Preface

The APHRS was founded in 2008 with the goal to promote the care, education, and research in heart rhythm disorders in Asia-Pacific countries. In pursuit of this goal, the APHRS has developed a White Book in 2010 under the leadership of Prof Shu Zhang, China, to collect basic statistical data and other information on the current status of interventional therapies for cardiac arrhythmia in Asia-Pacific countries. Such data have never been available before.

Interventional therapies for cardiac arrhythmias have developed rapidly in the Asia-Pacific region in recent decades, accompanied by the rapid growth of electrophysiological procedures and use of cardiac implantable electronic devices (CIEDs). However, significant inequalities exist in healthcare across Asia-Pacific countries and regions and in treatment of cardiac arrhythmia specifically, which highlight the importance and the necessity for the healthcare community to share, recognize, and communicate within itself the data and information on the current status of cardiac electrophysiology and arrhythmia treatment. My fellow members and I hope that the annually updated White Book will not only promote scientific, technological, and clinical development for better treatment of cardiac arrhythmias, but also improve healthcare and reduce inequalities in care for patients across Asia-Pacific countries and regions.

The APHRS White Book reports the most updated and comprehensive information on the current situation in the field of arrhythmia treatment, encompassing country demographics, epidemiology of cardiac arrhythmia, usage of CIEDs (pacemakers, implantable cardioverter defibrillators, and cardiac resynchronization therapy), and interventional electrophysiology. Prof Zhang first presented such data from 7 countries in the scientific session of APHRS 2012, and the next year the Society published the first edition of the APHRS White Book during the scientific session of APHRS 2013. Since then, the APHRS White Book has been updated each year. With the continuous efforts of the Society in the past 7 years, the APHRS White Book has gained increasing attention from researchers and clinicians across Asia-Pacific countries and regions.

The current Eighth Edition of the APHRS White Book is much extended. This new edition comprises data from 17 countries and regions. As before, data collection is

mostly the result of voluntary participation of each county or region's representative Society of Pacing and Electrophysiology or Heart Rhythm Society. In some other Asia-Pacific countries, there are currently no registries and data are limited. As such, the APHRS White Book marks the beginnings of an international registry compiled by collaborative efforts between countries, which may also encourage the adoption of a systematic approach to data collection on arrhythmia therapies in each country and region.

May I take this opportunity to thank and congratulate Prof Zhang and his team for putting this excellent job together. I would also like to thank the country representatives and members of individual national HRS working group who have voluntary contributed important data from their countries.

Tachapong NGARMUKOS
President of APHRS (2020)

Acknowledgements

As a member of APHRS and the chief editor of this book, I would like to express my great appreciation for all who made possible the publication of the Eighth edition of the APHRS White Book. I owe particular thanks to the president of APHRS 2019, Professor Chu-Pak LAU, and the current president of APHRS, Professor Tachapong NGARMUKOS, who led the preparation of this edition of the APHRS White Book. I would like to thank our board members for their great support of this work.

My deep gratitude also goes to all contributors, the national Societies of Pacing and Electrophysiology and the national Heart Rhythm Societies of 17 member countries or regions of APHRS. Without their voluntary collection of data, this book would never have been completed. In particular, I'd like to thank Mr. Jimmy Yap, and the secretary of APHRS, who helped collect data from member countries and regions. Finally, I would like to express my appreciation to the members of my working group, Dr. Xiaohan Fan and Ms. Na Lin, and Dr Xiaohui Ning, who performed secondary research to verify and establish the quantitative and qualitative information contained in the book.

Shu Zhang, MD, PhD, FHRS, FESC
Chief Editor of the APHRS White Book 2020

APHRS Board of Trustees

(January 1-December 31, 2020)

Immediate Past President
Chu-Pak Lau
(Hong Kong)

President
Tachapong Ngarmukos
(Thailand)

First Vice President
Wataru Shimizu
(Japan)

Second Vice President
Chen-Chuan Cheng
(Taiwan)

First Secretary General
Hui-Nam Pak
(Korea)

Second Secretary General
Wei Hua
(China)

Scientific Program Chair
Hung-Fat Tse
(Hong Kong)

Treasurer
Kyoko Soejima
(Japan)

Chief Editor of the Official Journal
Shih-Ann Chen
(Taiwan)

Representing Members from Each Country or Region

Australia	Saurabh Kumar
Brunei Darussalam	Sofian Johar
Cambodia	Chandara Mam
Hong Kong	Chung-Wah Siu
India	Ajay Naik
Islamic Republic of Pakistan	Zahoor Ahmad Khan
Japan	Akihiko Nogami, Yoshinori Kobayashi
Kingdom of Thailand	Charn Sriratanasathavorn
Malaysia	Kok Wei Koh
Mongolia	Saruul Tseveendee
Myanmar	Nwe Nwe
New Zealand	Dean Boddington
People's Republic of China	Congxin Huang, Dejia Huang
Republic of Indonesia	Dicky A. Hanafy
Republic of Korea	Seil Oh
Republic of Philippines	Eden Gabriel
Republic of Singapore	Chi Keong Ching
Sri Lanka	Suresh Kottegoda
Taiwan	Hsuan-Ming Tsao, Yung-Kuo Lin
Vietnam	Phan Dinh Phong

List of Contributors and Authors

Brunei Darussalam	Sofian Johar
Hong Kong	Ngai-Yin Chan
India	Ajay Naik, Anil Saxena
Islamic Republic of Pakistan	Zahoor Ahmad Khan
Japan	Akihiko Nogami, Yoshinori Kobayashi
Kingdom of Thailand	Tachapong Ngarmukos, Charn Sriratanasathavorn
Malaysia	Kok Wei Koh
Mongolia	Saruul Tseveendee
Myanmar	Nwe New
New Zealand	Dean Boddington
People's Republic of China	Shu Zhang, Xiaohan Fan, Na Lin
Republic of Indonesia	Yoga Yuniadi, Dicky A. Hanafy
Republic of Korea	Seil Oh, Hui-Nam Pak, Young-Hoon Kim
Republic of Philippines	Eden Gabriel, Giselle Gervacio
Republic of Singapore	Ching Chi Keong
Taiwan	Hsuan-Ming Tsao, Yung-Kuo Lin, Chun-Chieh Wang
Vietnam	Phan Dinh Phong

Table of Contents

PR. China..... 8
Brunei Darussalam.....12
Hong Kong,CN.....16
India.....20
Indonesia.....24
Japan.....28
Malaysia.....32
Mongolia.....37
Myanmar.....41
New Zealand.....45
Pakistan.....49
Philippines 53
Singapore.....59
South Korea.....65
Taiwan,CN.....69
Thailand.....73
Vietnam.....77

Country/Region: PR.China

1. Statistics

	2016	2017	2018	2019
Population(thousand)[1]	1382710	1390080	1395380	1400050
Hospitals	27587	31056	33009	34354
Beds(per 100,000 population) [1]	536.80	572.20	572.20	630
Physicians(per 1,000 population)[1]	2.21	2.21	2.40	2.40
Nurses(per 1,000 population)[1]	2.36	2.36	2.70	2.70
GDP (US$, billions)[3]	11,218.281	13173.585	134572.67	143647.03
Total expenditure on health as % GDP[2]	6.0%	6.2%	6.2%	6.6%
Government expenditure on health as %	30.88%	30.88%	30.88%	30.88%
Insured citizens (%)	70%	70%	70%	70%
SCD patients	0.54m	0.54m	0.54m	0.54m
Heart failure patients	4.5m	4.5m	4.5m	4.5m
AF patients	8m	8m	8m	8m

1, www.stats.gov.cn

2, www.who.int

3, www.imf.org

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	73080	76717	82779	90524
New implants	62508	63312	68660	72419
Replacements	10572	13405	14119	18105
Single-chamber	21066	20762	20853	26959
Dual-chamber	51588	55955	61926	63565
Sick sinus syndrome	37202	38791	40008	45388
AV block	29107	31122	34938	39396
Implanting Centers	995	1055	1066	946
Implanting Physicians	3000	3000	3000	3433
National Registry	☑	☑	☑	

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	3560	4138	4432	4523
CRT-P	1426	1633	1724	1628
CRT-P new implants	1095	1135		
CRT-P replacements/upgrade	331	498		
CRT-D	2078	2505	2708	2895
CRT-D new implants	1609	1993		
CRT-D replacements/upgrade	469	512		
Ischemic	1188	1319	1460	1492
Non-ischemic	2372	2819	2972	3031
Implanting Centers	396	403	410	366
Implanting Physicians	3000	3000	3000	3433
National Registry	☑	☑	☑	

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	3317	4092	4471	5031
ICD new implants	2986	3541	3897	
ICD replacements	331	551	574	
Single-chamber	2183	2550	2739	3119
Dual-chamber	1134	1542	1732	1912
Primary prevention	1693	1821	2129	2264
Secondary prevention	1624	2271	2342	2767
Implanting Centers	408	433	459	408
Implanting Physicians	3000	3000	3000	3433
National Registry	☑	☑	☑	

5. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	132504	133897	151595	173950
SVT ablation procedures	73702	80809	76971	77557
AVNRT	36708	40874	38754	38975
AVRT/WPW	28318	28885	26447	30065
AFL (RA isthmus dependent)	4734	5903	6428	4628
AT	3942	5147	5342	3889
VT/VPC	-	-		
Idiopathic	-	-		
Structural	-	-		
AF ablation procedures	30574	36615	48317	57275
Ablation centers	805	863	886	812
AF ablation centers	383	420	429	
Structural VT ablation centers	-	-		
Ablation physicians	-	2000	2000	2289
AF ablation physicians	-	-		
Structural VT ablation physicians	-	-		
National Registry	☑	☑	☑	

6. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation
Guidelines followed	☐ National	☐U.S.	☐Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	-	-	-	-
Insurance	-	-	-	-
Public insurance	-	-	-	-
Private insurance	-	-	-	-
Individual	-	-	-	-

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☑	☐	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☑	☐
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☐	☑	☐	☐
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☐	☑	☐	☐

7. Source

Chinese Society of Pacing and Electrophysiology (CSPE)

Country/Region: Brunei Darussalam

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	420	421	442	459
Hospitals	6	6	6	6
Beds	1165*	1224*		
Physicians	739	683		
Nurses	2742	2713		
GDP (US$, billions)	11.4	12.1	13.5	13.4
Total expenditure on health as % GDP	2.22	1.9	1.9	2.1
Government expenditure on health (US$)	259,000,000-	234,000,000	255,750,000	286,440,000
Insured citizens (%)	-			
SCD patients	-			
Heart failure patients	-			
AF patients	-			

* includes beds in Ministry of Health facilities only

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	65	52	75	52
New implants	52	41	67	40
Replacements	13	11	8	12
Single-chamber	17	12	27	11
Dual-chamber	48	40	48	41
Sick sinus syndrome	-	-		30
AV block	-	-		18
Implanting Centers	2	2	2	2
Implanting Physicians	5	5	5	6
National Registry	☐	☐		

	2016	2017	2018	2019
SSS	43	24	45	30
AVN	20	26	21	18
Bi Nodal	2	2	7	3
Others			2	1

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	14	16	13	19
CRT-P	0	6	4	4
CRT-P new implants	0	2	0	4
CRT-P replacements/upgrade	0	4	4	0
CRT-D	14	10	9	15
CRT-D new implants	5	5	5	13
CRT-D replacements/upgrade	9	5	4	2
Ischemic	7	3	7	10
Non-ischemic	7	7	2	9
Implanting Centers	2	2	2	
Implanting Physicians	2	5	2	
National Registry	☐	☐		

*exclude CRT-P for ischemic & non ischemic.

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	14	18	31	44
ICD new implants	13	14	30	37
ICD replacements	1	4	1	7
Single-chamber	0	3	2	1
Dual-chamber	14	15	29	43
Primary prevention	10	16	23	35
Secondary prevention	4	2	7	9
Implanting Centers	2	2	2	2
Implanting Physicians	5	5	5	6
National Registry	☐	☐		

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	0	3	6	2
Hospitals performed lead extraction	1	1	1	1
Cardiologists performing lead extraction	1	1	1	1
Surgeons performing lead extraction	0	0	0	0
National Registry	☐	☐		

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	109	103	149	103
SVT ablation procedures	26	32	29	41
AVNRT	14	19	21	10
AVRT/WPW	6	4	8	11
AFL(RA isthmus dependent)	5	1	9	11
AT	5	8	3	9
VT/VPC	4	15	7	15
Idiopathic		9	3	9
Structural		6	4	6
AF ablation procedures	52	56	59	47
Ablation centers	-	-	-	
AF ablation centers	1	1	1	1
Structural VT ablation centers	1	1	1	1
Ablation physicians	-	-	-	
AF ablation physicians	2	2	2	1
Structural VT ablation physicians	1	1	1	1
National Registry	☐	☐		

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation

Guidelines followed ☐ National ☑U.S. ☑Europe ☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government				
Insurance				
Public insurance				
Private insurance				
Individual				

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☑	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☑	☐	☐	☐
Lack of referral	☐	☑	☐	☐	☐
Lack of trained personnel	☐	☑	☐	☐	☐
Low awareness of guidelines	☐	☑	☐	☐	☐
Lack of operators	☐	☑	☐	☐	☐

8. Source
Name of national working group or arrhythmia body

Cardiac Society, Brunei Darussalam
Ministry of Health, Brunei Darussalam
Department of Economic Planning and Development, Prime Minister's Office, Brunei Darussalam

Country/Region: Hong Kong SAR

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	7,375	7392	7,482.5	7,520.80
Hospitals	53	54	55	55
Beds	39,090	39683	40,434	41,474
Physicians	14,013	14290	14,651	15,004
Nurses	39,178	40505	42,485	44,601
GDP (US$, billions)	308.28	341.15	364.82	367.71
Total expenditure on health as % GDP	3.23%	2.33%	2.99%	2.88%
Government expenditure on health (US$)	9,949 mil	7936mil	10,924mil	10,600mil
Insured citizens (%)	-			
SCD patients	-			
Heart failure patients	-			
AF patients	-			

1, www.census.gov

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	752	1513	1958	1810 (including 302 leadless pacemakers)
New implants	625	1191		
Replacements	127	322		
Single-chamber	-	-		
Dual-chamber	-	-		
Sick sinus syndrome	-	-		
AV block	-	-		

Implanting Centers	-	-		
Implanting Physicians	-	-		
National Registry	☐	☐		

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	-	-	179	164
CRT-P	-	-	71	27
CRT-P new implants	-	-		
CRT-P replacements/upgrade	-	-		
CRT-D	-	-	108	137
CRT-D new implants	-	-		
CRT-D replacements/upgrade	-	-		
Ischemic	-	-		
Non-ischemic	-	-		
Implanting Centers	-	-		
Implanting Physicians	-	-		
National Registry	☐	☐		

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	174	142	268	274
ICD new implants	99	83		
ICD replacements	75	59		
Single-chamber	-	-		
Dual-chamber	-	-		
Primary prevention	-	-		
Secondary prevention	-	-		
Implanting Centers	-	-		
Implanting Physicians	-	-		
National Registry	☐	☐		

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	-	-		
Hospitals performed lead extraction	-	-		
Cardiologists performing lead extraction	-	-		
Surgeons performing lead extraction	-	-		
National Registry	☐	☐		

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	-	-		768
SVT ablation procedures	-	-		
AVNRT	-	-		
AVRT/WPW	-	-		
AFL (RA isthmus dependent)	-	-		
AT	-	-		
VT/VPC	-	-		
Idiopathic	-	-		
Structural	-	-		
AF ablation procedures	-	-		
Ablation centers	-	-		
AF ablation centers	-	-		
Structural VT ablation centers	-	-		
Ablation physicians	-	-		
AF ablation physicians	-	-		
Structural VT ablation physicians	-	-		
National Registry	☐	☐		

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐ Ablation

National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation
Guidelines followed	☐ National	☐U.S.	☐Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	-	-	-	-
Insurance	-	-	-	-
Public insurance	-	-	-	-
Private insurance	-	-	-	-
Individual	-	-	-	-

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☐	☐
Lack of referral	☐	☐	☐	☐	☐
Lack of trained personnel	☐	☐	☐	☐	☐
Low awareness of guidelines	☐	☐	☐	☐	☐
Lack of operators	☐	☐	☐	☐	☐

8. Source

Name of national working group or arrhythmia body

Country/Region: India

1. Statistics

	2016	2017	2018	2019
Population (bn)	1.326	1.342	1.354	1.38
Urban Hospitals (Govt. only)	-	-	8812	4375
Beds (Govt. only)	-	-	1013017	713986
Physicians	-	-	-	1154686
Nurses	-	-	-	ANM =860927; RN &RM = 2048979
GDP (US$ - billion)	2,250	2597	2716	3202
Total expenditure on health as % GDP	2.5%	2.5%	3.66 as per WHO and World Bank 2016 data; 1.5% as per Indian Health Ministry data	4%
Government expenditure on health as %	-	-	1.02	1.6
Insured citizens (in Millions)	-	-	482	472
SCD patients[i1] (in Thousands)	NA	-	202	204
Heart failure patients[ii] (in Millions)	~8–10mn	-	1.145	1.2
AF patients (million)	-	-	4.26	4.5

1' http://www.worldometers.info/world-population/india-population/

2' https://data.gov.in/catalog/number-government-hospitals-and-beds-rural-and-urban-areas

3' http://statisticstimes.com/economy/gdp-of-india.php.

4' https://www.ihs.com/country-industry-forecasting.html?ID=1065985237

5' http://www.japi.org/december_2014/006_ra_sudden_cardiac_death.pdf.

6' http://csiheartfailure2015.org/

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	35794	38700	44700	48,860
New implants	75%	70%	70%	70%
Replacements	25%	30%	30%	30%
Single-chamber	19440	22200	25100	26,028
Dual-chamber	16354	16500	19600	22,832
Sick sinus syndrome[iii]	25%	20%	20%	20%
AV block	75%	80%	80%	80%
Implanting Centers	970	1120	1120	1500
Implanting Physicians	1560	1560	1560	2000
National Registry	☐	☐	0	1

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	2728	2500	3000	3608
CRT-P	944	1000	1200	1372
CRT-P new implants	88%	80%	88%	90%
CRT-P replacements/upgrade	12%	20%	12%	10%
CRT-D	1784	1500	1800	2236
CRT-D new implants	82%	75%	82%	85%
CRT-D replacements/upgrade	18%	25%	18%	15%
Ischemic	-		40%	40%
Non-ischemic	-		60%	60%
Implanting Centers	345	345	345	350
Implanting Physicians	395	395	395	400
National Registry	☐	☐	1	1

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	3664	3500	4100	5021
ICD new implants	85%	75%	85%	88%
ICD replacements	15%	25%	15%	12%

Single-chamber	2464	2300	2800	3360
Dual-chamber	1200	1200	1300	1661
Primary prevention	40%	20%	20%	22%
Secondary prevention	60%	80%	80%	78%
Implanting Centers	~380	400	400	400
Implanting Physicians	500	515	515	500
National Registry	☐	☐	1	1

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	-	-	170	84
Hospitals performed lead extraction	-	-	26	15
Cardiologists performing lead extraction	-	-	84	25
Surgeons performing lead extraction	-	-	8	6
National Registry	☐	☐	0	0

6. Interventional electrophysiology

	2016	2017	2018 (Incomplete data, obtained only from a few centers)	2019 (Data from limited centers)
Ablation procedures	22900		7910	4659
SVT ablation procedures	14400		6642	3328
AVNRT	7500		4066	2342
AVRT/WPW	5000		2152	1482
AFL (RA isthmus dependent)	900		424	239
AT	1000		456	220
VT/VPC	7100		1025	597
Idiopathic	3000		618	262
Structural	4100		407	168
AF ablation procedures	1400		215	146

Ablation centers	176		66	49
AF ablation centers	30		29	19
Structural VT ablation centers	93		21	20
Ablation physicians	135		54	46
AF ablation physicians	41		31	29
Structural VT ablation physicians	83		35	29
National Registry	☐		0	0

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation
Guidelines followed	☐ National	√ U.S.	√ Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	60%	35%	40%	25%
Insurance	10%	10%	10%	50%
Public insurance				25%
Private insurance				25%
Individual	30%	55%	50%	25%

Insurance data – External consultant data, Media source

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	☑	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☑	☐
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☐	☐	☑	☐
Low awareness of guidelines	☐	☐	☐	☑	☐
Lack of operators	☐	☐	☑	☐	☐

8. Source

Name of national working group or arrhythmia body

INDIAN HEART RHYTHM SOCIETY

Country/Region: Indonesia

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	260,580	261,890	265,050	268,074
Hospitals[2]	2,147	2,773	2,813	2,877
Beds[2]	-	353,136	310,710	321,544
Physicians[2]	186,091	192,879	205,597	228,180
Nurses[2]	-	345,276	354,218	345,508
GDP (US$, billions)	861.9	1,015.53	1,042.17	1,063.5
Total expenditure on health as % GDP	2.9	3.4	3.3	4.2
Government expenditure on health (US$)	299	124	124	4.510
Insured citizens (%)	65	72.9	78	83.94
SCD patients	-	-	-	-
Heart failure patients	-	-	-	-
AF patients	-	-	-	-

2, Indonesian Health Profile 2019, Ministry of Health

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	1017	1049	1609	1637
New implants	972	969	1522	1518
Replacements	45	80	87	119
Single-chamber	541	693	1109	1075
Dual-chamber	476	356	500	563
Sick sinus syndrome	350	381	555	673
AV block	667	668	1054	964
Implanting Centers	40	65	65	65
Implanting Physicians	86	111	111	119
National Registry	☐	☐	☐	☐

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	81	63	62	63
CRT-P	34	29	31	35
CRT-P new implants	30	21	26	26
CRT-P replacements/upgrade	4	8	5	9
CRT-D	47	34	31	28
CRT-D new implants	41	28	28	22
CRT-D replacements/upgrade	6	6	3	6
Ischemic	38	24	34	32
Non-ischemic	43	39	28	31
Implanting Centers	10	8	12	12
Implanting Physicians	16	15	25	25
National Registry	☐	☐	☐	☐

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	38	45	49	56
ICD new implants	28	38	44	49
ICD replacements	10	7	5	7
Single-chamber	28	40	35	37
Dual-chamber	10	5	14	19
Primary prevention	8	15	9	10
Secondary prevention	30	30	40	46
Implanting Centers	10	11	14	14
Implanting Physicians	20	19	25	25
National Registry	☐	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	7	13	6	12
Hospitals performed lead extraction	5	9	8	9
Cardiologists performing lead extraction	8	17	17	17
Surgeons performing lead extraction	0	2	2	7
National Registry	☐	☐	☐	☐

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	740	760	880	1193
SVT ablation procedures	395	343	404	680
AVNRT	190	210	239	377
AVRT/WPW	138	133	165	228
AFL (RA isthmus dependent)	48	18	32	31
AT	19	41	32	44
VT/VPC	268	296	346	433
Idiopathic	247	249	312	386
Structural	21	47	34	47
AF ablation procedures	77	55	67	68
Ablation centers	11	19	16	17
AF ablation centers	6	7	9	11
Structural VT ablation centers	6	7	10	12
Ablation physicians	18	23	24	26
AF ablation physicians	14	18	17	17
Structural VT ablation physicians	10	17	18	20
National Registry	☐	☐	☐	☐

7. Management

National certification for physicians	☑PM	☑CRT	☑ICD	☑ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☑ Ablation
Guidelines followed	☑ National	☐U.S.	☐Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	85	90	80	90
Insurance	13	10	15	7
Public insurance	-	-	-	-
Private insurance	-	-	-	-
Individual	2	0	5	3

Obstacles to guideline implémentation (1=no obstacle, 5= great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	☑	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☑	☐
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☑	☐	☐	☐
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☑	☐	☐	☐

8. Source

Indonesian Heart Rhythm Society (InaHRS)

Country/Region: Japan

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	126933	126706	126496	126167
Hospitals (per 100,000 population)	6.68	6.62		
Beds	1559901	1652102	1662567	1627288
Physicians (per 1,000 population) [2]	2.45			
Nurses (per 1,000 population) [2]	8.56			
GDP (US$, billions) [3]	4758.75.	4884.49	4938,64	4,971.77
Total expenditure on health as % GDP [2]	10.9	10.9		
Government expenditure on health as % [2]	-			
Insured citizens (%)	-			
SCD patients	-			
Heart failure patients	1254300			
AF patients	1000000			

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	58693	60137	61238	63411
New implants	40318	41895	43495	44359
Replacements	18375	18242	17743	19052
Single-chamber	10928	11734	13209	12575
Dual-chamber	47765	48403	48029	50836
Sick sinus syndrome	-			
AV block	-			
Implanting Centers	-			
Implanting Physicians	-			
National Registry	☐	☐		

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	4722	4782	4778	5149

CRT-P	1188	1213	1330	1503
CRT-P new implants	817	922	1041	1201
CRT-P replacements/upgrade	371	291	289	302
CRT-D	3534	3569	3448	3646
CRT-D new implants	2179	2399	2367	2406
CRT-D replacements/upgrade	1355	1170	1081	1240
Ischemic	-	-		
Non-ischemic	-	-		
Implanting Centers	-	-		
Implanting Physicians	-	-		
National Registry	☐	☐		

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	6367	6691	6772	6552
ICD new implants	4208	4288	4405	4341
ICD replacements	2159	2403	2367	2211
Single-chamber	1627	1931	2039	2096
Dual-chamber	4740	4760	4733	4456
Primary prevention	-	-		
Secondary prevention	-	-		
Implanting Centers	-	-		
Implanting Physicians	-	-		
National Registry	☐	☐		

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	524	588	648	819
Hospitals performed lead extraction	66	96	106	109
Cardiologists performing lead extraction	59	87	100	103
Surgeons performing lead extraction	7	9	6	6

National Registry	☐	☐	+(J-LEX)	+(J-LEX)

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	65000	75000	80000	96000
SVT ablation procedures	15000	15000	15000	11000
AVNRT	-	-		7500
AVRT/WPW	-	-		3500
AFL (RA isthmus dependent)	-	-		10000
AT	-	-		3000
VT/VPC	6000	6000	6000	6000
Idiopathic	-	-		
Structural	-	-		
AF ablation procedures	45000	54000	59000	62000
Ablation centers	690	700	700	700
AF ablation centers	450	500	500	500
Structural VT ablation centers	-	-		
Ablation physicians	2000	2200	2200	2500
AF ablation physicians	1500	1700	1700	2000
Structural VT ablation physicians	-	-		
National Registry	☐	☐	☑	☑

7. Management

National certification for physicians	☐PM	☑CRT	☑ICD	☐ Ablation
National accreditation for centers	☐PM	☑CRT	☑ICD	☐ Ablation
Guidelines followed	☑ National	☐U.S.	☐Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	-	-	-	-

Insurance	-	-	-	-
Public insurance	-	-	-	-
Private insurance	-	-	-	-
Individual	-	-	-	-

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☑	☐	☐	☐	☐
Lack of reimbursement, limited financial resources	☑	☐	☐	☐	☐
Lack of referral	☑	☐	☐	☐	☐
Lack of trained personnel	☑	☐	☐	☐	☐
Low awareness of guidelines	☐	☑	☐	☐	☐
Lack of operators	☑	☐	☐	☐	☐

8. Source

Name of national working group or arrhythmia body

Japanese Heart Rhythm Society

Country/Region: Malaysia

1. Statistics

	2016	2017	2018	2019
Population (Thousand)	31, 700	32042	32,400	32，733
Hospitals	146	147	148	7
Beds	42,100	42200	42400	1768
Physicians	53,225	53300	53450	715
Nurses	104,500	104900	105,000	3174
GDP (RM)	48, 918	49890	49, 999	1，353，380
Total expenditure on health as % GDP	4.5	4.5	4.5	4
Government expenditure on health as %	50.2	50.2	50.2	7
Insured citizens (%)	-	-	-	32
SCD patients	-	-	-	12%
Heart failure patients	-	-	-	1780
AF patients	-	-	-	492

***Data source: Portal Rasmi, Kementerian Kesihatan Malaysia (www.moh.gov.my)**

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	460	640	755 (PPM), 87 (leadless)	798

New implants	345	516	597	626
Replacements	115	124	166	172
Single-chamber	155	159	252	233
Dual-chamber	305	481	503	560
Sick sinus syndrome	218	290	296	382
AV block	235	350	370	428
Implanting Centers	38	38	38	7
Implanting Physicians	122	122	127	28
National Registry	☑	☑	☑	☑

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	163	171	177	160
CRT-P	53	40	55	60
CRT-P new implants	23	26	33	38
CRT-P replacements/upgrade	30	14	22	26
CRT-D	110	128	122	84
CRT-D new implants	63	93	92	73
CRT-D replacements/upgrade	47	35	30	19
Ischemic	77	72	65	51
Non-ischemic	86	97	106	55
Implanting Centers	16	16	16	5
Implanting Physicians	31	31	31	15

National Registry	☑	☑	☑	☑

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	158	213	256	223
ICD new implants	88	183	216	203
ICD replacements	90	30	40	29
Single-chamber	117	154	179	168
Dual-chamber	41	59	76	64
Primary prevention	69	80	91	78
Secondary prevention	89	133	140	154
Implanting Centers	21	21	21	7
Implanting Physicians	28	28	28	23
National Registry	☑	☑	☑	☑

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	12	10	12	19
Hospitals performed lead extraction	2	5	7	4
Cardiologists performing lead extraction	6	9	4	9
Surgeons performing lead extraction	5	2	1	3
National Registry	☑	☑	☑	

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	664	979	822	891
SVT ablation procedures	443	647	611	576
AVNRT	193	283	233	251
AVRT/WPW	49/63	182	96	156
AFL (RA isthmus dependent)	92	124	90	101
AT	46	49	40	70
VT/VPC	127	232	164	238
Idiopathic	92	86	45	100
Structural	35	137	39	59
AF ablation procedures	94	94	101	122
Ablation centers	5	5	5	5
AF ablation centers	5	5	5	4
Structural VT ablation centers	2	2	2	3
Ablation physicians	5	12	13	8
AF ablation physicians	5	12	13	8
Structural VT ablation physicians	5	12	13	7
National Registry	☑	☑	☑	

7. Management

National certification for physicians ☑PM ☑CRT ☑ICD ☑Ablation

National accreditation for centers ☑PM ☑CRT ☑ICD ☑Ablation

Guidelines followed ☑National ☑U.S. ☑Europe ☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	80	80	80	80
Insurance	10	10	10	10
Public insurance				
Private insurance				
Individual	10	10	10	10

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☑	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☐	☑
Lack of referral	☐	☐	☐	☑	☐
Lack of trained personnel	☐	☐	☐	☑	☐
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☐	☐	☑	☐

6 Data source: UMMC, PPUKM, SGH, QEH2, HRPZII, IJN

Country/Region: Mongolia

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	3027.4	3177.9	3,238.5	3,296,9
Hospitals	13	13	13	58
Beds	22960	23897	24884	25661
Physicians	10000	10576	11169	11788
Nurses	11486	11939	12267	12773
GDP (US$, billions)	1.118	1.149	1.301	13.85
Total expenditure on health as % GDP	-	-	-	4%
Government expenditure on health (US$)	3808000.0	3592390.4	-	458000.0
Insured citizens (%)	-	-	-	-
SCD patients	-	-	-	-
Heart failure patients	-	-	-	-
AF patients	-	-	-	-

3, www.census.gov

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	123	115	166	180
New implants	118	112	153	-
Replacements	5	3	13	-
Single-chamber	-	-	-	-
Dual-chamber	-	-	-	180
Sick sinus syndrome	-	-	-	-
AV block	-	-	-	-
Implanting Centers	1	1	2	3
Implanting Physicians	3	3	5	6
National Registry	☐	☐	none	none

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	3	2	3	3
CRT-P	3	2	3	3
CRT-P new implants	3	2	3	3
CRT-P replacements/upgrade	-	-	-	-
CRT-D	-	-	-	-
CRT-D new implants	-	-	-	-
CRT-D replacements/upgrade	-	-	-	-
Ischemic	-	-	-	-
Non-ischemic	3	2	3	3
Implanting Centers	1	1	1	1
Implanting Physicians	1	1	1	1
National Registry	☐	☐		none

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	-	2	5	1
ICD new implants	-	2	5	1
ICD replacements	-	-	-	-
Single-chamber	-	2	-	-
Dual-chamber	-	-	5	1
Primary prevention	-	-	-	-
Secondary prevention	-	2	5	-
Implanting Centers	-	1	1	1
Implanting Physicians	-	2	2	2
National Registry	☐	☐		

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	-	-	-	1

Hospitals performed lead extraction	-	-	-	1
Cardiologists performing lead extraction	-	-	-	2
Surgeons performing lead extraction	-	-	-	-
National Registry	☐	☐		none

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	38	49	74	156
SVT ablation procedures	38	44	70	140
AVNRT	18	20	32	98
AVRT/WPW	20	21	26	32
AFL(RA isthmus dependent)	-	2	5	6
AT	-	3	4	4
VT/VPC	-	3	2	10
Idiopathic	-	3	2	10
Structural	-	-		-
AF ablation procedures	-	2	4	6
Ablation centers	1	1	1	1
AF ablation centers	1	1	1	1
Structural VT ablation centers	1	1	1	1
Ablation physicians	1	1	2	2
AF ablation physicians	1	1	1	1
Structural VT ablation physicians	1	1	1	1
National Registry	☐	☐		none

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation
Guidelines followed	☐ National	☐U.S.	☑Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	75%	75%	75%	75%
Insurance				
Public insurance				
Private insurance				
Individual	25%	25%	25%	25%

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	☐	☐	☑
Lack of reimbursement, limited financial resources	☐	☐	☑	☐	☐
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☐	☐	☐	☑
Low awareness of guidelines	☐	☐	☐	☑	☐
Lack of operators	☐	☐	☐	☐	☑

8. Source

Name of national working group or arrhythmia body

State Third Central Hospital, National Cardiac Center

Mongolian Heart Rhythm Society

Country/Region: Myanmar

1、Statistics

	2016	2017	2018	2019
Population (thousand)	51480	55000	53850	54425
Hospitals (implanting)	8	8	10	11
Beds	-			
Physicians	-			
Nurses	-			
GDP (US$, billions)	-	64.33	74	
Total expenditure on health as % GDP	-	1.0		
Government expenditure on health as %	-	45.9		
Insured citizens (%)	-			
SCD patients	-			
Heart failure patients	-			
AF patients	-			

1. Pacemaker

	2016	2017	2018	2019
Total pacemakers	515	554	648	641
New implants	495	529	624	610
Replacements	20	25	24	31
Single-chamber	474	513	589	572
Dual-chamber	41	41	59	69
Sick sinus syndrome	249	273	317	296
AV block	266	281	331	345
Implanting Centers	8	8	10	11
Implanting Physicians	15	18	21	21
National Registry	☐	☐		–

2. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	4	10	13	11
CRT-P	2	5	2	1
CRT-P new implants	2	5	2	1
CRT-P replacements/ upgrade			-	
CRT-D	2	5	11	10
CRT-D new implants	2		11	10
CRT-D replacements/upgrade				
Ischaemic	4	9	5	6
Non-ischaemic		1	8	5
Implanting Centers	3	4	4	4
Implanting physicians	3	15	15	15
National Registry	☐	☐		–

3. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	21	33	24	37
ICD new implants	19	32	20	37
ICD replacements	2	1	4	-
Single-chamber	17	31	21	32
Dual-chamber	4	2	3	5
Primary prevention	5	8	9	21
Secondary prevention	16	25	15	16
Implanting Centers	4	4	4	5
Implanting physicians	4	15	15	15
National Registry	☐	☐		–

4. Lead extraction

	2016	2017	2018	2019
Total lead extraction procedure	-	-	-	-
Hospitals performed lead extraction	-	-	-	-
Cardiologists performing lead extraction	-	-	-	-
Surgeons performing lead extraction	-	-	-	-
National Registry	-	-	-	-

5. Interventional Electrophysiology

	2016	2017	2018	2019
Ablation procedures	618	751	960	1034
SVT ablation procedures	561	672	891	945
AVNRT	318	362	461	519
AVRT/WPW	223	282	398	408
AFL (RA isthmus dependent)	17	15	17	10
AT	3	13	15	8
VT/PVC	44	66	58	76
Idiopathic	44	62	56	69
Structural	-	4	2	7
AF ablation procedures	13	13	11	13-
Ablation centers		4	5	6
AF ablation centers	1	1	1	1
Structural VT ablation centers	-	1	1	1
Ablation physicians		10	13	13
AF ablation physicians	1	1	1	1
Structural VT ablation physicians	-	1	1	1

National Registry	☐	☐		–

6. Management

National certification for physicians ☐PM ☐CRT ☐ICD ☐Ablation
National accreditation for centers ☐PM ☐CRT ☐ICD ☐Ablation
Guidelines followed ☐ National ☑**US** ☑**Europe** ☑**AP**

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	80 %	-	-	100 %
Insurance	-	-	-	-
Public insurance	-	-	-	-
Private insurance	-	-	-	-
Individual	20 %	100 %	100 %	-

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☑	☐	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☑	☐
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☐	☑	☐	☐
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☐	☑	☐	☐

7. Source

Yangon General Hospital, North Okkalapa General Hospital, Mandalay General Hospital, No (1) Defense Services General Hospital, No (2) Defense Services General Hospital, Naypyitaw 1000 bedded Hospital, Private Hospitals in Yangon

Country/Region: New Zealand

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	4693	4844	4929	5000
Hospitals *(includes every small hosp.)*	184		220	
Beds *(includes every small hosp.)*	10793		13010	
Physicians	14700		15819	
Nurses	53000		58206	
GDP(US$, billions)[2]	185		206	
Total expenditure on health as % GDP[2]	10%		9%	
Government expenditure on health as %[2]	80%		80%	
Insured citizens (%)	30%			
SCD patients	3700			
Heart failure patients	30000			
AF patients	-			

4, www.census.gov

5, www.imf.org

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	2492	2582	2635	2644
New implants	1933	2140	2133	2142
Replacements	526	441	502	502
Single-chamber	730	703	829	773
Dual-chamber	1598	1783	1806	1763
Sick sinus syndrome	-			
AV block	-			
Implanting Centers	12	14	14	14
Implanting Physicians	38	38	38	39
National Registry	☑	☑		Yes

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	309	326	329	318
CRT-P	150	166	168	168
CRT-P new implants	89		107	106
CRT-P replacements/upgrade	61		61	62
CRT-D	159	160	161	150
CRT-D new implants	107		121	108
CRT-D replacements/upgrade	52		40	42
Ischemic				
Non-ischemic				
Implanting Centers	6	6	8	9
Implanting Physicians	22	22	22	23
National Registry	☑	☑		

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	638	654	649	602
ICD new implants	448	459	479	416
ICD replacements	100	161	170	186
Single-chamber	–			
Dual-chamber	–			
Primary prevention	–			
Secondary prevention	–			
Implanting Centers	7	9		9
Implanting Physicians	22	22		23
National Registry	☑	☑		Yes

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	33		40	42
Hospitals performed lead extraction	2	2	1	1

Cardiologists performing lead extraction	3	3	2	2
Surgeons performing lead extraction	support			Support
National Registry	☐			

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	1482	1640	1725	1788
SVT ablation procedures	881	901	882	1029
AVNRT	322	315	274	300
AVRT/WPW	151	133	178	146
AFL (RA isthmus dependent)	331	336	335	391
AT	77	97	80	80
VT/VPC	135	158	152	153
Idiopathic	94			
Structural	41			
AF ablation procedures	405	510	563	644
Ablation centers				
AF ablation centers	8	8	8	8
Structural VT ablation centers	4	4	4	7
Ablation physicians				
AF ablation physicians	12	14	15	16
Structural VT ablation physicians	12	14	15	16
National Registry	☐			No

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation
Guidelines followed	☑ National	☐U.S.	☐Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	98%	99.7%	99.7%	66%
Insurance	–	–	–	–
Public insurance	–	–	–	–
Private insurance	–	–	–	34%
Individual	2%	0.3%	0.3%	

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	☑	☐	☐
Lack of reimbursement, limited financial resources	☐	☑	☐	☐	☐
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☑	☐	☐	☐
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☑	☐	☐	☐

8. Source

"Heart Rhythm New Zealand" ---- a branch of the Cardiac Society of Australia and New Zealand

Country/Region: Pakistan

1. Statistics

	2016	2017	2018	2019
Population (million)[1]	182.5	182.7	190	194
Hospitals	–	–		
Beds(per thousand)	0.6	0.6	0.6	0.7
Physicians	05/1000	0.5/1000	0.5/1000	0.5/1000
Nurses	–	–		
GDP (US$, billions)	247	247	246	248
Total expenditure on health as % GDP	3.5	3.8	4.5	5
Government expenditure on health (US$)	4%	4.5%	4.9	5
Insured citizens (%)	0.1%	1	3%	3.1%
SCD patients	–	–		
Heart failure patients	–	–		
AF patients	0.5%	0.5%	0.5%	0.7%

6' www.census.gov

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	3450	4030	4300	4600
New implants	3000	4000	4000	4050
Replacements	450	500	520	550
Single-chamber	80%	80%	70%	70%
Dual-chamber	20%	20%	30%	30%
Sick sinus syndrome	20%	26%	25%	23%
AV block	80%	74%	75%	77%
Implanting Centers	29	31	32	34
Implanting Physicians	70	100	102	110
National Registry	☐	☐	no	

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	137	416	360	390
CRT-P	102	290	300	290
CRT-P new implants	97	290	280	270
CRT-P replacements/upgrade	5	16	20	20
CRT-D	35			
CRT-D new implants	35	110	100	100
CRT-D replacements/upgrade	–	–		
Ischemic	90%	80%	80%	70%
Non-ischemic	10%	20%	20%	30%
Implanting Centers	6	8	8	10
Implanting Physicians	7	8	8	12
National Registry	☐	☐	no	

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	–	–		
ICD new implants	150	350	360	390
ICD replacements				
Single-chamber	92%	85	80%	70%
Dual-chamber			20%	30%
Primary prevention	18%	32%	27%	23%
Secondary prevention	82%	68%	73%	77%
Implanting Centers	8	9	9	10
Implanting Physicians	8	8	12	15
National Registry	☐	☐	no	

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	–	–		7
Hospitals performed lead extraction	–	–	1	2
Cardiologists performing lead extraction	–	–	1	2
Surgeons performing lead extraction	–	–		
National Registry	☐	☐	no	

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	–	–	1350	1500
SVT ablation procedures	870	1200	1300	1450
AVNRT	63%	65%	67%	65%
AVRT/WPW	25%	25%	20%	35%
AFL (RA isthmus dependent)	5%	6%	8%	7%
AT	7%	5%	6%	5%
VT/VPC	8%	11%	82%	15%
Idiopathic	7%	10%	18%	10%
Structural				
AF ablation procedures	10	20	16	10
Ablation centers	1		2	
AF ablation centers	2	2	2	2
Structural VT ablation centers	1	2	2	2
Ablation physicians				
AF ablation physicians	2	1	3	3
Structural VT ablation physicians	1		3	3
National Registry	☐	☐		

7. Management

National certification for physicians	☐YPM	☐CRT	☐ICD	☐ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation
Guidelines followed	☐ National	☐U.S.	☐Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	40%	5%	20%	50%
Insurance	–	–	–	–
Public insurance	–	–	–	–
Private insurance	–	–	–	–
Individual	60%	95%	80%	50%

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	☐	☑	Y
Lack of reimbursement, limited financial resources	☐	☐	☐	☑	Y
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☐	☑	☐	Y
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☑	☐	☐	Y

8. Source

Pakistan Heart Rhythm Society

Asia Pacific Heart Rhythm Society APHRS

Country/Region: Philippines

1. Statistics

	2016	2017	2018	2019
Population (thousand) *	103,796	104,918	106,512	109,938,244
Hospitals	1823	1436	1800	1800
Beds (per 100,000 population)**	102	100	100	135
Physicians (per 1,000 population) ***	1.16	1.16	1.16	1.16
Nurses (per 1,000 population) ****	6	24	24	24
GDP (US$, billions) *****	304.9	313.6	354.31	376.79
Total expenditure on health as % GDP	4.71	4.5%	4.5%	7.1%
Government expenditure on health as %	10.1	10.5%	33%	33%
Insured citizens (%)	33%	92%	93%	93%
SCD patients	–	–	–	–
Heart failure patients		1.6%	-	-
AF patients	0.2%	0.2%	0.2%	0.2%

*http://www.worldometers.info/world-population/philippines-population/

** http://statista.com

*** http://data.worldbank.org/indicator/SH.MED.BEDS.ZS

**** http://www.who.int/whosis/whostat/EN_WHS2011_Full.pdf

***** http://www.tradingeconomics.com/philippines/gdp-growth-annual

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	1225	649	1037	1335
New implants	973	609	974	1168
Replacements	252	40	63	167
Single-chamber	584	308	414	526
Dual-chamber	637	336	617	778
Sick sinus syndrome	353	355	346	197
AV block	64	78	691	84
Implanting Centers	98	46	72	42
Implanting Physicians	160	51	76	55
National Registry	☐	☐	☐	☐

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	34	17	15	27
CRT-P	7	3	1	3
CRT-P new implants	2	6	0	1
CRT-P replacements/upgrade	0	2	1	2
CRT-D	26	12	14	24
CRT-D new implants	22	12	13	18

CRT-D replacements/upgrade	4		1	6
Ischemic	4	5	4	5
Non-ischemic	2	4	11	2
Implanting Centers	16	6	6	4
Implanting Physicians	5	6	6	6
National Registry	☐	☐	☐	☐

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	104	60	72	109
ICD new implants	84	58	70	98
ICD replacements	20	2	2	11
Single-chamber	55	38	53	61
Dual-chamber	49	22	19	48
Primary prevention	15	18	45	26
Secondary prevention	89	-	27	11
Implanting Centers	7	9	12	10
Implanting Physicians	6	11	11	9
National Registry	☐	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	-	4	-	-
Hospitals performed lead extraction	-	3	-	-
Cardiologists performing lead extraction	-	3	-	-
Surgeons performing lead extraction	-		-	-
National Registry	☐	☐	☐	☐

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	151	142	137	153
SVT ablation procedures	29	-	-	
AVNRT	62	53	46	60
AVRT/WPW	25	46	47	55
AFL (RA isthmus dependent)	1	8	6	1
AT	0	5	4	1
VT/VPC	17	15	16	19
Idiopathic	8	-	-	-
Structural	2	-	-	-

AF ablation procedures	13	15	18	17
Ablation centers	4	4	4	4
AF ablation centers	1	1	4	4
Structural VT ablation centers	1	4	4	4
Ablation physicians	-	-	-	-
AF ablation physicians	-	-	-	-
Structural VT ablation physicians	-	-	-	-
National Registry	☐	☐	☐	☐

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐Ablation
Guidelines followed	☐Nationa	☑U.S.	☐Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	5%	5%	5%	5%
Insurance				
Public insurance	5%	5%	5%	5%
Private insurance	0	0	0	0%
Individual	90%	90%	90%	90%

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	☑	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☐	☑
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☐	☐	☑	☐
Low awareness of guidelines	☐	☐	☐	☑	☐
Lack of operators	☐	☐	☐	☑	☐

8. Source

a. Philippine Heart Rhythm Society, Inc.

b. Different ablation centers

c. Other Sources:

Medtronic Phils.

Abbott Phils.

Boston Phils.

Transmedic Phils.

Country/Region: Singapore

1. Statistics

	2016	*2017*	*2018*	*2019*
Population ('000)[1]	**5,607.3**	**5,612.3**	**5,638.7**	**5,703.6**
Hospitals [2]	**28**	**27**	**28**	**29**
a. Public Sector	*13*	*13*	*15*	*16*
- Acute Hospitals	*9*	*9*	*10*	*10*
- Psychiatric Hospitals	*1*	*1*	*1*	*1*
- Community Hospitals	*3*	*3*	*4*	*5*
b. Not-for-Profit	*5*	*5*	*5*	*5*
- Acute Hospitals	*1*	*1*	*1*	*1*
- Psychiatric Hospitals	*-*	*-*	*-*	*-*
- Community Hospitals	*4*	*4*	*4*	*4*
c. Private Sector	*10*	*9*	*8*	*8*
- Acute Hospitals	*9*	*8*	*8*	*8*
- Psychiatric Hospitals	*-*	*-*	*-*	*-*
- Community Hospitals	*1*	*1*	*-*	*-*
Beds[3]	**27,126**	**29,050**	**29,938**	**31,495**
a. Public Sector	*14,335*	*16,568*	*17,425*	*18,590*
- Acute Hospitals	*8,561*	*8,623*	*9,071*	*9,404*
- Psychiatric Hospitals	*1,950*	*1,950*	*1,950*	*1,950*
- Community Hospitals	*690*	*690*	*799*	*974*
- Nursing Homes	*3,110*	*5,281*	*5,581*	*6,238*
- Inpatient Hospices	*24*	*24*	*24*	*24*
b. Not-for-Profit	*7,484*	*7,267*	*7,360*	*7,418*
- Acute Hospitals	*316*	*271*	*273*	*288*
- Psychiatric Hospitals	*-*	*-*	*-*	*-*
- Community Hospitals	*961*	*969*	*979*	*1,012*
- Nursing Homes	*6,058*	*5,872*	*5,953*	*5,963*
- Inpatient Hospices	*149*	*155*	*155*	*155*

b. Private Sector	*5,307*	*5,215*	*5,153*	*5,487*
- Acute Hospitals	*1,441*	*1,446*	*1,482*	*1,629*
- Psychiatric Hospitals	*-*	*-*	*-*	*-*
- Community Hospitals	*12*	*4*	*-*	*-*
- Nursing Homes	*3,854*	*3,765*	*3,671*	*3,858*
- Inpatient Hospices	*-*	*-*	*-*	*-*
Physicians[4]	**12,967**	**13,386**	**13,766**	**14,279**
a. Public Sector	*8,358*	*8,573*	*8,819*	*9,030*
b. Private Sector	*3,979*	*4,107*	*4,225*	*4,439*
c. Not in active Practice	*630*	*706*	*722*	*810*
Nurses/Midwives[4]	**40,561**	**41,440**	**42,125**	**42,777**
- Registered Nurses	*31,615*	*32,672*	*33,614*	*34,609*
- Enrolled Nurses	*8,781*	*8,631*	*8,394*	*8,059*
- Registered Midwives	*165*	*137*	*117*	*109*
Advanced Practice Nurses[4]	**197**	**218**	**238**	**267**
GDP (US$, billions)				
Government Health Expenditure (as % of GDP)[5]	**2.1**	**2.1**	**2.1**	**N/A**
Government Health Expenditure (as % of Total Government Expenditure)[5]	**13.8**	**13.9**	**13.4**	**N/A**
Insured citizens (%)	-	-		
SCD patients	-	-		
Heart failure patients	-	-		
AF patients	-	-		

Source: Singapore Health Facts, Ministry of Health, Singapore and data.gov.sg retrieved as of 24 Sept 2020[1,2,3,4,5] (www.moh.gov.sg).

2. Pacemaker

	2016	***2017***	***2018***	***2019***
Total Pacemakers[4]	**827**	**801**	**875**	**928**
- New implants	580	574	589	620

Replacements/Upgrades	126	121	139	135
Others	121	106	147	173
- Single-chamber	145	141	143	131
Dual-chamber	588	562	591	621
Not applicable	94	98	141	176
- Sick sinus syndrome	391	387	377	338
AV block*	219	195	230	259
Implanting Centers[4]	5	6	6	6
Implanting Physicians[4]	~18	~24	~25	~27
National Registry[4]	☑	☑	☑	☑

Source: CGH, KTPH, NHCS, NTFGH, NUH, TTSH, SCDB as of 31 August 2020[4]

** refer to Complete AV Block only.*

CGH: Changi General Hospital, KTPH: Khoo Teck Puat Hospital, NHCS: National Heart Centre Singapore, NTFGH: Ng Teng Fong General Hospital, NUH: National University Hospital, TTSH: Tan Tock Seng Hospital, SCDB: Singapore Cardiac Data Bank

3. Cardiac resynchronization therapy

	2016	***2017***	***2018***	***2019***
Total CRTs[4]	**166**	**178**	**184**	**205**
- CRT-P	26	20	38	52
CRT-P new implants	10	11	16	30
CRT-P replacements/upgrade	15	9	22	20
Others	1	-	-	2
- CRT-D	140	158	146	153
CRT-D new implants	94	91	100	101
CRT-D replacements/upgrade	39	58	42	41
Others	7	9	4	11
- Ischemic	87	91	92	94
Non-ischemic	46	48	26	49
Implanting Centers[4]	5	6	6	6
Implanting Physicians[4]	~16	~20	~22	~25
National Registry[4]	☑	☑	☑	☑

Source: CGH, KTPH, NHCS, NTFGH, NUH, TTSH, SCDB as of 31 August 2020[4]

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs[4]	**339**	**378**	**394**	**345**
- ICD new implants	239	277	288	222
ICD replacements/upgrade	57	64	64	77
Others	43	37	42	46
- Single-chamber	272	295	311	246
Dual-chamber	45	59	54	70
Others	22	24	29	29
- Primary prevention	225	248	266	225
Secondary prevention	114	130	128	119
Others	-	-	-	1
Implanting Centers[4]	5	6	6	6
Implanting Physicians[4]	~17	~23	~21	~26
National Registry[4]	☑	☑	☑	☑

Source: CGH, KTPH, NHCS, NTFGH, NUH, TTSH, SCDB as of 31 August 2020[4]

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	48	45	47	49
Hospitals performed lead extraction	~4	~5	~6	~5
Cardiologists performing lead extraction	~14	~18	~16	~16
Surgeons performing lead extraction	~2	~2	-	~2
National Registry	☑	☑	☑	☑

Inclusive of Explantation of PPM / ICD

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures[4]	**764**	**844**	**951**	**963**
SVT ablation procedures	-	-	-	-
AVNRT	201	185	193	206
AVRT/WPW	134	114	116	116

AFL (RA isthmus dependent)	146	188	205	198
AT	38	43	42	67
VT/VPC	45	107	128	152
Idiopathic	-	-	-	-
Structural	-	-	-	-
AF ablation procedures	132	181	244	193
Others	68	26	23	31
Ablation centers[4]	3	3	3	3
AF ablation centers	2	2	2	2
Structural VT ablation centers	2	2	2	2
Ablation physicians[4]	~18	~15	~20	~21
AF ablation physicians	–	–	–	–
Structural VT ablation physicians	–	–	–	–
National Registry[4]	☑	☑	☑	☑

Source: CGH, KTPH, NHCS, NTFGH, NUH, TTSH, SCDB as of 31 August 2020[4]

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐Ablation
National accreditation for centers	☑PM	☑CRT	☑ICD	☑Ablation
Guidelines followed	☐ National	☑U.S.	☑Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	-	-	-	-
Insurance	–	–	–	–
Public insurance	-	-	-	-
Private insurance	-	-	-	-
Individual	-	-	-	-

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☑	☐	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☑	☐	☐

Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☑	☐	☐	☐
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☑	☐	☐	☐

8. Source

The source of information is contributed by the public hospitals i.e. Changi General Hospital, Khoo Teck Puat Hospital, National Heart Centre Singapore, Ng Teng Fong General Hospital, National University Hospital and Tan Tock Seng Hospital.

Country/Region: South Korea (Republic of Korea)

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	51619	50982	51164	51269
Hospitals[2]	68,476	-		-
Beds (per 100,000 population)[2]	1,327	-	1, 240	-
Physicians (per 1,000 population)[2]	2.3	2.3	2. 4	-
Nurses (per 1,000 population)[2]	6.8	6.9	7.3	-
GDP (US$, billions)[3]	1,404.30	1,530.7		1913.9
Total expenditure on health as % GDP[3]	7.3%	7.6%	-	8.0%
Government expenditure on health as %[3]	-			4.9%
Insured citizens (%)	100	100	100	100
SCD patients	-	-		
Heart failure patients	-	-		
AF patients	-	-		

1, www.census.gov

2, www.who.int / http://apps.who.int/nha/database/country_profile/Index/en

3, www.imf.org

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	5007	5347	5408	4368
New implants	4319	4336	4457	
Replacements	688	1011	951	
Single-chamber	2126	2106	-	
Dual-chamber	2881	3241	-	
Sick sinus syndrome	1371	1828	-	
AV block	1817	2716	-	
Implanting Centers	–	–	–	
Implanting Physicians	91	247	84	

National Registry	☐	☐	No	

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	281	350	272	352
CRT-P	24	49	-	
CRT-P new implants	14	32	-	
CRT-P replacements/upgrade	10	17	-	
CRT-D	257	301	-	
CRT-D new implants	204	251	-	
CRT-D replacements/upgrade	53	50	-	
Ischemic	15	15	-	
Non-ischemic	213	284	-	
Implanting Centers	-	-	-	
Implanting Physicians	71	57	62	
National Registry	☐	☐	No	

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	1113	1157	1542	1248
ICD new implants	887	1022	1366	
ICD replacements	226	135	176	
Single-chamber	544	666	-	
Dual-chamber	569	491	-	
Primary prevention	195	361	-	
Secondary prevention	638	688	-	
Implanting Centers	-	-	-	
Implanting Physicians	80	112	76	
National Registry	☐	☐	No	

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	41	–	92	113

Hospitals performed lead extraction	47	–	12	
Cardiologists performing lead extraction	47	–	31	
Surgeons performing lead extraction	0	–	2	
National Registry	☐	☐	No	

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	5617	3961	9545	9631
SVT ablation procedures	2921	2160	5040	4936
AVNRT	1905	1045	-	
AVRT/WPW	1259	626	-	
AFL (RA isthmus dependent)	620	489	-	
AT	279	187	506	
VT/VPC	407	172	461	671
Idiopathic	282	140	-	
Structural	68	32	-	
AF ablation procedures	2324	1375	3538	4024
Ablation centers	39	24	40	
AF ablation centers	39	22	37	45
Structural VT ablation centers	28	15	17	19
Ablation physicians	68	44	66	
AF ablation physicians	64	33	54	
Structural VT ablation physicians	46	26	42	
National Registry	☐	☐	Yes	

7. Management

National certification for physicians	☐PM	☐CRT	☐ICD	☐ Ablation
National accreditation for centers	☐PM	☐CRT	☐ICD	☐ Ablation

Guidelines followed ☒ National ☐U.S. ☐Europe ☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	95%	95%	95%	95%
Insurance				
Public insurance	100%	100%	100%	100%
Private insurance				
Individual				

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☑	☐	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☑	☐	☐
Lack of referral	☐	☐	☑	☐	☐
Lack of trained personnel	☐	☑	☐	☐	☐
Low awareness of guidelines	☐	☐	☑	☐	☐
Lack of operators	☐	☑	☐	☐	☐

8. Source

KHRS (Korean Heart Rhythm Society)

Country/Region: Taiwan, CN

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	23,540	23571	23590	23574
Hospitals[2]	494	478	473	476
Beds[2]	133,335	164590	148947	168,266
Physicians[3]	43,961	46311	46356	49,542
Nurses[3]	126,458	135969	159621	154,747
GDP (US$, billions)[4]	529.676	574.895	589.391	
Total expenditure on health as % GDP[5]	5.94	6.3	6.1	
Government expenditure on health as %[6]	6.92			
Insured citizens (%)	99%	99%	99%	99%
SCD patients	–			
Heart failure patients	–			
AF patients	–			

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	6661	6222	6735	6904
New implants	78%	85%	85%	82%
Replacements	22%	15%	15%	18%
Single-chamber(Leadless included)	24%	23%	23%	22%
Leadless	0	0	1.7%	1.3%
Dual-chamber	76%	77%	77%	78%
Sick sinus syndrome	62%	59%	55%	63%
AV block	38%	41%	45%	37%
Implanting Centers	108	110	112	110
Implanting Physicians	484	538	552	550
National Registry	☑	☑	☑	☑

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	331	328	312	354
CRT-P	238	243	227	216
CRT-P new implants	68%	60%	70%	60%
CRT-P replacements/upgrade	32%	40%	30%	40%
CRT-D	93	85	85	138
CRT-D new implants	67%	52%	71%	43%
CRT-D replacements/upgrade	33%	48%	29%	57%
Ischemic	24%	31%	34%	40%
Non-ischemic	76%	69%	66%	60%
Implanting Centers	51	60	52	35
Implanting Physicians	117	166	122	120
National Registry	☑	☑	☑	☑

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	649	695	816	891
ICD new implants	82%	85%	80%	77%
ICD replacements	18%	15%	20%	23%
Single-chamber	37%	42%	44%	39%
Dual-chamber	63%	58%	56%	61%
Primary prevention	1%	2%	2%	1.5%
Secondary prevention	99%	98%	98%	98.5%
Implanting Centers	67	69	82	58
Implanting Physicians	177	206	234	175
National Registry	☑	☑	☑	☑

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	–		55	14
Hospitals performed lead extraction	–		6	8
Cardiologists performing lead extraction	–		44	12
Surgeons performing lead extraction	–		11	2
National Registry	☐	☐	☑	☑

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	4345	4997	5069	5020
SVT ablation procedures	2983	3443	2514	2507
AVNRT	1466	1828	1757	1804
AVRT/WPW	764	766	740	722
AFL (RA isthmus dependent)	547	646	621	632
AT	175	203	158	171
VT/VPC	685	816	1056	1115
Idiopathic	402	548	676	810
Structural	81	135	135	125
AF ablation procedures	596	738	1241	1142
Ablation centers	36	15	38	38
AF ablation centers	16	15	15	15
Structural VT ablation centers	8	15	15	15
Ablation physicians	47	89	94	98
AF ablation physicians	38	66	67	70
Structural VT ablation physicians	32	65	66	69
National Registry	☐	☐	☐	

7. Management

National certification for physicians	☐ PM	☐CRT	☑ ICD	☑ Ablation
National accreditation for centers	☐ PM	☐CRT	☐ICD	☐ Ablation
Guidelines followed	☑ National	☑ U.S.	☑ Europe	☑ AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	100	100	100	95
Insurance				
Public insurance				
Private insurance				
Individual				5

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☑	☐	☐	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☑	☐
Lack of referral	☑	☐	☐	☐	☐
Lack of trained personnel	☑	☐	☐	☐	☐
Low awareness of guidelines	☑	☐	☐	☐	☐
Lack of operators	☑	☐	☐	☐	☐

8. Source

Taiwan Heart Rhythm Society

[1]https://www1.stat.gov.tw/np.asp?ctNode=4649&mp=3
[2]https://dep.mohw.gov.tw/DOS/cp-1735-3246-113.html
[3]https://dep.mohw.gov.tw/DOS/cp-1735-3245-113.html
[4]https://www1.stat.gov.tw/point.asp?index=1#
[5]https://iiqsw.mohw.gov.tw/InteractiveIntro.aspx?TID=9FBD55607C91A331
[6]https://dep.mohw.gov.tw/DOS/lp-2156-113.html

Country/Region: THAILAND

2017 EP & Implant data(Black) limited to government hospitals, (Red) are national total from device companies

1. Statistics

	2016	2017	2018	2019
Population	68,146,609	69,037,513	69,282,825	69,828,393
Hospitals	583			
Beds(per 100,000 population)	2.1 beds/1,000 population (2010)			
Physicians	0.39 physicians/1,000 population (2010)			
Nurses	2.07:1000 (2010)			
GDP (US$)	USD406 billion	USD 403.6 billion		$543.65 billion
Total expenditure on health as % GDP				
Government expenditure on health as %	6.5% of GDP (2014)	3.76% of GDP		
Insured citizens (%)	100			87.9
SCD patients				
Heart failure patients				
AF patients				

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	3046	2306(3749)	3863	3827
New implants	2897	1862(2985)	3301	2802
Replacements	149	252(784)	562	1025

Single-chamber	33%, 2 micra	325(14.1%),(1094) 10 micra	1160	1138
Dual-chamber	68%	1729(74.9%) (2736)	2633	2711
Sick sinus syndrome	49%			
AV block	51%			
Implanting Centers	85	16		25(government)
Implanting Physicians	140			
National Registry	yes	no		no

3.Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	111	329(389)	384	373
CRT-P				
CRT-P new implants	78	46(51)	50	62
CRT-P replacements/upgrade		14(20)	20	33
CRT-D				
CRT-D new implants	226	245(262)	234	177
CRT-D replacements/upgrade		24(56)	80	101
Ischemic				
Non-ischemic				
Implanting Centers				25(government)
Implanting Physicians	20			
National Registry	yes			

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	960	927(950)	949	952
ICD new implants	841	919(1091), 3SICD	820	750
ICD replacements	119	8(174)	129	202
Single-chamber	72% 2 SICD	575(710)	809	805
Dual-chamber	13%	82(119)	148	225

Primary prevention				
Secondary prevention				
Implanting Centers				25(government)
Implanting Physicians				
National Registry	☐	☐	☐	

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures		33	42	23
Hospitals performed lead extraction	1	3	5	7
Cardiologists performing lead extraction				
Surgeons performing lead extraction				
National Registry	☐no	☐	☐	

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures				
SVT ablation procedures				
AVNRT		1296	1158	1135
AVRT/WPW		702	667	372
AFL (RA isthmus dependent)		244	181	184
AT		156	116	138
VT/VPC				
Idiopathic		413	384	479
Structural		6	10	16
AF ablation procedures		128	131	177
Ablation centers		16	18	25(government)
AF ablation centers				25(government)
Structural VT ablation centers				

Ablation physicians		40		
AF ablation physicians				
Structural VT ablation physicians				
National Registry	☐	☐	N/A	

7. Management

National certification for physicians	☐PM	☐CRT	ICD	☐Ablation
National accreditation for centers	☐PM	☐CRT	X ICD	☐Ablation
Guidelines followed	XNational	XU.S.	XEurope	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government				
Insurance				
Public insurance				
Private insurance				
Individual				

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐	x	☐	☐
Lack of reimbursement, limited financial resources	☐	☐	☐	☐	x
Lack of referral	☐	☐	☐	x	☐
Lack of trained personnel	☐	☐	x	☐	☐
Low awareness of guidelines	☐	☐	☐	x	☐
Lack of operators	☐	x	☐	☐	☐

Country/Region: Vietnam

1. Statistics

	2016	2017	2018	2019
Population (thousand)[1]	94,444	94,971	96,452	
Hospitals	-	-	-	
Beds	-	-	-	
Physicians	-	-	-	
Nurses	-	-	-	
GDP (US$, billions)	200	220	241	
Total expenditure on health as % GDP	-	-	-	
Government expenditure on health (US$)	-	-	-	
Insured citizens (%)	80	86.4	87.7	
SCD patients	-		-	
Heart failure patients	-		-	
AF patients	-		-	

7, www.census.gov

2. Pacemaker

	2016	2017	2018	2019
Total Pacemakers	2.588	2805	3242	4891
New implants	-	2595	2594	
Replacements	-	210	648	
Single-chamber	1.214	1.118	1450	1876
Dual-chamber	1.185	1.687	1792	2641
Sick sinus syndrome	-	1.825	2107	
AV block	-	980	1135	
Implanting Centers	37	43	44	46
Implanting Physicians	98	110	120	126
National Registry	☐	☐		

3. Cardiac resynchronization therapy

	2016	2017	2018	2019
Total CRTs	76	95	94	111
CRT-P	65	71	54	49
CRT-P new implants	-	67	48	
CRT-P replacements/upgrade	-	4	6	
CRT-D	11	14	40	62
CRT-D new implants	-	13	35	
CRT-D replacements/upgrade	-	1	5	
Ischemic	-	12	-	
Non-ischemic	-	83	-	
Implanting Centers	8	14	14	14
Implanting Physicians	24	30	30	30
National Registry	☐	☐		

4. Implantable cardioverter defibrillator

	2016	2017	2018	2019
Total ICDs	73	153	192	263
ICD new implants	-	144	168	
ICD replacements	-	9	24	
Single-chamber	58	148	170	
Dual-chamber	15	5	22	
Primary prevention	-	122	154	
Secondary prevention	-	31	38	
Implanting Centers	12	16	18	18
Implanting Physicians	30	36	40	40
National Registry	☐	☐		

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2016	2017	2018	2019
Total lead extraction procedures	-	5	-	
Hospitals performed lead extraction	-	2	-	
Cardiologists performing lead extraction	-	4	-	
Surgeons performing lead extraction	-	1	-	
National Registry	☐	☐		

6. Interventional electrophysiology

	2016	2017	2018	2019
Ablation procedures	2958	4022	3483	4042
SVT ablation procedures	-			
AVNRT	837	1.478	1729	1656
AVRT/WPW	868	936	804	902
AFL (RA isthmus dependent)	35	121	49	40
AT	35	38	129	100
VT/VPC	1183	1290	1343	1289
Idiopathic	-	1280	1343	
Structural	-	10	0	
AF ablation procedures	79	159	101	55
Ablation centers	19	20	21	22
AF ablation centers	6	7	7	7
Structural VT ablation centers	-	4	4	4
Ablation physicians	36	44	45	
AF ablation physicians	14	14	14	16
Structural VT ablation physicians	-	7	7	
National Registry	☐	☐		

7. Management

National certification for physicians	☑PM	☑CRT	☑ICD	☑ Ablation

National accreditation for centers	☑PM	☑CRT	☑ICD	☑ Ablation
Guidelines followed	☑ National	☑U.S.	☑Europe	☐AP

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government				
Insurance				
Public insurance	50%	20%	25%	80%
Private insurance				
Individual	50%	80%-	75%	20%

Obstacles to guideline implementation (1=no obstacle, 5=great obstacle)

	1	2	3	4	5
Lack of centers	☐	☐X	☐	☐	☐
Lack of reimbursement, limited financial resources	☑	☐	☐	☐	☐
Lack of referral	☑	☐	☐	☐	☐
Lack of trained personnel	☐	☑	☐	☐	☐
Low awareness of guidelines	☑	☐	☐	☐	☐
Lack of operators	☐	☐	☑	☐	☐

8. Source

Vietnam Heart Rhythm Society: Tran Van Dong, MD., Phan Dinh Phong, MD. Vien Hoang Long, MD., at al

The APHRS White Book: Eighth edition

-The current status of cardiac electrophysiology in APHRS member countries

Shu Zhang, M.D.FHRS, FESC
Professor of Medicine, Chief of Department of Cardiology
Director of Clinical EP Lab and Arrhythmia Center
National Center for Cardiovascular Disease & Fu Wai Cardiovascular Hospital,
Chinese Academy of Medical Sciences & Beijing Union Medical College
President, Chinese Society of Arrhythmias
President of APHRS

1. Foreword

The White Book of Asia Pacific Heart Rhythm Society (APHRS) is an annual compilation of the cardiac electrophysiology data from APHRS member countries and regions from 2013. As in previous years, the APHRS white book provided valuable update information about current status of activity in the field of arrhythmia treatment encompassing country demographics, epidemiology of cardiac arrhythmia, implantation of CIEDs (pacemaker, cardiac resynchronization therapy, and implantable cardioverter defibrillator), procedures of interventional electrophysiology, and obstacles to guideline implementation etc. Under the joint effort of our board members, the Eighth edition of APHRS White Book was finally released with data from 17 countries and regions, including China mainland, Hong Kong CN, India, Indonesia, Japan, Korea, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, Singapore, Taiwan CN, Thailand, Vietnam, Brunei Darussalam, and Mongolia. The Data collection is mostly the result of voluntary participation of each national Society of Pacing and Electrophysiology or national Heart Rhythm Society. We hope the APHRS White Book will become a key reference for those seeking information about electrophysiological procedures and CIEDs in Asia-Pacific countries.

2. Methodology

A primary research was conducted within national Heart Rhythm Societies or working groups of cardiac pacing and electrophysiology of each country. Each chairman of the societies and/or working groups was asked to compile information about their country for the year 2016, 2017, 2018 and 2019 based on a questionnaire. Secondary research has been conducted with the help of reliable official online databases to cross verify the information reported here. Three major source of information have been used: healthcare data were extracted from the World

Health Organization (WHO) (http://www.who.int), whereas demographic information were taken by the United States Census Bureau International Database (http://www.census.gov), and finally, the source of economic information has been the International Monetary Fund (IMF) World Economic Outlook Databases (http://www.imf.org). A total of 17 APHRS member countries and regions provided their data in this edition. The analysis was performed on the trend of device implantation and catheter ablation from 2016 to 2019, and the device implantation rates or catheter ablation rates and centers in 2019.

3. Permanent Pacemaker Implantation

3.1 Increase in pacemaker implantation

As shown in Figure 1, the increasing trend in the implantation of permanent pacemaker was seen in all the 17 countries or regions in 2019 as compared with 2018. For Vietnam, the implantation of pacemaker demonstrated a significant increasing rate at 50%. The pacemaker implantation in Philippines, China, India, Mongolia, Pakistan, Singapore and Malaysia show an increasing rate over 5%. Reported data showed decreased pacemaker implantation in Brunei Darussalam, Hongkong CN, South Korea, Myanmar and Thailand. In Indonesia, Japan,New Zealand, Taiwan CN, the increasing rate was 1.7%, 3.55%,0.34%,2.51% respectively.

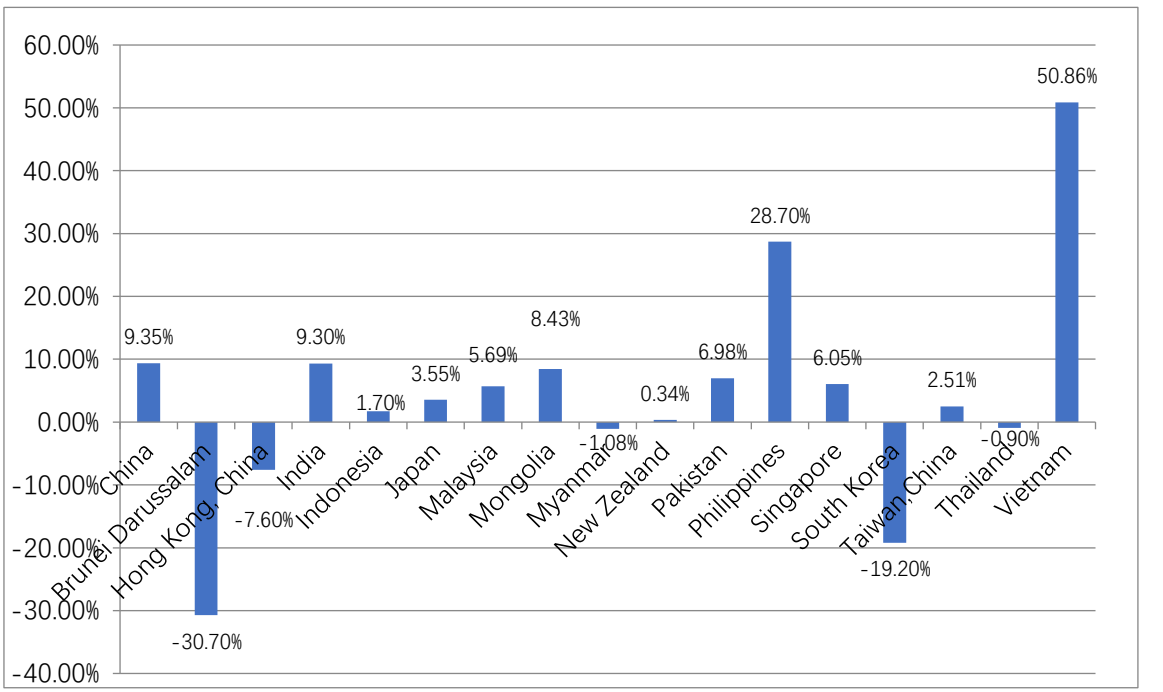

Figure 1: Increasing rate of pacemaker implantation in 2019 as compared with 2018

3.2 Pacemaker implantation rate

As shown in Table 1, data in 2019 were analyzed by evaluating pacemaker implantation rates. Across the 17 countries or regions, the pacemaker implantation rate per million inhabitants showed similar trend to that in last year with the highest reported implantation rate in New Zealand (536.3) and Japan (501.3) and the lowest in Indonesia (6.1). The pacemaker implantation rates per million inhabitants were also low in Philippines (12.5) and Myanmar (11.9). The large gap in the number of pacemaker implanting center per million inhabitants still remained among the 17 countries and regions. In 2019, Taiwan remianed as the top region where had the same highest implanting centers per million inhabitants (4.7), while the second with high pacemaker implanting centers per million inhabitants were Brunei(4.5) and Vietnam(4.5). Other countries remained similar level to that in 2018. Although the reported data in 2019 did not differ significantly from that in 2018, our analysis still found a significant change as compared with several years before. One major difference from last year is that pacemaker implantation rate was shown an increased trend in most of Asia-Pacific countries and regions. Other data provided similar information. For example, China and Japan are still the countries that had the highest total number of pacemaker implantations in 2019. The influence of GDP on pacemaker implants did not differ as compared with that in 2018. The countries with highest GDP per capita of the 17 countries and regions were Hong Kong, New Zealand, Japan, and Taiwan. The countries with highest implantation rate per million inhabitants were also New Zealand, Japan, Taiwan and Hong Kong.

3. ICD and Cardiac Resynchronization Therapy devices (CRT)

3.1 The implantation of ICD in 2019

Similar to data last year, the increasing trend of implantation of ICD was observed in 17 APHRS countries and regions in 2019 as compared with 2018 (Figure 2). Most Asia-Pacific countries and region kept an increasing trend in ICD implantation. Japan, China and India are the three countries that had the highest total number of pacemaker implantations in 2019. The countries with the increase rates of ICD implant more than 30% in 2019 were Myanmar(54.2%), Philippines(51.4%), Brunei(41.9%), and Vietnam(36.9%). China had an increasing trend of 12.5% in ICD implantation. The ICD implantation was still rare in some Asia-Pacific countries like Mongolia (1 cases).

We also analyzed the data on ICD primary or secondary prevention from 11 countries and regions: China mainland, India, Philippines, Taiwan, Indonesia, Singapore, Malaysia, Myanmar, Pakistan, Brunei, and Mongolia. The use of ICD for primary prevention in Brunei, Singapore, and Myanmar were higher than 50% (79.5%, 65.22%, 56.76%, respectively). China mainland and Malaysia had a primary prevention ratio of ICD more than 30% (45%, 34.98%, respectively).

Brunei was the country having the highest ratio of primary prevention in Asia-Pacific countries and regions (79.5%).

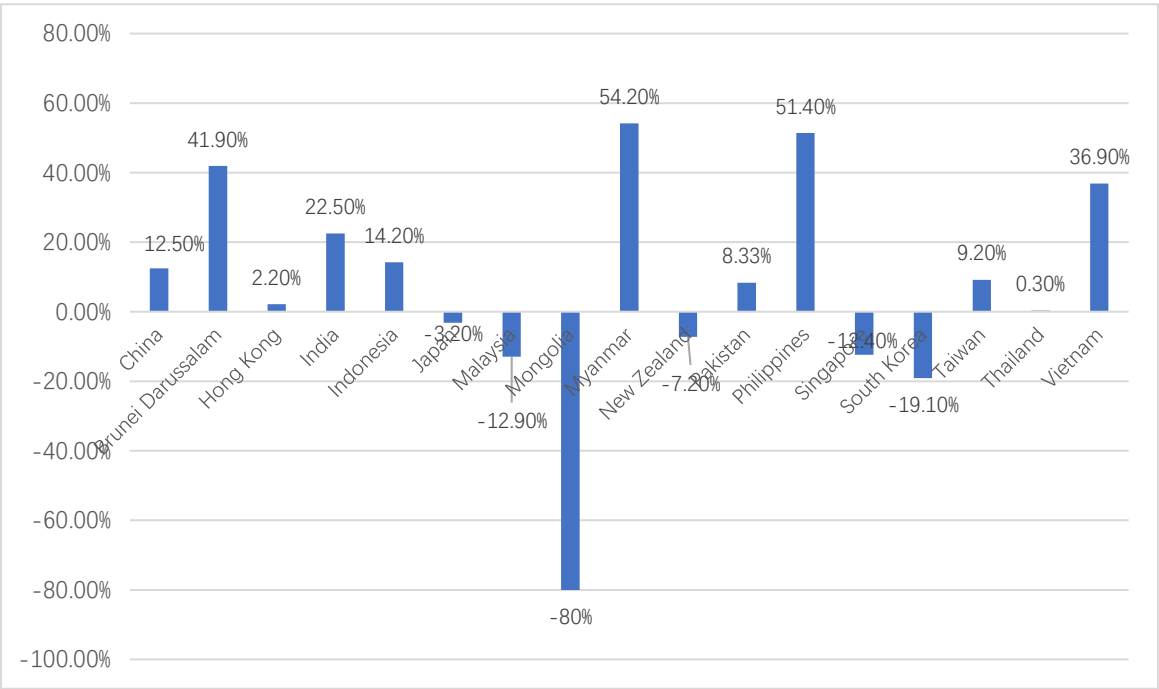

Figure 2: Increasing rate of ICD implantation in 2019 as compared with 2018

3.2 ICD implantation rate

As shown in table 1, New Zealand was still the country with highest reported ICD implantation rate per million inhabitants (122.1). Brunei(100), Singapore (61.67) and Japan (51.79) were the other countries with high ICD implants/million. Some countries kept increasing ICD implants/million, including Taiwan (37.77), Hong Kong (36.63), ~~South Korea(30.1)~~, and Thailand(13.74). Countries with low ICD implants/million were Indonesia (0.21), Mongolia (0.31), Philippines (1.02), and Myanmar (0.69). The available data also showed a large gap among the 17 countries and regions in the number of ICD implanting center per million inhabitants. In 2019 data, the countries with more than 1 ICD implanting centers per million inhabitants were Brunei (4.5), Taiwan (3.5), New Zealand (1.6), and Singapore (1.1). The other countries and regions with less than 1 implanting centers per million inhabitants included India (0.3), Indonesia(0.1), Malaysia (0.6), Mongolia (0.3), Myanmar (0.1), Sri Lanka (0.4), Philippines (0.1), Mainland China (0.3), and Vietnam (0.2).

3.3 CRT utilization in Asia-Pacific area

In 2019,we had data on CRT implantation from 17 Asia-Pacific countries and regions (Figure 3). The rising trend in CRT implantation remains in 11 among the data from 17 countries and regions, there were 5 countries and regions which showed decreased CRT implantation.

In 2019, the countries with total number of CRTs implantation more than 1000 were Japan (5149), Mainland China (4523) and India (3608), and those with CRT implantation between 100 and 1000 were Hong Kong (164), Malaysia (160), Thailand (373), New Zealand (318), Pakistan (390) , Singapore (205), South Korea (352), Taiwan (354), and Vietnam(111). The countries with the increase rates of CRT implant more than 10% in 2019 were Brunei (46.15%), India (20.27%), Singapore (11.43%), Philippines(80%), South Korea (29.41%), Taiwan (13.46%), and Vietnam(18.09%), and the countries and regions with an increase below 10% included China(2.05%%), Indonesia(1.61%), Japan(7.76%), and Pakistan(8.33%). In contrast, 5 countries and region presented as decrease in CRT implantation, including Hong Kong (-8.38%), Malaysia (-9.6%), Myanmar (-15.39%), New Zealand (-3.34%), Thailand (-2.87%). The total number of CRT implant was also relatively low in 4 countries and regions, including Mongolia(3), Philippines (27), Brunei (19), and Myanmar (11), although some of them had been demonstrated as an increasing trend.

The CRT implantation rate per million inhabitants in 2019 seemed to be increased as compared to last year. However, still a great heterogeneity was seen similar to last year, from as low as 0.2-0.93/million (Myanmar, Pakistan, Indonesia and Philippines) to as high as 64.5/million in New Zealand, 43.18 in Brunei, 40.7 in Japan, and 36.35 in Singapore. The increasing trend continued was seen in the CRT implantation rate per million inhabitants in most Asia-Pacific countries and regions, including India (from 2.2 in 2018 to 2.7 in 2019), Japan (from 37.8 in 2018 to 40.7 in 2019), Singapore (from 32.6 in 2018 to 36.3 in 2019), South Korea (from 5.3 in 2018 to 6.9 in 2019), and there was a slightly decreasing trend in Hong Kong (from 23.9 in 2018 to 21.9 in 2019), Malaysia (from 5.5 in 2018 to 4.9 in 2019).

There was also significant variability in the ratio of CRT-D/CRT-P implants. The number of “CRT implant centers” in 15 countries and regions were analyzed. 11 out of 15 Asia-Pacific countries and regions were with more than 50% CRT-D implantation rate, in which Myanmar were shown with the highest CRT-D/total CRT ratio (90.91%). Philippines CRT-D implantation rate above 50% were shown in other 10 countries and regions, including China(64%), Brunei(78.95%), Hong Kong (83.54%), India (85%), Japan (70.81%), Malaysia (52.5%), Philippines(88.89%), Singapore(74.63%), Thailand(74.53%), Vietnam(55.86%). However, CRT-D implant rate was less than 30% in Pakistan(25.64%).

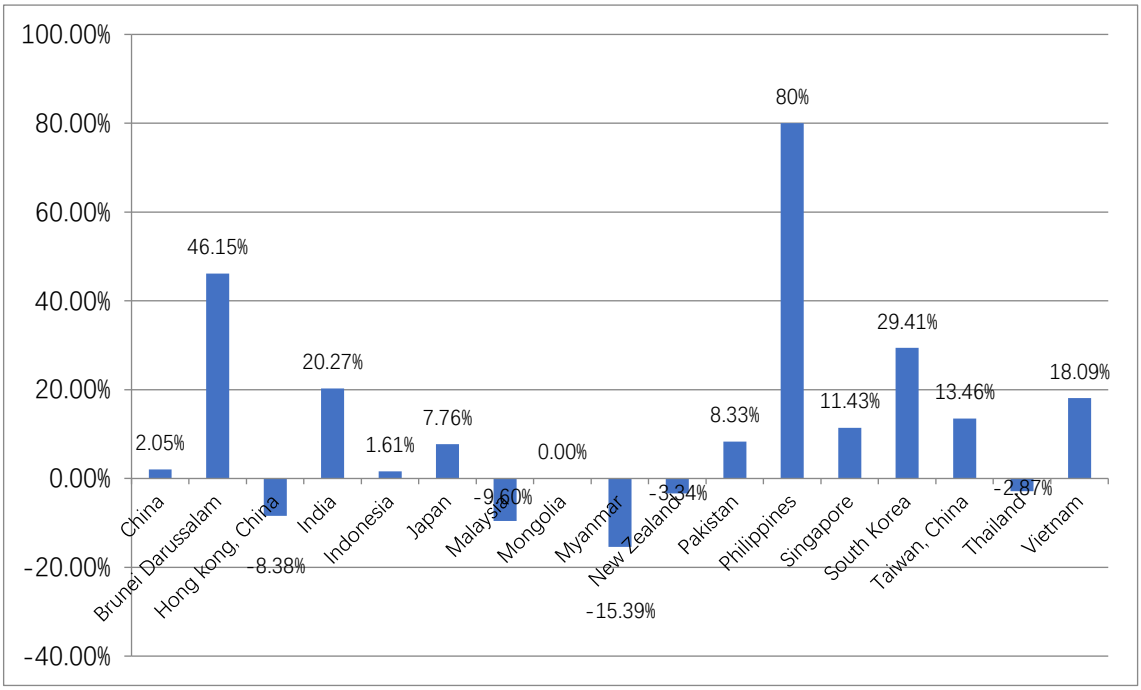

Figure 3: Increasing rate of CRT implantation in 2019 as compared with 2018

4 Catheter Ablation

4.1 General information of Catheter Ablation

4.2 We received data about catheter ablation from 15 countries and regions in 2019. China mainland was still the country having the highest cases receiving catheter ablations (173950). Japan was the other countries with high cases of 96000. The ablation procedures in other 13 countries and regions were less than 10000. An increasing trend was observed in ablation procedures across 12 countries. Mongolia and Indonesia were the countries with the highest ablation increasing rate (110.8%, and 35.57% respectively). There were 4 countries and regions with an increasing rate between 10% and 20%, including China(14.75%), Japan(20%), Pakistan(11.11%), Philippine (11.68%),and Vietnam(16.05%). The increasing rate in Malaysia(8.39%), Myanmar(7.71%), New Zealand (3.65%), Singapore(1.26%) and South Korea(0.9%), were relatively low as compared with other countries. However, India (-4.11%),

Thailand(-5.52%) and Taiwan(-0.97%) demonstrated decrease in catheter ablation.

Ablation procedure rates

Table 2 is shown the ablation procedures per million inhabitants in 15 countries and regions. Japan was the country which continued having increasing ablation procedures per million inhabitants, from591.9 in 2017 to 632.4 in 2018, and then to 758.9 in 2019. New Zealand was the second with highest increment ablation procedures per million inhabitants (from 349.9 to 362.7). Countries having more than one hundred ablation procedures per million inhabitants included Mainland China (124.7), Singapore (170.7), Brunei (338.6), South Korea(188.3), and Taiwan (212.8). Philippines(1.4) and Philippines(3.4) had the lowest ablation procedures per million inhabitants. In China mainland, the ablation procedures/ million inhabitants increased from 95.8 in 2017 to 108.6 in 2018, and to 124.7 in 2019. Regarding ablation centers per million inhabitants in 2019, the highest density was remained in Japan (5.5) and the lowest in pakistan (0.01) and Philippines (0.04).

4.3 Atrial fibrillation (AF) catheter ablation

We had the data of AF ablation from 15 countries and regions this year. In 2019, AF ablation procedures increased almost in all countries. Japan was still the country with the highest number of AF ablation procedures (62000 cases). As shown in Table 2, the AF ablation rate per million inhabitants was increased from 466.4 to 490.1 in Japan, which was the highest among APHRS member countries and regions. Pakistan (0.05), Philippines (0.16) and Myanmar(0.24) were the countries with the lowest AF ablation rate. Regarding the ratio of AF ablation/total ablation, there was also a large gap among 15 countries and regions, with highest ratio of AF ablation/total ablation in Japan (77.5%), and lowest AF ablation ratio in Pakistan (0.7%). And the AF ablation ratio was 1.8% in India, 7.7% in Indonesia, 14.8% in Malaysia, 8.1% in Mongolia, 1.4% in Myanmar, 37.3%in New Zealand, 12.4% in Philippines, 20.2% in Singapore, 42.1% in South Korea, 22.5% in Taiwan, 6.7% in Thailand, and 1.6% in Vietnam.

5 Conclusion and future work

This edition of APHRS White book had made a great progress with collection of data from 17 APHRS countries and regions although some data were not available. Primary analysis of these data showed a growing trend in arrhythmia interventional treatment in most Asia-Pacific countries and regions. However, there is still a great gap between Asia and Western countries. These data also highlight significant inequalities covering all arrhythmia interventional therapies in Asia-Pacific countries. The overview of these data indicated that more supervision, cardiac education training and guideline implementation are needed to promote the development of arrhythmia interventional therapy. The APHRS White Book needs indispensable support and

participation of all member countries in Asia-Pacific regions. The APHRS White book may serve as motivation for these countries to adopt a systematic approach to key data on arrhythmia therapy in the future.

Table 1. The CIEDs implantation rates and implanting centers per million inhabitants for the year 2018 in 19 Asia-Pacific countries and regions

Countries and regions	Pacemaker implantation rate/ million inhabitants	Pacemaker implanting centers / million	ICD implantation rate/ million inhabitants	CRT implantation rate/ million inhabitants	ICD/CRT implanting centers / million
PR. China	64.9	0.8	3.61	3.24	0.3
Brunei	115.6	4.5	100	43.18	4.5
Hong Kong	240.7	No data	36.63	21.93	No data
India	35.4	0.8	3.71	2.66	0.3
Indonesia	6.1	0.2	0.21	0.24	0.1
Japan	501.3	No data	51.79	40.7	No data
Malaysia	24.6	1.2	6.88	4.94	0.6
Mongolia	55.6	0.6	0.31	0.93	0.3
Myanmar	11.9	0.2	0.69	0.2	0.1
New Zealand	536.3	2.8	122.11	64.5	1.6
Pakistan	24.2	0.2	2.05	2.05	No data
Philippines	12.5	0.7	1.02	0.25	0.1
Singapore	164.5	1.1	61.17	36.35	1.1
South Korea	85.4	No data	24.39	6.88	No data
Taiwan	292.7	4.7	37.77	15.01	3.5
Thailand	55.2	No data	13.74	5.38	No data
Vietnam	50.7	4.5	2.73	1.15	0.2

Table 2 The ablation procedure rate and centers per million inhabitants for the year 2019 in 15 Asia-Pacific countries and regions

Countries and regions	Ablation procedure rate/ million inhabitants	Ablation centers/ million inhabitants	AF ablation rate/ million inhabitants	AF ablation centers/ million inhabitants	AF ablation/ ablation procedure
PR. China	124.7	0.63	41	0.31	37.78%
Brunei	No data	No data	No data	No data	No data
Cambodia	No data	0.06	No data	No data	No data
India	3.4	0.05	0.11	0.02	1.85%
Indonesia	4.5	0.06	0.26	0.03	7.7%
Japan	758.9	5.53	490.1	3.95	77.5%
Malaysia	27.5	0.15	3.77	0.15	14.8%
Mongolia	48.1	0.31	1.85	0.31	8.11%
Myanmar	19.2	0.09	0.24	0.02	1.35%
New Zealand	362.7	1.62	130.6	0.81	37.33%
Pakistan	7.9	0.01	0.05	0.01	0.74%
Philippines	1.4	0.04	0.16	0.04	12.4%
Singapore	170.7	0.53	34.2	0.35	20.3%
South Korea	188.3	0.78	78.7	0.72	42.2%
Sri Lanka	No data	0.23	No data	No data	No data
Taiwan	212.8	1.61	48.4	0.64	22.53%
Thailand	36.1	0.26	2.55	No data	6.69%
Vietnam	41.9	0.22	0.57	0.07	1.57%

- *ISSN: **2424-9386** (Online)*

*ISSN: **2424-9378** (Print)*