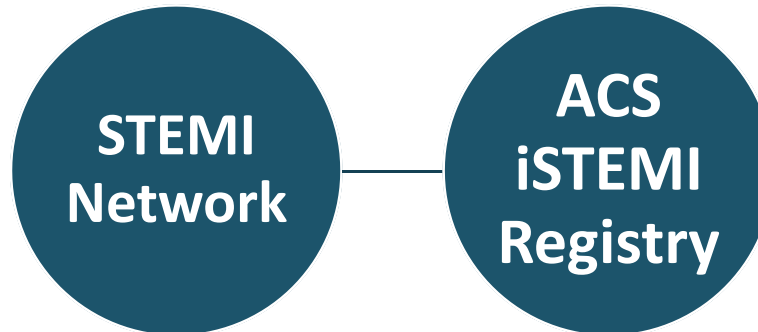


1 Alignment Meeting
3 iSTEMI Trainings



iSTEMI Program

*Managed by Indonesian Heart Association (IHA)
Working Group Acute Cardiovascular Care (ACC) &
Indonesian Society of Interventional Cardiology (ISIC)*





iSTEMI Network

Vision

Reperfusion for all STEMI patients

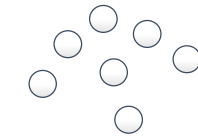
Mission

To increase community awareness of cardiovascular heart disease especially acute coronary syndrome

To develop a healthcare facility network for acute coronary syndrome especially STEMI from downstream to upstream

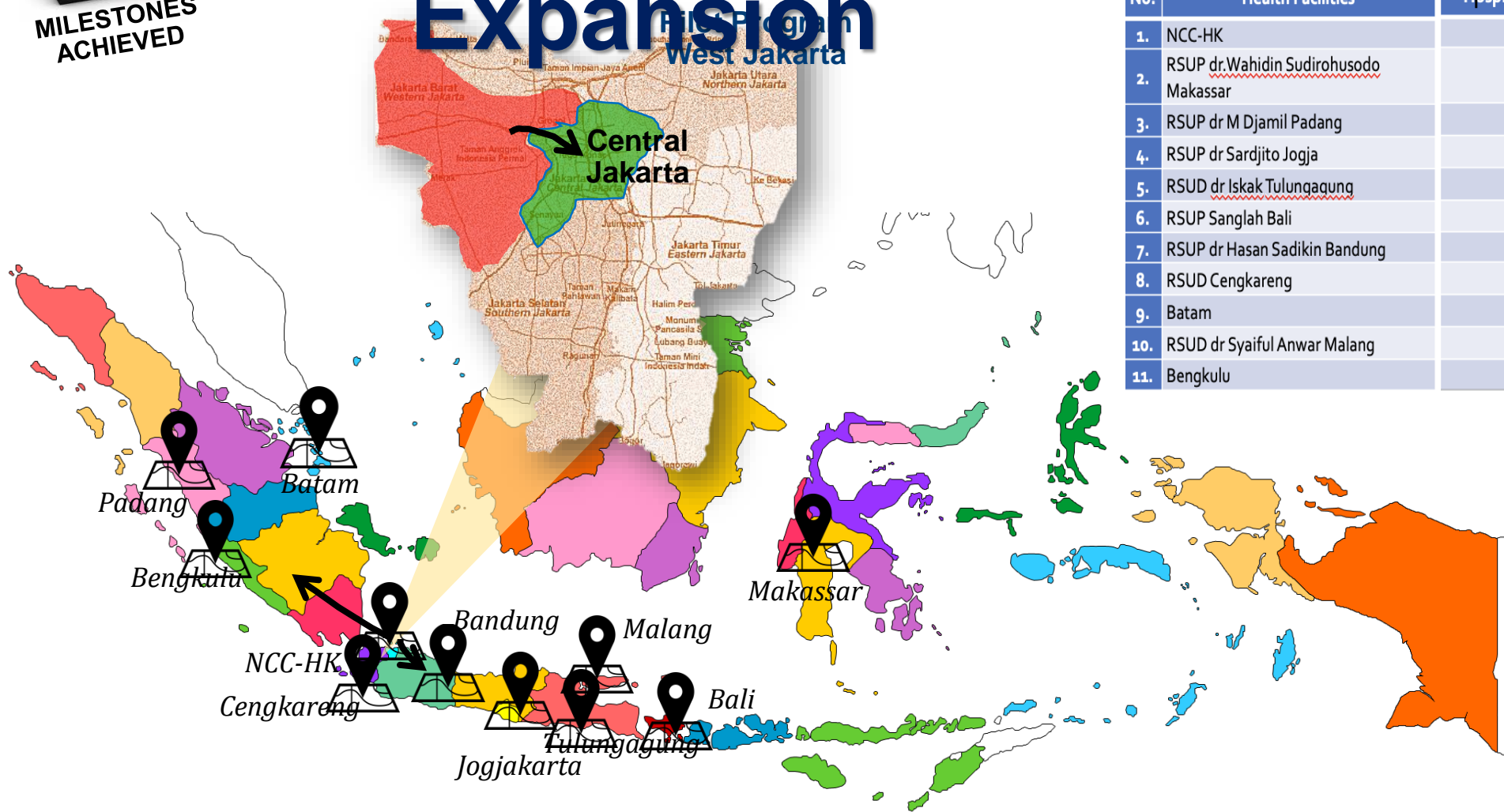
To create strategic breakthrough to increase STEMI reperfusion

To shorten First Medical Contact (FMC) to reperfusion for STEMI patients





iSTEMI Expansion



No.	Health Facilities	Hospital Types
1.	NCC-HK	A
2.	RSUP dr. Wahidin Sudirohusodo Makassar	A
3.	RSUP dr M Djamil Padang	A
4.	RSUP dr Sardjito Jogja	A
5.	RSUP dr Iskak Tulungagung	B
6.	RSUP Sanglah Bali	A
7.	RSUP dr Hasan Sadikin Bandung	A
8.	RSUD Cengkareng	B
9.	Batam	B
10.	RSUD dr Syaiful Anwar Malang	A
11.	Bengkulu	B

*Batam: RS Otorita Batam, RS Awal Bros Batam, RS Santa Elizabeth Batam

*Bengkulu: RSUD dr M Yunus Bengkulu, RS Rafflesia Bengkulu

ACS Patient's Characteristic

in 11 Centers One ACS Registry

Characteristics	STEMI (n=3725)	NSTEMI/UAP (n=3909)	P-Value
Gender - Male	83.5%	70.5%	< 0.001
Age	57 (20-95)	60 (18-95)	< 0.001
Insurance Status			
• BPJS PBI	31.9 %	24.1 %	< 0.001
• BPJS Non PBI	54.9 %	67.8 %	
• Personal	12.6 %	6.8 %	
• Company Insurance	0.6 %	1.2 %	
Symptoms			
• Chest pain	92.7 %	84.6 %	< 0.001
• Autonomic symptoms	79.8 %	62.8 %	< 0.001
• Lasting > 20 minutes	82.7 %	76.1 %	< 0.001
• New onset of angina	72.0 %	45.4 %	< 0.001
• Referred pain	53.5 %	42.7 %	< 0.001
• Dyspnea	26.7 %	42.0 %	< 0.001

Characteristics	STEMI (n=3725)	NSTEMI/UAP (n=3909)	P Value
Risk Factors			
• Smoking	65.7 %	48.4 %	< 0.001
• Hypertension	51.5 %	67.3 %	< 0.001
• Diabetes Mellitus	27.8 %	36.6 %	< 0.001
• Dyslipidemia	13.7 %	20.2 %	< 0.001
• Family history	5.7 %	7.0 %	0.031
CV Co Morbidities			
• Prior Asthma/COPD	1.7 %	2.3 %	0.061
• Prior CABG	0.1 %	3.8 %	< 0.001
• Prior AMI	8.3 %	34.5 %	< 0.001
• Prior Heart Failure	5.1 %	20.2 %	< 0.001
• Prior Peripheral Vascular Disease	0.4 %	1.0 %	0.005
• Prior Cerebrovascular	4.5 %	4.0 %	0.315
• Prior PCI	3.8 %	18.5 %	< 0.001

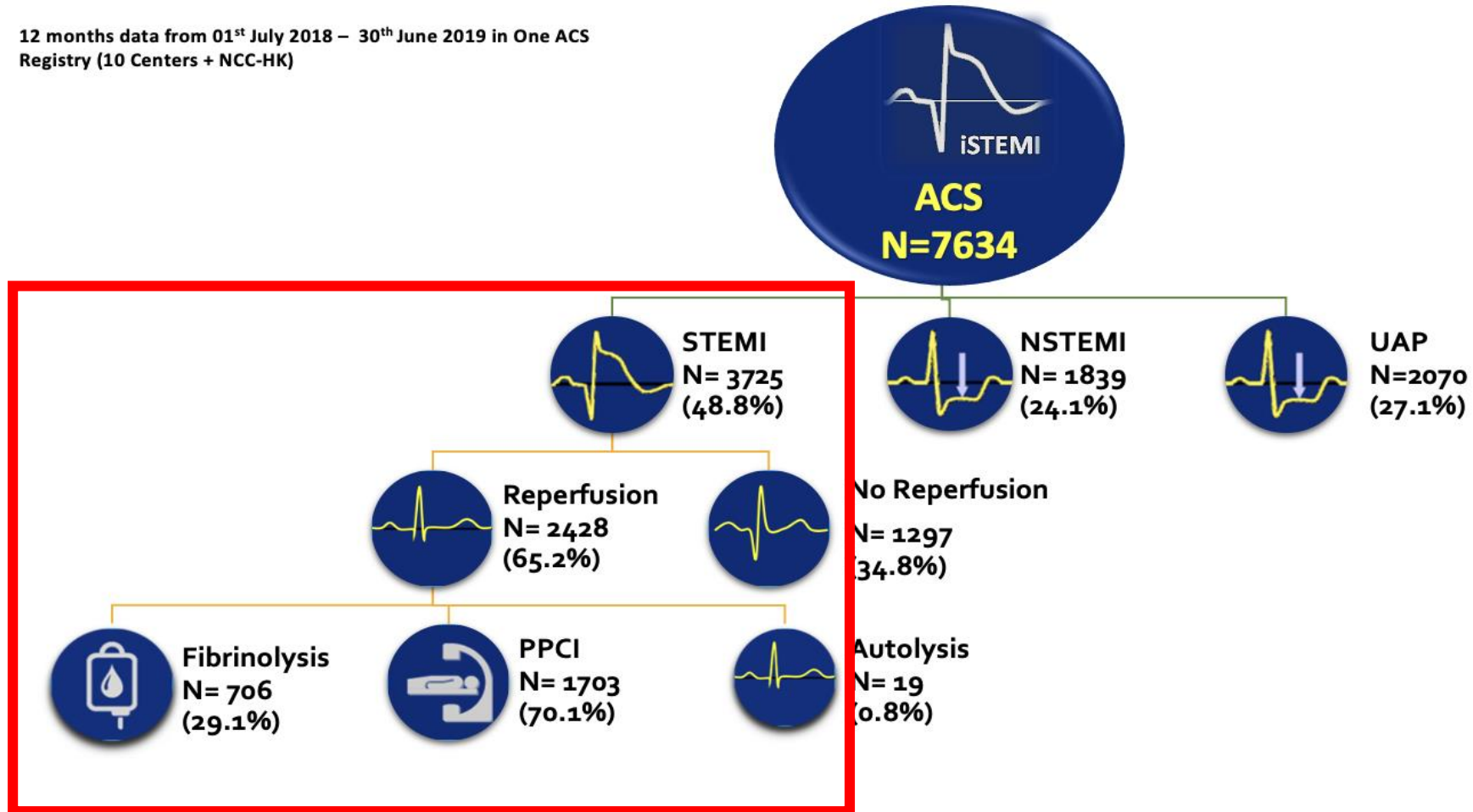
12 months data from 01st July 2018 – 30th June 2019 in One ACS Registry (10 Centers + NCC-HK)

12 months data from 01st July 2018 – 30th June 2019 in One ACS Registry (10 Centers + NCC-HK)

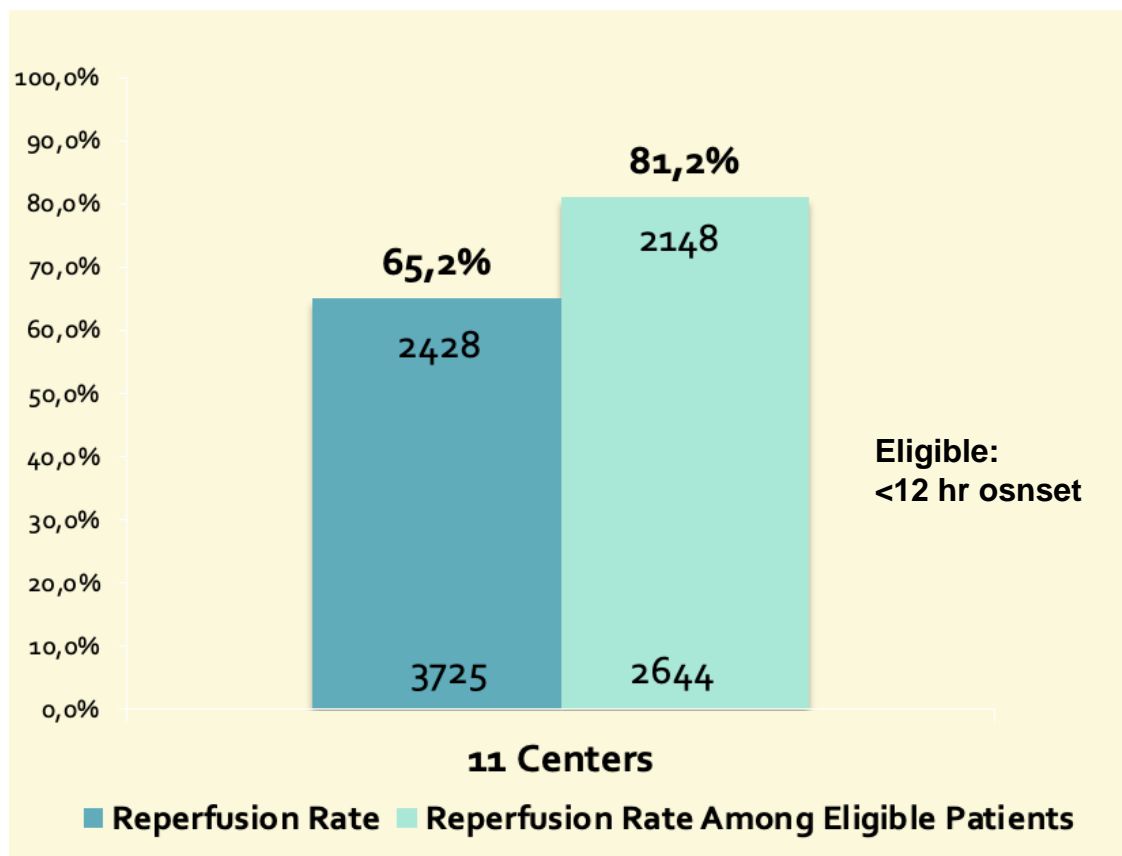
One ACS Registry

11 Centers

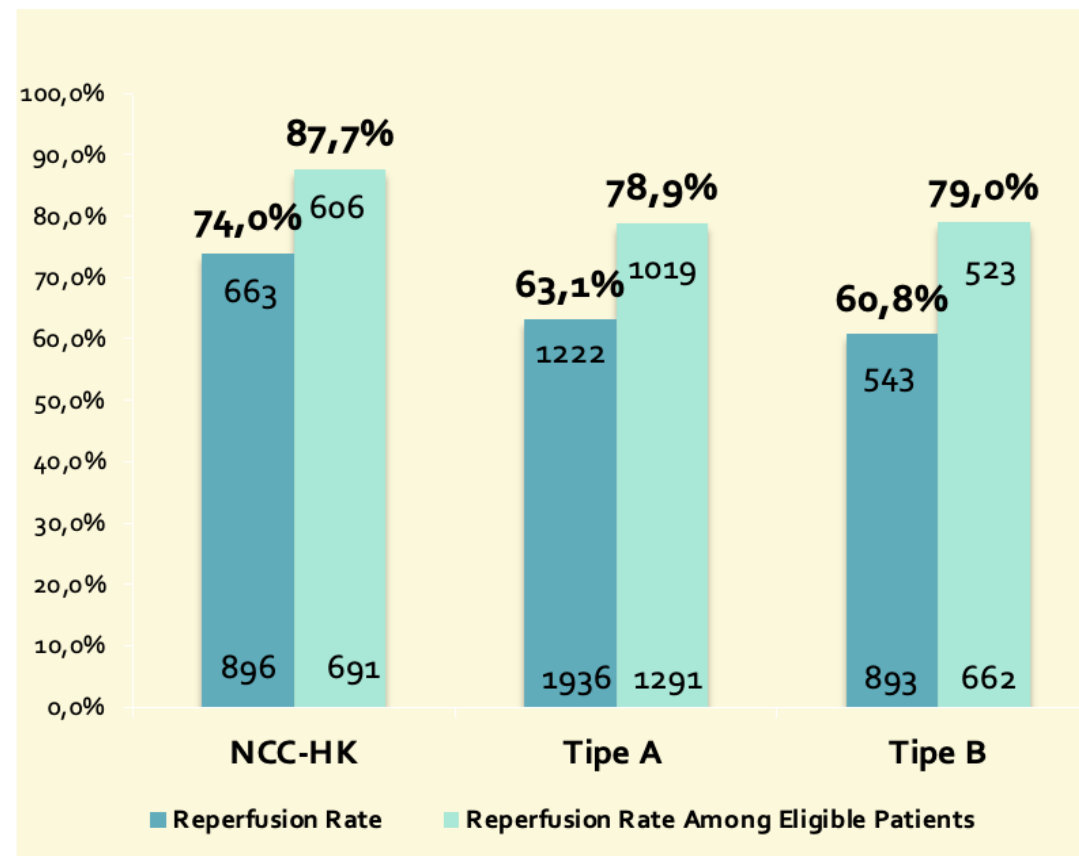
12 months data from 01st July 2018 – 30th June 2019 in One ACS Registry (10 Centers + NCC-HK)



STEMI Reperfusion Rate Among Eligible Patients in 11 Centers One ACS Registry



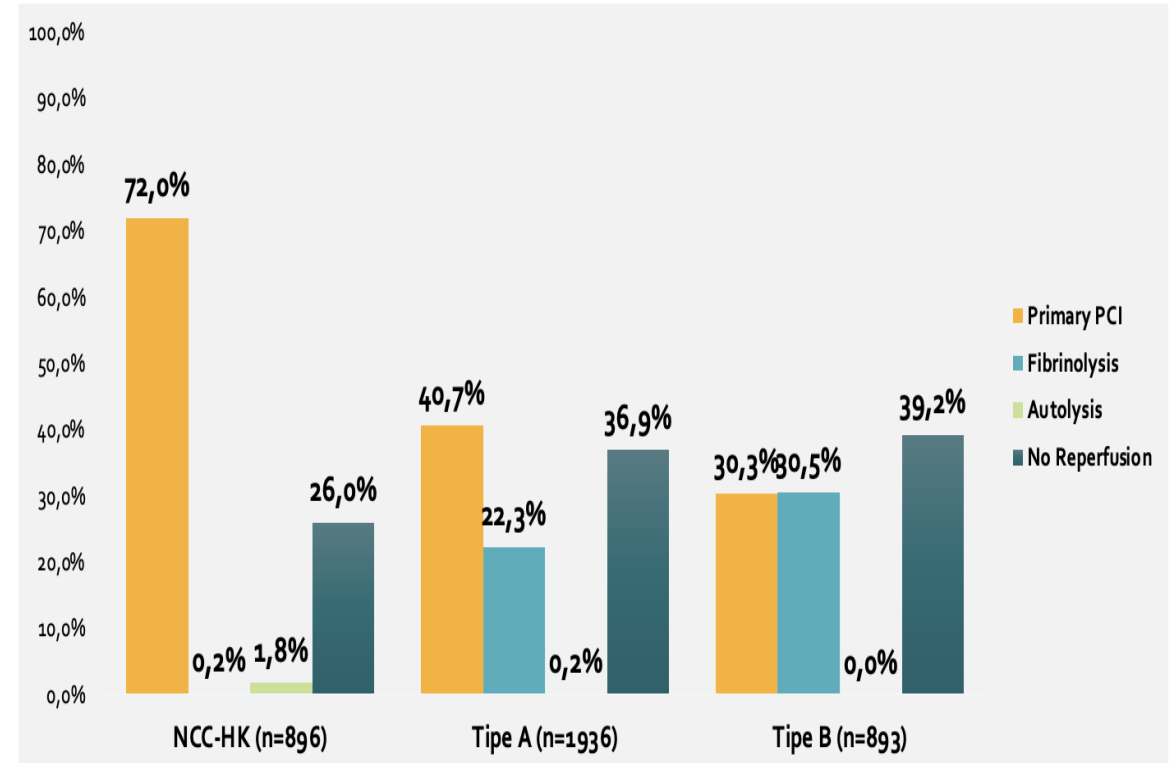
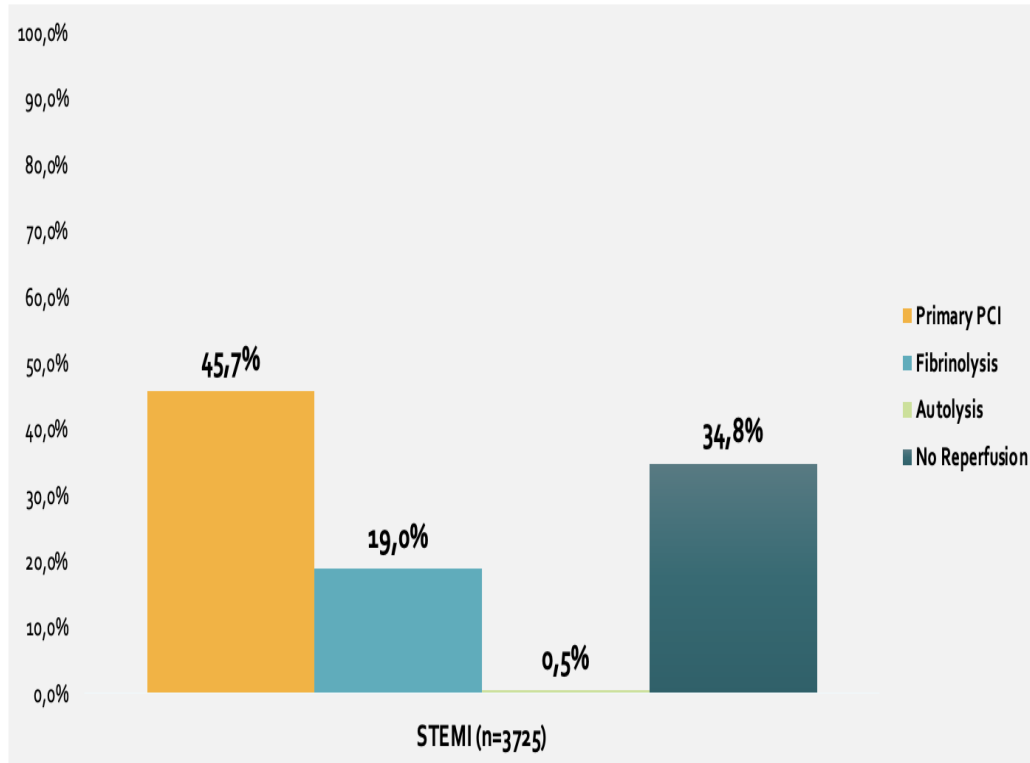
*Bandung : periode pengumpulan data sampai Oktober 2018



12 months data from 01st July 2018 – 30th June 2019 in One ACS Registry (10 Centers + NCC-HK)

STEMI Reperfusion Strategies

11 Centers One ACS Registry



Fibrinolytics successful rate > 70% in Type B hospital

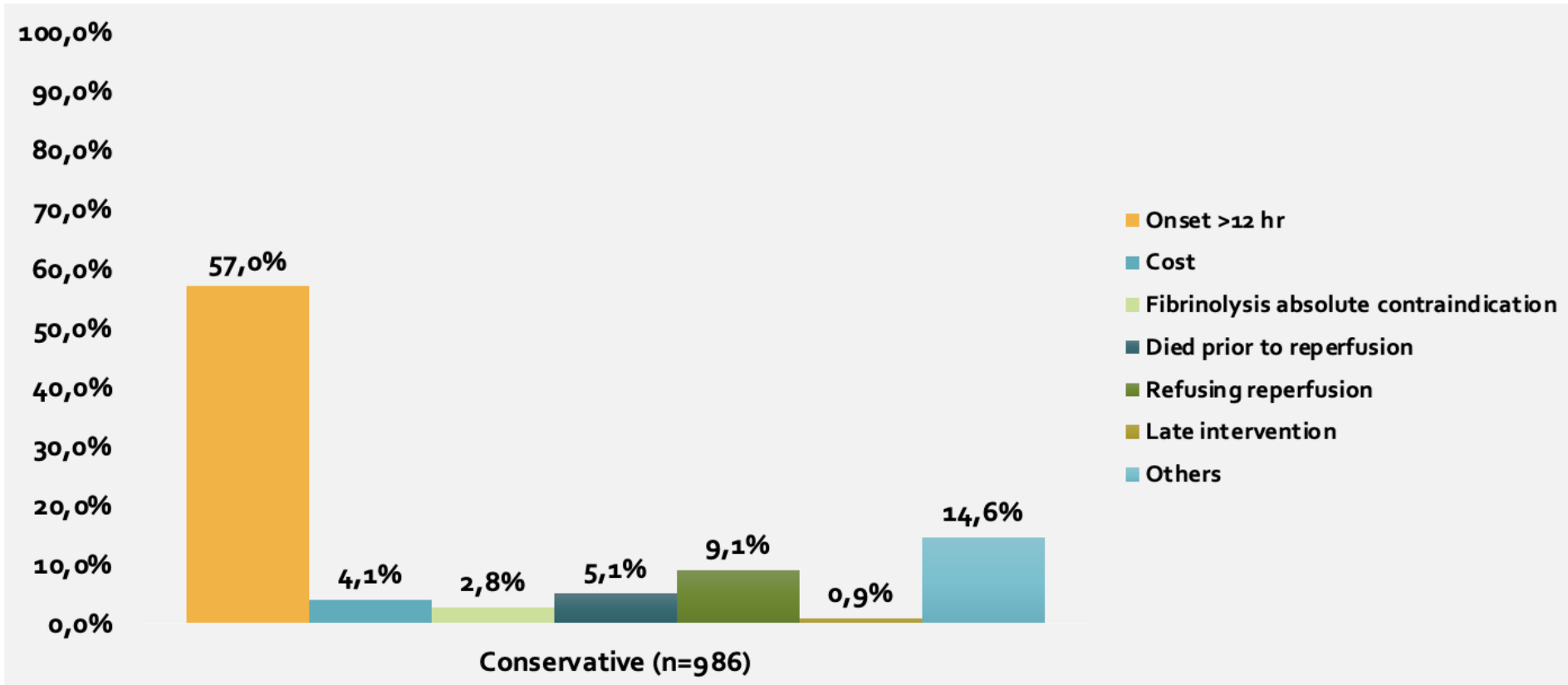
12 months data from 01st July 2018 – 30th June 2019 in One ACS Registry (10 Centers + NCC-HK)

*Type A: RSUP Sanglah, RS Hasan Sadikin, RSUP Dr Sardjito, RSUP Dr Wahidin Sudirohusodo, RSUD Dr Saiful Anwar, RSUP Dr M Djamil Padang

Type B: RS Otorita Batam, RS Awal Bros Batam, RSUD dr M Yunus Bengkulu, RSUD Cengkareng, RSUD Dr Iskak Tulungagung, RS Santa Elizabeth Batam, RS Rafflesia Bengkulu

Conservative Strategy Rationale

11 Centers One ACS Registry



12 months data from 01st July 2018 – 30th June 2019 in One ACS Registry (10 Centers + NCC-HK)

PERFORMANCE OF HEALTH CARE FACILITY

11 Centers One ACS Registry

Time (minutes)	11 Centers (N=2519)	
	Median	Min - max
Onset – FMC	150	5-699
Transfer Time	165	5-660
<i>Door to Device</i>	91	18-1851
<i>Door to Needle</i>	60	10-645
Ischemic Time	405	36-2020

12 months data from 01st July 2018 – 30th June 2019 in NCC-HK

PERFORMANCE OF HEALTHCARE FACILITIES

Base on Hospital Type

Time (minutes)	NCC-HK (591)		Type A (1179)		Type B (649)	
	Median	Min - max	Median	Min - max	Median	Min - max
Onset – FMC	150	13-660	150	5-685	150	9-699
Transfer Time	207.5	40-624	150	5-660	117	10-625
Door to Device	65	22-551	114	18-1851	132.5	40-716
Door to Needle	32.5	30-35	51	10-645	74.5	15-540
Ischemic Time	427	82-1151	421	36-2020	342	60-1150



•Patient delay



•System delay



•Hospital Performance

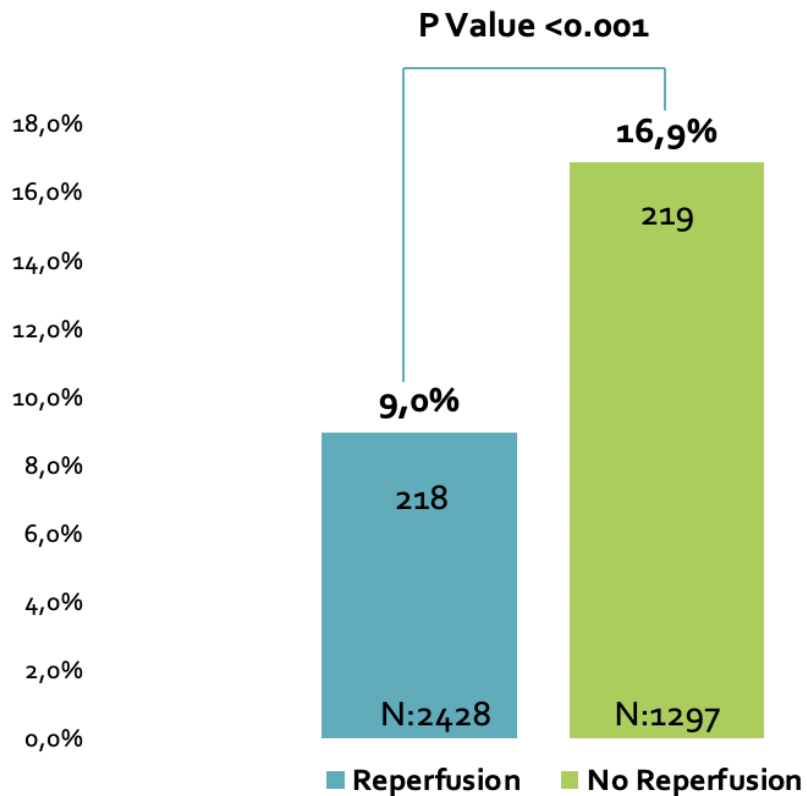


•Ischemic time

12 months data from 01st July 2018 – 30th June 2019 in NCC-HK

STEMI In Hospital Mortality Rate Among Reperfusion Strategies

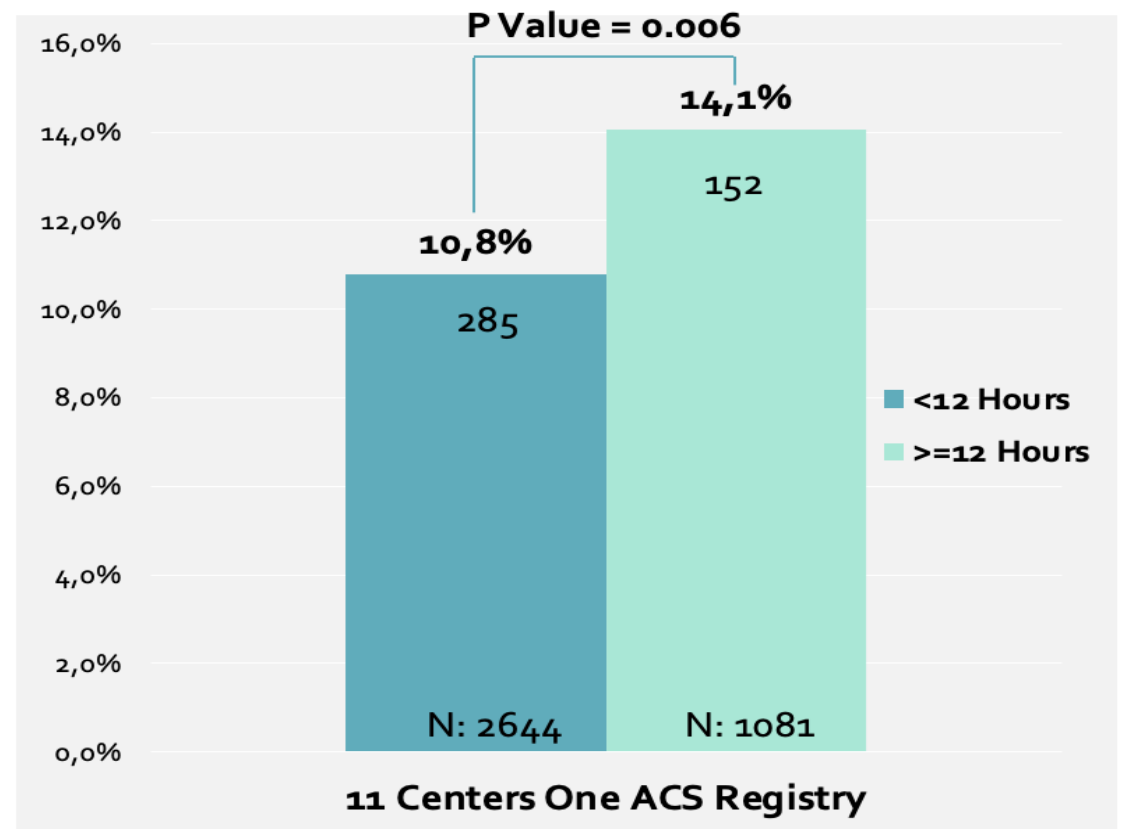
In 11 Centers One ACS Registry



12 months data from 01st July 2018 – 30th June 2019 in 11 Centers One ACS Registry

STEMI In Hospital Mortality Rate Among Presentation Times

In 11 Centers One ACS Registry



Indonesia STEMI in Early Pandemic of Covid-19

In 5 Centers Database (march-June 2019 and 2020)



Decrease in the Number of Patients Presenting With ST-Segment Elevation Myocardial Infarction Across Catheterization Centers in Indonesia During the Coronavirus Disease 2019 Pandemic

Doni Firman^{1*}, Arwin Saleh Mangkuanom¹, Nanda Iryuza¹, Ismir Fahri², I Made Junior Rina Artha³, Erwin Mulla⁴, Muhammad Sukri⁵, Emir Yonas⁶, Raymond Pranata⁷ and Amir Aziz Alkatiri¹

¹ Department of Cardiology and Vascular Medicine, Faculty of Medicine, Universitas Indonesia, National Cardiovascular Center Harapan Kita, Jakarta, Indonesia, ² Department of Cardiology and Vascular Medicine, Mohammad Yunus General Hospital, Bengkulu, Indonesia, ³ Department of Cardiology and Vascular Medicine, Faculty of Medicine, Udayana University, Sanglah General Hospital, Denpasar, Indonesia, ⁴ Department of Cardiology and Vascular Medicine, Bumi Waras Hospital, Lampung, Indonesia, ⁵ Department of Cardiology and Vascular Medicine, Faculty of Medicine, Universitas Andalas, DR. M. Djamil General Hospital, Padang, Indonesia, ⁶ Faculty of Medicine, Universitas YARSI, Jakarta, Indonesia, ⁷ Faculty of Medicine, Universitas Pelita Harapan, Banten, Indonesia

OPEN ACCESS

Edited by: Shuyang Zhang, Peking Union Medical College Hospital (CAMHS), China

Reviewed by: Johannes Tobias Neumann, University Heart and Vascular Center Hamburg (UH2), Germany
Timothy Henry, Christ Hospital, United States

***Correspondence:** Doni Firman
donifirman@gmail.com

Specialty section: This article was submitted to Cardiovascular Epidemiology and Prevention, a section of the journal Frontiers in Cardiovascular Medicine

Received: 05 March 2021
Accepted: 21 July 2021
Published: 16 August 2021

Citation: Firman D, Mangkuanom AS, Iryuza N, Fahri I, Artha BJR, Mulla E, Sukri M, Yonas E, Pranata R and Alkatiri AA (2021) Decrease in the Number of Patients Presenting With ST-Segment Elevation Myocardial Infarction Across Catheterization Centers in Indonesia During the Coronavirus Disease 2019 Pandemic. *Front. Cardiovasc. Med.* 8:676592. doi: 10.3389/fcvm.2021.676592

Background: The coronavirus disease 2019 (COVID-19) pandemic has become a global problem, put a heavy burden on the health care system, and resulted in many fatalities across the globe. A reduction in the number of cardiac emergencies, especially ST-segment elevation myocardial infarction (STEMI), is observed worldwide. In this study, we aimed to analyze the trends of cases and presentation of STEMI across several cardiac catheterization centers in Indonesia.

Method: This retrospective study was performed by combining medical record data from five different hospitals in Indonesia. We compared data from the time period between February to June 2019 with those between February and June 2020. Patients who were diagnosed with STEMI and underwent primary percutaneous coronary intervention (PPCI) procedures were included in the study.

Results: There were 41,396 emergency department visits in 2019 compared with 29,542 in 2020. The number of patients with STEMI declined significantly from 338 in 2019 to 190 in 2020. Moreover, the total number of PPCI procedures reduced from 217 in 2019 to 110 in 2020. The proportion of PPCI was not significantly reduced (64.2 vs. 57.9%). The majority of the patients were men, with a mean age of 54 years in 2019 and 55 years in 2020. We observed a significantly longer door-to-balloon time in 2020 than in 2019 ($p < 0.001$). We also observed a difference in the door-to-balloon time and ischemic time between the two periods.

Conclusion: We observed a decline in the number of patients presenting with STEMI to our centers. However, we observed no significant decline in the percentage of PPCI performed across our centers during this pandemic.

Keywords: STEMI, COVID-19, case, decrease, pandemic (COVID-19), cardiovascular

Results: There were 41,396 emergency department visits in 2019 compared with 29,542 in 2020. The number of patients with STEMI declined significantly from 338 in 2019 to 190 in 2020. Moreover, the total number of PPCI procedures reduced from 217 in 2019 to 110 in 2020. The proportion of PPCI was not significantly reduced (64.2 vs. 57.9%). The majority of the patients were men, with a mean age of 54 years in 2019 and 55 years in 2020. We observed a significantly longer door-to-balloon time in 2020 than in 2019 ($p < 0.001$). We also observed a difference in the door-to-balloon time and ischemic time between the two periods.

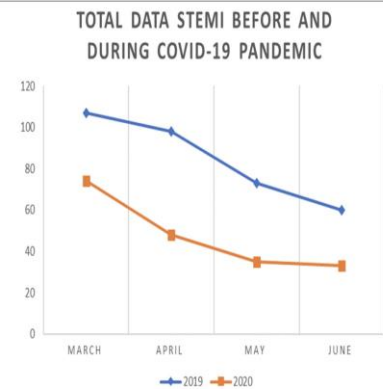


FIGURE 1 | Total STEMI Cases before and during COVID 19 pandemic.

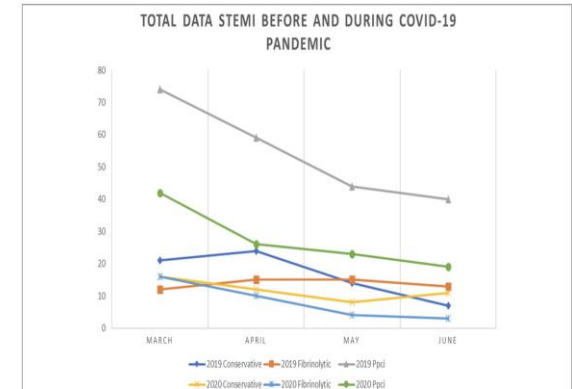


FIGURE 2 | Comparison between conservative, fibrinolytic and primary PCI management of STEMI in 2019 and 2020.

CONCLUSION

- The National Health Insurance (JKN) provide all citizen to have an affordable and equal health care services.
- Central government need to reduce the interregional disparities in term of resource, services and health outcomes.
- Increasing Reperfusion rate :
 - Develop more **regional network**
 - Breakthrough in **reimbursement** policy
 - Increase community **awareness**
 - Availability of more simple and effective **fibrinolysis** method
 - Improve **door to balloon** and **door to needle time** in district hospitals
- Integrated disaster and emergency management (Incl; emerging infectious disease), need to be improve to have a sustain healthcare services against future pandemic.

THANK YOU