Preface

The APHRS was founded in 2008 with its goal to establish infrastructure for basic and clinical researches in the arrhythmia field of Asia-Pacific countries, to provide systematic educational opportunities for young researchers and clinicians wanting to specialize in this field, and to promote multinational researches.

In 2010, the need of White Book focusing on basic statistical data and current status of interventional therapies of cardiac arrhythmia in Asia-Pacific countries has been keenly felt.

The interventional therapies for cardiac arrhythmia have developed rapidly in Asia-Pacific region within past few decades. There is a rapidly growing trend in electrophysiological procedures and implantation of cardiac implantable electronic devices (CIEDs) in most of Asia-Pacific countries. However, significant inequalities exist in healthcare and treatment of cardiac arrhythmia across Asian countries and regions, which make it important and necessary for the healthcare community to share, recognize, and communicate with each other on the data and information relating to current status of cardiac electrophysiology and arrhythmia treatment. We hope annually updated White Book will not only promote scientific, technological, and clinical development for better therapy of cardiac arrhythmia but also improve and equalize healthcare for patients across countries and regions in Asia.

The APHRS White Book reports the most updated information about today of activities 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, obstacles to guideline implementation, etc. Since Professor Shu Zhang first presented valuable data across 7 countries in the scientific session of APHRS 2012, we decided to publish the first edition of the APHRS White Book during the scientific session of APHRS2013.

This third edition of the APHRS White Book 2015 includes data from 14 countries and regions on the use of CIEDs and electrophysiological procedures in the past three years. Data collection is mostly the result of voluntary participation of national Society of

Pacing and Electrophysiology or national Heart Rhythm Society in each country or region. In some other Asia countries, there are currently no registries or the data are limited. Thus, the APHRS White Book can be a cradle of international registry or collaboration and also provocative to adopt a systematic approach to collect data on arrhythmia therapies in each country. We hope more Asian countries and regions will participate in the future edition of APHRS White Book.

With the release of this third edition of the APHRS White Book, the APHRS appreciate the effort made by all authors, chairs and co-chairs from each of individual national HRS working groups, and expresses special thanks to Professor Shu Zhang, China, who devoted his precious time to annually updated APHRS White Book.

Young-Hoon Kim, MD.

Immediate Past President
APHRS

Massage from President

This White Book is a very important document looking at the current status of device implantation and interventional electrophysiology in the Asia Pacific region. It will provide trends in the growth and development of device implantation and ablation in the individual countries and also provides an epidemiological data of the current practice of arrhythmia management in the Asia Pacific region. This insight will help APHRS and even health care planners to anticipate the demand for treatment and management of cardiac arrhythmias in the Asia Pacific region.

APHRS' role as the society of heart rhythm specialists in the Asia Pacific region is to continue to educate and train all doctors especially electrophysiologists in the best management of patients with heart rhythm disorders. The Asia Pacific region with an estimated 3.7 billion people and a rapidly aging population will require an exponential increase in heart rhythm specialists especially device implanters.

APHRS is indebted to Dr Shu Zhang and his team for the excellent data collected by them and looking forward to the continued collaboration of all involved. We also hope that more countries will participate in this data collection so that future generations can benefit from this work.

Wee Siong TEO
President APHRS

Acknowledgement

As a member of APHRS and the chief editor of this book, I would like to express my great appreciation for the publication of the third edition of the APHRS White Book. I owe particular thanks to the current president of APHRS, Professor Wee Siong TEO, and the Immediate Past President, Professor Young-Hoon Kim, both of them led the preparation of this edition of the APHRS White Book. I would also like to thank our board members for their great support to this work. I will express my appreciation to all contributors, the national Society of Pacing and Electrophysiology and the national Heart Rhythm Society of 14 member countries or regions of APHRS. Without their voluntary collection of data, the publication of this book would not have been possible. In addition, I'd like to thank Ms. Shigeno, Mr. Jimmy Yap the secretary of APHRS, who help us collect data from member countries or regions. Finally, I'd like to mention contributions of members of my working group, Dr. Xiaohan Fan and Miss. Na Lin, who performed the 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
Vice President of APHRS

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Table of Contents

Country/Region: Australia

1. Statistics

	2012	2013	2014
Population (thousand)[1]		23,320	
Hospitals (implanting)			
Beds			
Physicians			
Nurses			
GDP (US$, billions)[2]			
Total expenditure on health as % GDP			
Government expenditure on health as %			
Insured citizens (%)		55%	
SCD patients		0	
Heart failure patients			
AF patients			

2. Pacemaker

	2012	2013	2014
Total Pacemakers			
New implants		15,203	
Replacements		3,664	
Single-chamber		4,131	
Dual-chamber		13,995	
Sick sinus syndrome		50%	
AV block		30%	
Implanting Centers		128	
Implanting Physicians			
National Registry		No	

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs		2,872	
CRT-P		661	
CRT-P new implants			
CRT-P replacements/upgrade			
CRT-D		2,211	
CRT-D new implants			
CRT-D replacements/upgrade			
Ischemic			
Non-ischemic			
Implanting Centers		113	
Implanting Physicians			
National Registry		No	

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs		3,724	
ICD new implants			
ICD replacements			
Single-chamber		1,687	
Dual-chamber		2,037	
Primary prevention			
Secondary prevention			
Implanting Centers		113	
Implanting Physicians			
National Registry			

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			
Hospitals performed lead extraction			
Cardiologists performing lead extraction			
Surgeons performing lead extraction			
National Registry			

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures			
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

Mond H, Crozier I. The Australian and New Zealand Cardiac Pacemaker and Implantable Cardioverter-Defibrillator Survey: Calendar Year 2013. Heart Lung and Circulation 2015; 24: 291-297.

Country/Region: PR. China

1. Statistics

	2011	2012	2013	2014[4]
Population (thousand)[1]	1,336,718	1,343,240	1,349,586	1,367,820
Hospitals	21,979	23,170	24,709	25,860
Beds (per 100,000 population) [2]		390	468.41	482.59
Physicians (per 1,000 population)[2]		1.46	1.67	1.74
Nurses(per 1,000 population)[2]		1.51	2.05	2.20
GDP (US$, billions)[3]	7,298.15	7,991.74	9,469.12	10,356.51
Total expenditure on health as % GDP[2]	5.03%	5.26%	5.39%	5.55%
Government expenditure on health as %	30.7%	30.0%	30.1%	30.0%
Insured citizens (%)	60%	70%	70%	70%
SCD patients	0.54m	0.54	0.54	0.54
Heart failure patients	4.5m	4.5m	4.5m	4.5m
AF patients	6m	6m	6m	8m

1. www.census.gov
2. www.who.int
3. www.imf.org
4. www.stats.gov.cn

2. Pacemaker

	2011	2012	2013	2014
Total Pacemakers	42,986	49,502	51,752	59,735
New implants	35,573	41,889	43,917	48,273
Replacements	7,413	7,613	7,835	8,305
Single-chamber	16,309	18,117	17,706	17,199
Dual-chamber	25,905	29,747	33,753	35,856
Sick sinus syndrome	21,762	24,980	26,318	27,294
AV block	16,765	19,144	20,240	21,262
Implanting Centers	840	938	933	963
Implanting Physicians	3,000	3,000	3,000	3,000
National Registry	☑	☑	☑	☑

3. Cardiac resynchronization therapy

	2011	2012	2013	2014
Total CRTs	1,876	2,210	2,198	2,753
CRT-P	987	1,020	959	1,057
CRT-P new implants	903	892	840	754
CRT-P replacements/upgrade	84	128	119	180
CRT-D	835	1,173	1,220	1,234
CRT-D new implants	762	1,062	1,066	873
CRT-D replacements/upgrade	73	111	154	254
Ischemic	548	587	542	528
Non-ischemic	1,289	1,623	1,656	1,571
Implanting Centers	330	358	353	383
Implanting Physicians	3,000	3,000	3,000	3,000
National Registry	☑	☑	☑	☑

4. Implantable cardioverter defibrillator

	2011	2012	2013	2014
Total ICDs	1,228	1,553	1,903	2,333
ICD new implants	1,126	1,424	1,745	1,864
ICD replacements	102	129	158	199
Single-chamber	879	1,044	1,300	1,295
Dual-chamber	349	509	603	622
Primary prevention	506	663	855	894
Secondary prevention	722	890	1,048	1,022
Implanting Centers	260	309	323	368
Implanting Physicians	3,000	3,000	3,000	3,000
National Registry	☑	☑	☑	☑

5. Interventional electrophysiology

	2011	2012	2013	2014
Ablation procedures	63,355	74,410	83,450	101,063
SVT ablation procedures	41,688	46,499	50,990	54,481
AVNRT	20,483	23,097	25,588	27,036
AVRT/WPW	18,415	20,325	21,809	21,653
AFL (RA isthmus dependent)	1,363	1,495	1,781	3,136
AT	1,427	1,582	1,812	2,656
VT/VPC	351	392	478	494
Idiopathic	334	369	423	476
Structural	17	23	16	18
AF ablation procedures	8,921	11,214	14,752	18,616
Ablation centers	658	732	737	773
AF ablation centers	316	331	345	390
Structural VT ablation centers				
Ablation physicians	2,000	2,000	2,000	2,000
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: Hong Kong SAR

1. Statistics

	2012	2013	2014
Population (thousand)[1]	7,154	7,219	7,266
Hospitals	53	53	53
Beds	35,500	35,790	36,965
Physicians	12,800	13,203	13,417
Nurses	31,500	34,597	35,821
GDP (US$, billions)	260.471	272.481	274.948
Total expenditure on health as % GDP	2.05%	2.17%	2.64%
Government expenditure on health (US$)	4,916 mil	5,905 mil	7,269mil
Insured citizens (%)			
SCD patients			
Heart failure patients			
AF patients			

1, www.census.gov

2. Pacemaker

	2012	2013	2014
Total Pacemakers	987	537	762
New implants	818	470	620
Replacements	169	67	142
Single-chamber			
Dual-chamber			
Sick sinus syndrome			
AV block			
Implanting Centers			
Implanting Physicians			
National Registry	☐	☐	☐

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs			
CRT-P			
CRT-P new implants			
CRT-P replacements/upgrade			
CRT-D			
CRT-D new implants			
CRT-D replacements/upgrade			
Ischemic			
Non-ischemic			
Implanting Centers			
Implanting Physicians			
National Registry	☐	☐	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	116	79	110
ICD new implants	79	57	77
ICD replacements	37	22	33
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

	2012	2013	2014
Total lead extraction procedures			
Hospitals performed lead extraction			
Cardiologists performing lead extraction			
Surgeons performing lead extraction			
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures			
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

	2012	2013	2014
Population (billion)	1.23	1.252	1.267[1]
Urban Hospitals (Govt. only)	11,993	13,761	14,432[2]
Beds (Govt. only)	8,32,000	14,38,738	15,96,168[2]
Physicians	8,83,812	9,19,812	9,36,448[3]
Nurses	22,27,912	23,61,591	25,30,275[3]
GDP (US$ - billion)	1,824	1,877	2,049.5[4]
Total expenditure on health as % GDP	4.0%	4.0%	3.9%[4]
Government expenditure on health as %	33.1%	33.1%	21%[4]
Insured citizens (in Millions)	370	410	550
SCD patients[3] (in Thousands)	615	627	700[5]
Heart failure patients[4] (in Millions)	2.38	2.31	~4.6[6]
AF patients (in Millions)	12.3	12.7	15.8

2. Pacemaker

	2012	2013	2014
Total Pacemakers	27,518	36,322	32,747
New implants	91.1%	85.8%	80%
Replacements	8.9%	14.4%	20%
Single-chamber	12,392	14,477	18,386
Dual-chamber	5,952	21,846	14,361
Sick sinus syndrome[5]	25%	25%	25%
AV block	65%	65%	75%
Implanting Centers	810	888	930
Implanting Physicians	1,480	1,500	1,535
National Registry	☐	☐	☐

http://www.worldometers.info/world-population/india-population/
https://data.gov.in/catalog/number-government-hospitals-and-beds-rural-and-urban-areas
http://statisticstimes.com/economy/gdp-of-india.php.
https://www.ihs.com/country-industry-forecasting.html?ID=1065985237
http://www.japi.org/december_2014/006_ra_sudden_cardiac_death.pdf.
http://csiheartfailure2015.org/

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs	1,514	1,830	2,935
CRT-P	834	945	1,257
CRT-P new implants	745	850	1,006
CRT-P replacements/upgrade	89	95	251
CRT-D	680	885	1678
CRT-D new implants	612	800	1411
CRT-D replacements/upgrade	68	85	267
Ischemic	65%		65%
Non-ischemic	35%		35%
Implanting Centers	207	300	315
Implanting Physicians	306	360	380
National Registry	☐	☐	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	1,540	1,950	3,268
ICD new implants	1,309	1,630	2,614
ICD replacements	308 (20%)	320	653
Single-chamber	1,120	1,350	2,075
Dual-chamber	420	550	1,193
Primary prevention	415 (27%)		30%
Secondary prevention	1,124 (73%)		70%
Implanting Centers	230	340	350
Implanting Physicians	358	440	475
National Registry	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures	10	20	30
Hospitals performed lead extraction	2	4	5
Cardiologists performing lead extraction	2	4	6
Surgeons performing lead extraction	1	1	1
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures	**11,346**	**13,707**	**16,349**
SVT ablation procedures	**8,046**	**9,179**	**10,555**
AVNRT	3,985	4,436	5,128
AVRT/WPW	2,733	3,143	3,618
AFL (RA isthmus dependent)	498	630	713
AT	830	970	1,096
VT/VPC	**2,800**	**3,768**	**4,792**
Idiopathic	988	1,324	1,638
Structural	1,812	2,444	3,154
AF ablation procedures	**500**	**760**	**1,002**
Ablation centers	100	126	143
AF ablation centers	20	20	24
Structural VT ablation centers	65	69	78
Ablation physicians	90	95	102
AF ablation physicians	25	27	33
Structural VT ablation physicians	48	51	63
National Registry	☐	☐	☐

All EP data – Company internal and Market data

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	20	20	20	15
Insurance	10	10	10	10
Public insurance	7	7	7	7
Private insurance	3	3	3	3
Individual	70	70	70	75%

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

Country/Region: Indonesia

1. Statistics

	2012	2013	2014
Population (thousand)[1]	244,775.80	248,422.90	252,101.20
Hospitals	2,083	2,228	2,486
Beds	149,826	238,373	269,791
Physicians	76,523	90,444	157,393
Nurses	235,496	288,405	281,111
GDP (US$, billions)	876.70	868.30	870.00
Total expenditure on health as % GDP	3%	3.1%	No data
Government expenditure on health (US$)	92.08%	91.66%	96.54%
Insured citizens (%)	66.82	76.18	No data
SCD patients	No data	No data	No data
Heart failure patients	No data	0.3%	No data
AF patients	9.3%	9.8%	No data

[2,] www.census.gov

2. Pacemaker

	2012	2013	2014
Total Pacemakers	371	573	717
New implants	307	542	688
Replacements	48	27	29
Single-chamber	223	357	436
Dual-chamber	132	216	281
Sick sinus syndrome	127	224	341
AV block	217	349	376
Implanting Centers	10	11	12
Implanting Physicians	16	20	23
National Registry	☐	☐	☐

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs	29	38	55
CRT-P	16	16	40
CRT-P new implants	20	27	40
CRT-P replacements/upgrade	2	2	0
CRT-D	4	4	15
CRT-D new implants	5	9	14
CRT-D replacements/upgrade	2	0	1
Ischemic	23	27	37
Non-ischemic	6	11	18
Implanting Centers	3	3	4
Implanting Physicians	10	10	11
National Registry	☐	☐	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	16	21	19
ICD new implants	10	19	19
ICD replacements	2	2	0
Single-chamber	10	15	18
Dual-chamber	2	5	0
Primary prevention	8	15	12
Secondary prevention	4	5	6
Implanting Centers	5	7	7
Implanting Physicians	16	20	23
National Registry	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures	1	1	5
Hospitals performed lead extraction	2	2	2
Cardiologists performing lead extraction	2	2	2
Surgeons performing lead extraction	0	0	0
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures	257	382	416
SVT ablation procedures	172	261	280
AVNRT	68	69	75
AVRT/WPW	47	48	48
AFL (RA isthmus dependent)	22	25	31
AT	9	15	20
VT/VPC	2	5	12
Idiopathic	43	60	80
Structural	0	2	4
AF ablation procedures	33	48	39
Ablation centers	5	6	6
AF ablation centers	2	2	3
Structural VT ablation centers	2	2	2
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: Japan

1. Statistics

	2012	2013	2014
Population (thousand)[1]	127,368	127,298	127,083
Hospitals (per 100,000 population)	6.71	6.71	6.71
Beds	1,706,326	1,695,210	1,691,450
Physicians (per 1,000 population) [2]	2.14	2.38	2.38
Nurses (per 1,000 population) [2]	7.47	7.98	7.99
GDP (US$, billions) [3]	5,981.00	5040.95	5008.57
Total expenditure on health as % GDP [2]	7.9%	7.3%	8.0%
Government expenditure on health as % [2]			
Insured citizens (%)	81%		
SCD patients			
Heart failure patients	1,087,000	108,700	1,200,000
AF patients	941,000	902,521	1,000,000

3. www.census.gov
4. www.who.int
5. www.imf.org

2. Pacemaker

	2012	2013	2014
Total Pacemakers	59,441	59,487	57,678
New implants	38,893	39,290	39,398
Replacements	20,548	20,197	18,280
Single-chamber	12,163	11,676	11,304
Dual-chamber	45,589	46,876	45,325
Sick sinus syndrome			
AV block			
Implanting Centers			
Implanting Physicians			
National Registry	☐	☐	☐

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs	4,209	4,260	4,405
CRT-P	839	935	1,049
CRT-P new implants			
CRT-P replacements/upgrade			
CRT-D	3,371	3,325	3,356
CRT-D new implants	2,439	2,217	2,139
CRT-D replacements/upgrade	932	1,108	1,217
Ischemic			
Non-ischemic			
Implanting Centers			
Implanting Physicians			
National Registry	☐	☐	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	5,594	6,373	5,830
ICD new implants	3,655	3,775	3,650
ICD replacements	1,939	2,598	2,108
Single-chamber	1,087	1,308	1,440
Dual-chamber	4,507	5,065	4,289
Primary prevention			
Secondary prevention			
Implanting Centers	394		
Implanting Physicians			
National Registry	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			
Hospitals performed lead extraction			
Cardiologists performing lead extraction			
Surgeons performing lead extraction			
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures	42,000	46,000	59,000
SVT ablation procedures	15,000	15,000	15,000
AVNRT			
AVRT/WPW			
AFL (RA isthmus dependent)			
AT			
VT/VPC	6,000	6,000	6,000
Idiopathic			
Structural			
AF ablation procedures	21,000	25,000	38,000
Ablation centers	600	550	490
AF ablation centers	350	350	400
Structural VT ablation centers			
Ablation physicians	1,500	1,600	1,800
AF ablation physicians	875	1,000	1,200
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

	2012	2013	2014
Population (Thousand)	29,336.8	29,714.7	30,097.9
Hospitals	132	141	142
Beds	38,978	39,728	40,126
Physicians	38,718	46,916	51,453
Nurses	84,968	89,167	92,681
GDP (RM)	35,075	37,542	44,748
Total expenditure on health as % GDP	4.58	4.40	4.53
Government expenditure on health as %	55.11	52.73	51.96
Insured citizens (%)	-	-	-
SCD patients	-	-	-
Heart failure patients	-	-	-
AF patients	-	-	-

*The data for 2014 is not available yet

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

2. Pacemaker

		2013	2014
Total Pacemakers		577	659
New implants		430	482
Replacements		147	177
Single-chamber		255	285
Dual-chamber		322	374
Sick sinus syndrome		151	172
AV block		183	216
Implanting Centers		18	35
Implanting Physicians		54	101
National Registry		**X**	**X**

3. Cardiac resynchronization therapy

		2013	2014
Total CRTs		121	173
CRT-P		57	78
CRT-P new implants		36	45
CRT-P replacements/upgrade		21	33
CRT-D		64	95
CRT-D new implants		39	58
CRT-D replacements/upgrade		25	37
Ischemic		65	102
Non-ischemic		56	71
Implanting Centers		11	13
Implanting Physicians		17	24
National Registry		**X**	**X**

4. Implantable cardioverter defibrillator

		2013	2014
Total ICDs		119	143
ICD new implants		89	108
ICD replacements		30	35
Single-chamber		72	96
Dual-chamber		47	47
Primary prevention		29	49
Secondary prevention		90	94
Implanting Centers		11	18
Implanting Physicians		17	24
National Registry		**X**	**X**

5. Interventional electrophysiology

		2013	2014
Ablation procedures		506	612
SVT ablation procedures		297	328
AVNRT		179	201
AVRT/WPW		118	127
AFL (RA isthmus dependent)		46	94
AT		31	54
VT/VPC		75	116
Idiopathic		53	63
Structural		22	53
AF ablation procedures		57	89
Ablation centers			
AF ablation centers		0	2
Structural VT ablation centers		0	1
Ablation physicians		4	7
AF ablation physicians		3	5
Structural VT ablation physicians		3	4
National Registry		**X**	**X**

6. Management

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

Payment (%)	Pacemaker	ICD	CRT	Ablation
Government	60	90	90	70
Insurance	20	5	5	20
Public insurance	0	0	0	0
Private insurance	20	5	5	20
Individual	10	5	5	10

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**

*Data source: UMMC, Penang Hospital Heart Centre, IJN, UiTM, PPUKM, SGH, QEH2, Pantai Medical Centre

Country/Region: New Zealand

1. Statistics

	2012	2013	2014
Population (thousand)[1]	4,328	4,511	4,550
Hospitals *(includes every small hosp.)*	184	184	184
Beds *(includes every small hosp.)*	27,000	27,000	27,000
Physicians	14,500	14,686	14,808
Nurses	34,000	42,400	45,293
GDP(US$, billions)[2]	180.55	179.8	191.7
Total expenditure on health as % GDP[2]	9%	8.9%	9%
Government expenditure on health as %[2]		77%	77%
Insured citizens (%)	32%	30%	30%
SCD patients	3,500	3,500	3,500
Heart failure patients	25,000	25,000	25,000
AF patients	Unknown	unknown	Unknown

6. www.census.gov
7. www.imf.org

2. Pacemaker

	2012	2013	2014
Total Pacemakers	2100	2200	2240
New implants	1800	1850	1817
Replacements	300	350	423
Single-chamber	700	750	750
Dual-chamber	1400	1350	1490
Sick sinus syndrome			
AV block			
Implanting Centers	12	12	12
Implanting Physicians	31	31	31
National Registry	☐No	☐Yes	☐Yes

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs			183
CRT-P			
CRT-P new implants			68
CRT-P replacements/upgrade			17
CRT-D			
CRT-D new implants	63	75	79
CRT-D replacements/upgrade	15	20	19
Ischemic			
Non-ischemic			
Implanting Centers	5	6	6
Implanting Physicians	13	13	14
National Registry	☐no	☐yes	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	535	560	624
ICD new implants	423	435	499
ICD replacements	112	125	125
Single-chamber			
Dual-chamber			
Primary prevention	203	207	
Secondary prevention	220	228	
Implanting Centers	5	6	7
Implanting Physicians	13	13	14
National Registry	☐yes	☐yes	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			
Hospitals performed lead extraction			
Cardiologists performing lead extraction			
Surgeons performing lead extraction			
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures		720	1267
SVT ablation procedures	No data	410	788
AVNRT			266
AVRT/WPW			194
AFL (RA isthmus dependent)			260
AT			68
VT/VPC	No data	60	141
Idiopathic		25	78
Structural		35	14
AF ablation procedures		230	355
Ablation centers			
AF ablation centers	4	4	6
Structural VT ablation centers	4	4	4
Ablation physicians			
AF ablation physicians	6	7	8
Structural VT ablation physicians	7	7	7
National Registry	☐no	☐no	☐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	95%	99%	99%	80%
Insurance				
Public insurance				
Private insurance				19%
Individual	5%	1%	1%	1%

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

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

8. Source

Name of national working group or arrhythmia body

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

Country/Region: Pakistan

1. Statistics

	2012	2013	2014
Population (million)[1]			182
Hospitals			
Beds			0.6bed/1000
Physicians			0.5 doc/1000
Nurses			
GDP (US$, billions)			246.88
Total expenditure on health as % GDP			3.2
Government expenditure on health (US$)			
Insured citizens (%)			0.1%
SCD patients			
Heart failure patients			
AF patients			

8. www.census.gov

2. Pacemaker

	2012	2013	2014
Total Pacemakers			2,222
New implants			2,000
Replacements			222
Single-chamber			70%
Dual-chamber			30%
Sick sinus syndrome			20%
AV block			80%
Implanting Centers			25
Implanting Physicians			50
National Registry	☐	☐	☐

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs			45
CRT-P			30
CRT-P new implants			
CRT-P replacements/upgrade			
CRT-D			
CRT-D new implants			15
CRT-D replacements/upgrade			
Ischemic			90%
Non-ischemic			10%
Implanting Centers			4
Implanting Physicians			6
National Registry	☐	☐	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs			100
ICD new implants			100
ICD replacements			
Single-chamber			90%
Dual-chamber			
Primary prevention			20%
Secondary prevention			80%
Implanting Centers			5
Implanting Physicians			7
National Registry	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			non
Hospitals performed lead extraction			
Cardiologists performing lead extraction			
Surgeons performing lead extraction			
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2011	2012	2013
Ablation procedures			700
SVT ablation procedures			700
AVNRT			60%
AVRT/WPW			25%
AFL (RA isthmus dependent)			4%
AT			2%
VT/VPC			6%
Idiopathic			3%
Structural			
AF ablation procedures			0
Ablation centers			
AF ablation centers			1
Structural VT ablation centers			1
Ablation physicians			
AF ablation physicians			
Structural VT ablation physicians			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			Individual	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	☐	☐	☐	☐	Y
Lack of referral	☐	☐	☐	☐	☐
Lack of trained personnel	☐	☐	☐	☐	☐
Low awareness of guidelines	☐	☐	☐	☐	☐
Lack of operators	☐	☐	☐	☐	☐

8. Source

Name of national working group or arrhythmia body

Pakistan Heart Rhythm Society

Country/Region: Philippines

1. Statistics

	2012	2013	2014
Population (thousand) *	95,053	98,393	100,096
Hospitals		1,840	1,921
Beds (per 100,000 population)	50	100	100
Physicians (per 1,000 population) **	1.2	1.2	1.5
Nurses (per 1,000 population) ***			6
GDP (US$, billions) ****	227.584	272.02	284.58
Total expenditure on health as % GDP	4.5%	4.4%	4.4%
Government expenditure on health as %		27%	31.6%
Insured citizens (%)			80%
SCD patients			
Heart failure patients			
AF patients			

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

	2012	2013	2014
Total Pacemakers	779	1,389	1,528
New implants	710	631	677
Replacements	69	102	87
Single-chamber	485	378	395
Dual-chamber	294	278	369
Sick sinus syndrome			
AV block			
Implanting Centers		36	37
Implanting Physicians		84	100
National Registry	☐	☐	☐

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs	8	18	17
CRT-P	1	2	2
CRT-P new implants	1	2	0
CRT-P replacements/upgrade	0	0	2
CRT-D	7	16	15
CRT-D new implants	7	15	12
CRT-D replacements/upgrade	0	1	3
Ischemic			
Non-ischemic			
Implanting Centers	10	10	23
Implanting Physicians	12	13	15
National Registry	☐	☐	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	38	48	52
ICD new implants	35	44	50
ICD replacements	3	4	2
Single-chamber	27		20
Dual-chamber	11		32
Primary prevention			
Secondary prevention			
Implanting Centers	10	10	23
Implanting Physicians	12	13	15
National Registry	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			none
Hospitals performed lead extraction			none
Cardiologists performing lead extraction			none
Surgeons performing lead extraction			none
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures	80	82	77
SVT ablation procedures			
AVNRT	21	25	25
AVRT/WPW	30	37	33
AFL (RA isthmus dependent)	5	2	3
AT	1	3	1
VT/VPC			
Idiopathic	8	9	6
Structural	2	2	3
AF ablation procedures	5	7	6
Ablation centers			
AF ablation centers	1	1	1
Structural VT ablation centers	1	1	1
Ablation physicians			
AF ablation physicians	4	4	6
Structural VT ablation physicians	2	2	6
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	50%	10%	5%	20%
Insurance				
Public insurance	10%	0	0	0%
Private insurance	0	0	0	0%
Individual	40%	90%	95%	80%

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:

Philippine Heart Rhythm Society, Inc.

Other Source: Medtronic, Phils.

Country: Singapore

1. Statistics

	2012	2013	2014
Population ('000)[1]	**5,312.4**	**5,399.2**	**5,469.7**
Singapore Residents ('000)	**3,818.2**	**3,844.8**	**3,870.7**
Hospitals [1]	**25**	**25**	**26**
a. Public Sector	*15*	*15*	*15*
- Acute Hospitals	*7*	*7*	*7*
- Specialty Centres	*8*	*8*	*8*
b. Private Sector	*10*	*10*	*11*
- Acute Hospitals	*9*	*9*	*10*
- Other Hospitals	*1*	*1*	*1*
Beds[2]	**10,755**	**10,969**	**11,230**
a. Public Sector	*9,180*	*9,387*	*9,602*
-Acute Hospitals	*6,985*	*7,192*	*7,467*
-Specialty Centres	*2,195*	*2,195*	*2,135*
b. Private Sector	*1,575*	*1,582*	*1,628*
-Acute Hospitals	*1,555*	*1,562*	*1,610*
-Other Hospitals	*20*	*20*	*18*
Number of Residential Intermediate and Long Term Care Facilities (by services offered)[2]			
a. Community Hospitals	*5*	*5*	*5*
b. Chronic Sick Hospitals	*3*	*3*	*3*
c. *Nursing Homes*	*64*	*66*	*66*
d. *Inpatient Hospice Care*	*4*	*4*	*4*
Total number of Beds	***10,692***	***11,819***	***12,156***
a. Community Hospitals	*822*	*832*	*1,047*
b. Chronic Sick Hospitals	*228*	*186*	*188*
c. Nursing Homes	*9,493*	*10,652*	*10,780*
d. Inpatient Hospice Care	*149*	*149*	*141*
Number of Polyclinics[2]	18	18	18

Total number of Physicians[3]	**10,225**	**10,953**	**11,733**
a. *Public Sector*	*6,131*	*6,661*	*7,330*
b. *Private Sector*	*3,515*	*3,678*	*3,790*
c. *Not in active Practice*	*579*	*614*	*613*
Doctor to Population Ratio	1:520	1:490	1:470
Doctor per 1,000 Population	1.9	2.0	2.1
Total number of Nurses/Midwives[3]	**34,507**	**36,075**	**37,618**
- *Registered Nurses*	***25,971***	***27,556***	***28,864***
- Public Sector	*15,916*	*16,738*	*17,667*
- Private Sector	*6,321*	*6,716*	*6,863*
- Not in Active Practice	*3,734*	*4,102*	*4,334*
- *Enrolled Nurses*	***8,274***	***8,273***	***8,528***
- Public Sector	*4,995*	*4,890*	*5,006*
- Private Sector	*2,027*	*2,049*	*2,078*
- Not in Active Practice	*1,252*	*1,334*	*1,444*
- *Registered Midwives*	***262***	***246***	***226***
- Public Sector	89	79	71
- Private Sector	65	61	61
- Not in Active Practice	108	106	94
Advanced Practice Nurses	88	117	145
Nurse to Population Ratio	1:150	1:150	1:150
Nurse per 1,000 Population	6.5	6.7	6.9
GDP (US$, billions)			
Government Health Expenditure (as % of GDP)[4]	**1.4**	**1.6**	**1.9**
Government Health Expenditure (as % of Total Government Expenditure)[4]	**9.5**	**10.8**	**11.9**
Insured citizens (%)	-	-	-
SCD patients	-	-	-
Heart failure patients	-	-	-
AF patients	-	-	-

Source: Singapore Health Facts, Ministry of Health, Singapore as of 3 August 2015[1], 13 March 2015[2], 12 March 2015[3] and 30 April 2015[4] (www.moh.gov.sg).

2. Pacemaker

	2012	*2013*	*2014*
Total Pacemakers[5]	**526**	**610**	**646**
- New implants	455	513	540
Replacements/Upgrades	65	76	83
Others	6	21	23
- Single-chamber	157	160	162
Dual-chamber	363	433	470
Not applicable	6	17	14
- Sick sinus syndrome	285	319	316
AV block*	136	164	188
Implanting Centers[5]	5	5	5
Implanting Physicians[5]	~ 22	~ 20	~26
National Registry[5]	☒	☒	☒

Source: CGH, KTPH, NHCS, NUH, TTSH, SCDB as of 12 August 2015[5]
** refer to Complete AV Block only.*
CGH: Changi General Hospital, KTPH: Khoo Teck Puat Hospital, NHCS: National Heart Centre Singapore, NUH: National University Hospital, TTSH: Tan Tock Seng Hospital, SCDB: Singapore Cardiac Data Bank

3. Cardiac resynchronization therapy

	2012	*2013*	*2014*
Total CRTs[5]	**120**	**129**	**147**
- CRT-P	15	19	12
CRT-P new implants	6	12	8
CRT-P replacements/upgrade	8	6	3
Others	-	1	1
- CRT-D	106	110	135
CRT-D new implants	77	77	90
CRT-D replacements/upgrade	23	29	41
Others	6	4	4
- Ischemic	70	77	99
Non-ischemic	22	15	11
Implanting Centers[5]	5	5	5
Implanting Physicians[5]	~15	~14	~18
National Registry[5]	☒	☒	☒

Source: CGH, KTPH, NHCS, NUH, TTSH, SCDB as of 12 August 2015[5]

4. Implantable cardioverter defibrillator

	2012	*2013*	*2014*
Total ICDs[5]	**304**	**293**	**289**
- ICD new implants	255	249	238
ICD replacements/upgrade	44	35	37
Others	5	9	14
- Single-chamber	265	245	239
Dual-chamber	39	44	39
Others	-	4	11
- Primary prevention	172	183	184
Secondary prevention	132	109	105
Others	-	1	-
Implanting Centers[5]	5	5	5
Implanting Physicians[5]	~16	~15	~22
National Registry[5]	☒	☒	☒

Source: CGH, KTPH, NHCS, NUH, TTSH, SCDB as of 12 August 2015[5]

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	*2013*	*2014*
Total lead extraction procedures	16	8	35
Hospitals performed lead extraction	~4	~2	~4
Cardiologists performing lead extraction	~10	~4	~10
Surgeons performing lead extraction			~1
National Registry	☒	☒	☒

Source: CGH, KTPH, NHCS, NUH, TTSH, SCDB as of 12 August 2015[5]
Inclusive of Explantation of PPM / ICD

6. Interventional electrophysiology

	2012	*2013*	*2014*
Ablation procedures[5]	**543**	**541**	**659**
SVT ablation procedures	-	-	-
AVNRT	155	141	160
AVRT/WPW	125	115	123
AFL (RA isthmus dependent)	93	96	136
AT	19	38	46
VT/VPC	58	42	51
Idiopathic	-	-	-
Structural	-	-	-
AF ablation procedures	82	82	101
Others	11	27	42
Ablation centers[5]	2	2	3
AF ablation centers	2	2	2
Structural VT ablation centers	2	2	3
Ablation physicians[5]	~15	~14	~17
AF ablation physicians			
Structural VT ablation physicians			
National Registry[5]	☒	☒	☒

Source: CGH, KTPH, NHCS, NUH, TTSH, SCDB as of 12 August 2015[5]

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, National University Hospital and Tan Tock Seng Hospital.

Country/Region: South Korea (Republic of Korea)

1. Statistics

	2012	2013	2014
Population (thousand)[1]	48,861	51,266	51,314
Hospitals[2]		1,738	
Beds (per 100,000 population)[2]	1,030	1,068	1,181
Physicians (per 1,000 population)[2]	2.02	2.16	2.2
Nurses (per 1,000 population)[2]	5.29	5.45	5.6
GDP (US$, billions)[3]	1,155.87	1,449.49	1,421.31
Total expenditure on health as % GDP[3]		7.6%	7.2%
Government expenditure on health as %[3]		58.2%	
Insured citizens (%)	100	100	100
SCD patients	n/a	28,342 OHCA	
Heart failure patients			
AF patients		800,000	

9. www.census.gov
10. www.who.int
11. www.imf.org

2. Pacemaker

	2012	2013	2014
Total Pacemakers	3,541	3,890	4,259
New implants	75.8%	3,280	3,349
Replacements	24.2%	610	910
Single-chamber	29.9%	1,189	1,125
Dual-chamber	70.1%	2,701	2,594
Sick sinus syndrome	42.2%	43.7%	1,846
AV block	57.8%	56.3%	2,420
Implanting Centers	n/a	146	
Implanting Physicians		156	
National Registry	☐	☐	☐

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs	112	166	190
CRT-P	6	16	14
CRT-P new implants	5	9	9
CRT-P replacements/upgrade	1	7	5
CRT-D	106	150	176
CRT-D new implants	99	125	157
CRT-D replacements/upgrade	7	25	19
Ischemic	23.8%	17.9%	43
Non-ischemic	762%	82.1%	110
Implanting Centers			
Implanting Physicians			
National Registry	☐	☐	☐

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	562	667	800
ICD new implants	460	580	680
ICD replacements	102	67	120
Single-chamber	349	401	472
Dual-chamber	213	246	328
Primary prevention	28.4%	347	199
Secondary prevention	71.6%	288	532
Implanting Centers	90	96	
Implanting Physicians			
National Registry	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			30
Hospitals performed lead extraction			
Cardiologists performing lead extraction			30
Surgeons performing lead extraction			
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures	5,950	6,875	7,059
SVT ablation procedures	3,966	4,380	4,829
AVNRT	1,777	1,866	2,263(46.86%)
AVRT/WPW	1,487	1,523	1,613(33.41%)
AFL (RA isthmus dependent)	381	502	694 (14.37%)
AT	257	489	259 (5.36%)
VT/VPC	423	512	360
Idiopathic	87.6%	85.8%	332(92.28%)
Structural	12.4%	14.2%	28(7.72%)
AF ablation procedures	1,561	1,983	1,870
Ablation centers		53	66
AF ablation centers	30	34	39
Structural VT ablation centers	16	19	
Ablation physicians			
AF ablation physicians		31	
Structural VT ablation physicians		19	
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	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

Korean Heart Rhythm Society (KHRS)

Country/Region: Taiwan

1. Statistics

	2012	2013	2014
Population (thousand)[1]	23,315	23,373	23,433
Hospitals	502	495	497
Beds	160,900	159,422	161,491
Physicians	42,490	43,556	44,539
Nurses	140,965	145,172	147,773
GDP (US$, billions)[2]	495,845	511,293	529,587
Total expenditure on health as % GDP	6.6	6.6	6.6
Government expenditure on health as %	~35%	37%	30%
Insured citizens (%)	100%	100%	100%
SCD patients	~17,020	~17,082	~17,242
Heart failure patients	~582,895	~584,880	~58,679
AF patients	~349,737	~351,025	~353,243

2. Pacemaker

	2012	2013	2014
Total Pacemakers	4,043	4,156	4,734
New implants	2,830	3,056	3,642
Replacements	1,213	1,100	1,092
Single-chamber	1,291	1,162	1,312
Dual-chamber	2,752	2,994	3,422
Sick sinus syndrome	2,426	2,380	2,440
AV block	1,602	1,537	1,563
Implanting Centers	101	103	96
Implanting Physicians	~170	~175	234
National Registry	x	x	x

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs	179	162	207
CRT-P	145	132	158
CRT-P new implants	114	104	122
CRT-P replacements/upgrade	31	28	36
CRT-D	34	30	49
CRT-D new implants	26	24	40
CRT-D replacements/upgrade	8	6	9
Ischemic	36	33	25
Non-ischemic	143	129	92
Implanting Centers	40	41	24
Implanting Physicians	~170	~175	46
National Registry	x	x	x

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	348	379	458
ICD new implants	278	308	378
ICD replacements	70	71	80
Single-chamber	97	112	136
Dual-chamber	251	266	322
Primary prevention	1	0	0
Secondary prevention	348	379	458
Implanting Centers	40	42	40
Implanting Physicians	~170	~175	71
National Registry	x	x	x

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			12
Hospitals performed lead extraction			6
Cardiologists performing lead extraction			8
Surgeons performing lead extraction			2
National Registry	☐	☐	x

6. Interventional electrophysiology

	2012	2013	2014
Ablation procedures	~2,500	2,754	3,740
SVT ablation procedures	~1,500	~1,910	2,309
AVNRT		~1,130	1,126
AVRT/WPW		~515	620
AFL (RA isthmus dependent)	~330	~250	450
AT			113
VT/VPC	~220	160	463
Idiopathic	N/A	70	248
Structural		80	186
AF ablation procedures	~450	434	531
Ablation centers		10	
AF ablation centers		5	
Structural VT ablation centers		3	
Ablation physicians			57
AF ablation physicians			34
Structural VT ablation physicians			28
National Registry	No	No	No

7. Management

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

Taiwan Heart Rhythm Society

***http://www.tma.tw/stats/stater.asp**

#http://www.dgbas.gov.tw/ct.asp?xItem=14616&CtNode=3566&mp=1

+http://www.mohw.gov.tw/cht/DOS/Statistic.aspx?f_list_no=312&fod_list_no=1828

$http://www.stat.gov.tw/ct.asp?xItem=15428&CtNode=3638&mp=4

&http://www.mohw.gov.tw/cht/DOS/Statistic_P.aspx?f_list_no=312&fod_list_no=2220&doc_no=43390

Country/Region: Thailand

1. Statistics

	2012	2013	2014
Population	64,456,695	67,367,943	67,091,120
Hospitals	n/a	583	1,318 (1002 public)
Beds (per 100,000 population)		210 (2010)	2,210 (as 2010)
Physicians	n/a	0.3:1000	0.3:1000
Nurses	n/a	2.8:1000	2.8:1000
GDP (US$, billions)	366	365.97	373.536
Total expenditure on health as % GDP	0.000019%	4.3%(2009)	4.6%
Government expenditure on health as %			
Insured citizens (%)	100	99.5%	99.5%
SCD patients			
Heart failure patients		95,390/year extrapolated	
AF patients		3.6/1000 (1999)	

2. Pacemaker

	2012	2013	2014
Total Pacemakers	2,619	2,401	3,078
New implants	2,326	2,198	2,834
Replacements	293	203	244
Single-chamber	44%	33.65%	35.9%
Dual-chamber	54%	64.93%	62.86%
Sick sinus syndrome	34.4%	43.34%	43.9%
AV block	36%	47,15%	42.64%
Implanting Centers	70	55	70
Implanting Physicians	115	115	115
National Registry	yes	yes	yes

3. Cardiac resynchronization therapy

	2012	2013	2014
Total CRTs	111	99	123
CRT-P	65		42
CRT-P new implants	65		
CRT-P replacements/upgrade			
CRT-D	46		
CRT-D new implants	46	99	81
CRT-D replacements/upgrade			
Ischemic			
Non-ischemic			
Implanting Centers		55	
Implanting Physicians	20	115	
National Registry	x		

4. Implantable cardioverter defibrillator

	2012	2013	2014
Total ICDs	662	662	700
ICD new implants	583		627
ICD replacements	79	71	73
Single-chamber	83.4%	77.34%	78.47%
Dual-chamber	5.5%	7.7%	8.61%
Primary prevention			
Secondary prevention			
Implanting Centers		55	
Implanting Physicians		115	
National Registry	☐	☐	☐

5. Lead Extraction

Lead extractions procedures and number of centers that performed lead extraction

	2012	2013	2014
Total lead extraction procedures			
Hospitals performed lead extraction			2
Cardiologists performing lead extraction			4
Surgeons performing lead extraction			
National Registry	☐	☐	☐

6. Interventional electrophysiology

	2011	2012	2013
Ablation procedures			
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	☐	☐	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	☐	☐	☐

The APHRS White Book: Third 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
Vice 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 leadership by current president Young-Hoon KIM, the third edition of APHRS White Book included data from two new participants: Australia and Pakistan. Therefore, this edition of APHRS White book offers data of electrophysiological procedures and CIEDs from 14 of the 30 member countries and regions of the APHRS: Australia, China mainland, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Pakistan, Philippines, Singapore, Taiwan, and Thailand. 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 2012, 2013, and 2014 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 10 APHRS member countries and regions provided their data. The analysis was performed on the trend of device implantation and catheter ablation from 2012 to 2014, and the device implantation rates or catheter ablation rates and centers in 2014.

3. Permanent Pacemaker Implantation

3.1 Increase in pacemaker implantation

The increasing trend of more than 5.0% of the implantation of permanent pacemaker was seen in 9 of the 14 countries and regions in 2014 compared with 2013 (see Figures). In Hong Kong SAR, the implantation of permanent pacemaker increased 41.9%, from 537 in 2013 to 762 in 2014. The pacemaker use was also increased significantly last year by almost 28.2% in Thailand, 25.1% in Indonesia, and 15.4% in China. The increase rates in pacemaker implantation varied from 1.8% in New Zealand to 14.2% in Malaysia among other countries and regions except for India and Japan. The overall use of pacemaker decreased last year as compared with 2012 by 9.8% in India and by 3% in Japan.

3.2 Pacemaker implantation rate

Data for 2014 were analyzed by evaluating pacemaker implantation rates. Across the 14 countries and regions, a marked heterogeneity was observed in the pacemaker implantation rate per million inhabitants (Table 1) with the highest reported implantation rate in Japan (454.2) and New Zealand (492.3) and the lowest in Indonesia (2.8). Pakistan also had a low pacemaker implantation rate per million inhabitants (12.2). The large gap in the number of pacemaker implanting center per million inhabitants still remained among the 14 countries and regions. In data for 2014, Taiwan was still the region where had the highest implanting centres per million inhabitants (4.1), but Korea did not provide there data on pacemaker implanting centers although it was on the top list last year. The countries with lowest density of implanting centers in 2014 data were Indonesia (0.05) and Pakistan (0.13). Other countries remained similar level to that in 2013. As for the pacemaker implants per center, the significant differences still exist among 14 countries. Although the reported data in 2014 did not differ significantly from that in 2013, still some changes were noted by our analysis. For example, Japan still had the highest implantation rate per million inhabitants (454.2), but China was the country that had the highest total number of pacemaker implantations (59735) in 2014 because the total volume of

pacemaker implant was decreased in Japan as compared with that in 2013. Similarly, the influence of GDP on pacemaker implants did not differ as compared with that in 2014. The countries with highest GDP per capita of the 14 countries and regions were Japan, and New Zealand Taiwan, and the countries with highest implantation rate per million inhabitants were also Japan, and New Zealand.

4. ICD and Cardiac Resynchronization Therapy devices (CRT)

4.1 Three-year trends in implantation of ICD

The implantation of ICD has increased in almost all APHRS countries and regions in 2014 as compared with 2013 (Figure 2). Japan is the country with highest ICD implantation in Asia-Pacific regions. However, the ICD implant was decreased by 8.5% from 6373 in 2013 to 5830 in 2014. We also observed a significant increase in ICD implantation in India (67.5%), Hong Kong SAR (39.2%), China (22.6%), Taiwan (20.8%) and Malaysia (20.2%) in 2014 as compared with 2013. However, the use of ICD was decreased slightly in Indonesia (-9.5%), Japan (-8.5%) and Singapore (-1.4%) compared with last year. Philippines is still the country with the lowest implants of ICD (52) in Asia-Pacific regions, in 2014.

This year, we are so happy to have data on ICD primary or secondary prevention from 8 countries: China, Korea, Singapore, Malaysia, Pakistan, India, Indonesia, and Taiwan. The use of ICD for primary prevention has been increasing in China (from 44.9% in 2013 to 46.7%), Singapore (from 37.5% in 2013 to 63.7% in 2014). In Taiwan, the ratio of ICD implantation for primary prevention still remains 0 in 2014. However, a slightly decrease in ICD use was observed in and Korea (from 52% in 2013 to 27.2% in 2014), and New Zealand did not provide their information this year although we had the data in 2012 and 2013. The use of ICD for primary prevention in the other countries was listed here: Pakistan (20%), Indonesia (63.2%), India (30%), Malaysia (34.3%). Indonesia had only 19 cases receiving ICD implant, and 12 cases were for primary prevention.

4.2 ICD implantation rate

As shown in table 1, New Zealand was still the Country with highest reported ICD implantation rate per million inhabitants (137). Singapore (52.8) and Japan (45.9) were the other countries with high ICD implants/million, while Taiwan had 19.6, Korea had 15.1, and Thailand had 10.4 ICD implants/million. Countries with low ICD implants/million were Philippines (0.5), China mainland (1.7), India (0.5), Indonesia (0.08), Pakistan (0.55), Malaysia (4.8). The available data also showed a large gap among the 13 countries and regions in the number of ICD implanting center per million inhabitants. In 2014 data, the countries with more than 1 ICD implanting centers per million inhabitants were Taiwan (1.7) and New Zealand (1.5). Korea reported 1.8 ICD implanting centers per million inhabitants last year but no data were provided.

The other countries with less than 1 implanting centers per million inhabitants included Singapore (0.9), India (0.3), China mainland (0.3), Indonesia (0.02), and Pakistan (0.02). Philippines only had 10 ICD implanting centers last year, but this year the ICD implanting centers increased to 23.

4.3 CRT utilization in Asia-Pacific area

In 2014, the rising trend in CRT implant still remains in Asia-Pacific countries and regions. The countries with total number of CRTs implantation more than 1000 in 2014 were Japan (4405), India (2935), and China mainland (2753). Countries with the increase rates of CRT implant more than 20% in 2014 included India (60.4%), Indonesia (44.7%), Malaysia (43%), China (25.3%), Taiwan (27.8%), and Thailand (24.2%) (Figure 3). The total number of CRT implant exceeded 100 included Taiwan (207), Korea (190), New Zealand (183), Singapore (147), and Thailand (123) in 2014. The implanting centers increased significantly in Philippine from 10 to 23, but the CRT implant did not increased in 2014. There were 55 cases in Indonesia and 45 cases in Pakistan receiving CRTs implant.

The CRT implantation rate per million inhabitants continued showing great heterogeneity from as low as 0.2/million (Philippines, Pakistan, Indonesia) to as high as 40.3/ million in New Zealand, 34.7 in Japan, and 26.8 in Singapore. And the CRT implantation rate per million inhabitants was slightly increased in most Asia-Pacific countries and regions, including Taiwan (from 6.8 in 2013 to 8.8 in 2014), India (from 1.5 in 2013 to 2.3 in 2014), Korea (from 3.2 in 2013 to 3.7 in 2014), and China mainland (from 1.6 in 2013 to 2.0 in 2014). There was also significant variability in the ratio of CRT-D/CRT-P implants and the number of “CRT centers”.

5. Catheter Ablation

5.1 General information of Catheter Ablation

Twelve countries and regions submitted their data about catheter ablation. China mainland had the highest cases receiving catheter ablations (101063) in 2014 (no data in Hong Kong and Thailand).The number of ablations procedures were 59000 in Japan and 16349 in India. The ablation procedures in other countries and regions were less than 10 thousands. Also an increasing trend was observed in ablation procedures across all 11 countries and regions except for Philippines. The increasing rates of ablations were 21.1% in China, 19.3% in India, 8.9% in Indonesia, 28.3% in Japan, 20.9% in Malaysia, 75.9% in New Zealand, 21.8% in Singapore,2.7% in Korea, and 35.8% in Taiwan.

5.2 Ablation procedure rates

As shown in Table 2, the highest ablation procedures per million inhabitants was recorded in Japan (464.6 in 2014), which was significantly increased than that (361.3) in 2013. New Zealand

(278.5) and Taiwan (159.8) also had the increased ablation procedures per million inhabitants. Philippines (0.8) and Indonesia (1.6) had the lowest ablation procedures per million inhabitants. In China mainland, the ablation procedures/ million inhabitants increased from 61.8 in 2013 to 73.9 in 2014. Regarding ablation centers per million inhabitants in 2014, the highest density was recorded also in Japan (3.9) and the lowest in Indonesia (0.01).

5.3 Atrial fibrillation (AF) catheter ablation

We had the data of AF ablation from 12 countries and regions this year although still no data were available in Hong Kong and Thailand. AF ablation procedures increased almost in all countries except for Indonesia and Korea. Japan was still the country with the highest number of AF ablation procedures (38,000 cases) in 2014. Compared with 2013, the AF ablations in 2014 significantly increased by 52% in Japan, 31.5% in China mainland, 31.8% in India, 56.1% in Malaysia, 54.3% in New Zealand, 14.2% in Philippine, 23.2% in Singapore, and 22.3% in Taiwan. The cases of AF ablation in China were 18616 in 2014. The AF catheter ablation procedures were also increased to 531 cases as compared to the past three years (410 in 2011, 450 in 2012, and 434 in 2013). As shown in Table 2, the highest AF ablation rate per million inhabitants was still in Japan (299.2), and the lowest ablation rate in India (0.8) and Philippine (0.06). The number of AF ablations done per million inhabitants was 36.5 in Korea. Regarding the ratio of AF/total ablations, there was also a large gap among 12 countries and regions, with highest reported AF ablation ratio in Japan (64.4%), and lowest AF ablation ratio in India (6.1%). And the AF ablation ratio was 26.5% in Korea, 18.4% in China mainland, and 14.2% in Taiwan, and 28% in New Zealand.

6. Conclusion and future work

This edition of APHRS White book had made a great progress with collection of data from14 APHRS countries and regions although some data were not available. Primary analysis of these data showed a growing trend in arrhythmia interventional treatment in many Asia-Pacific countries and regions. However, there is still a great gap between Asia and Western countries. The 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.

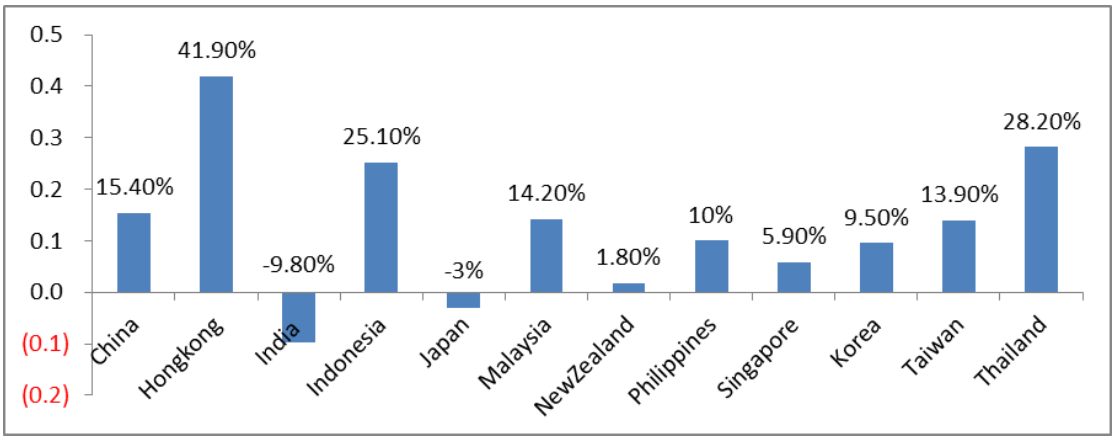

Figure 1: Increasing rate of pacemaker implantation in 2014 as compared with 2013

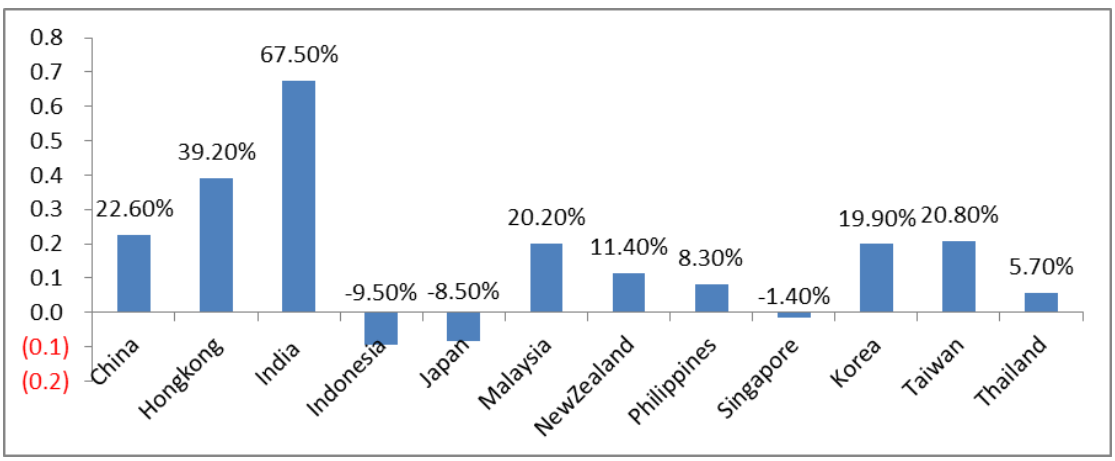

Figure 2: Increasing rate of ICD implantation in 2014 as compared with 2013

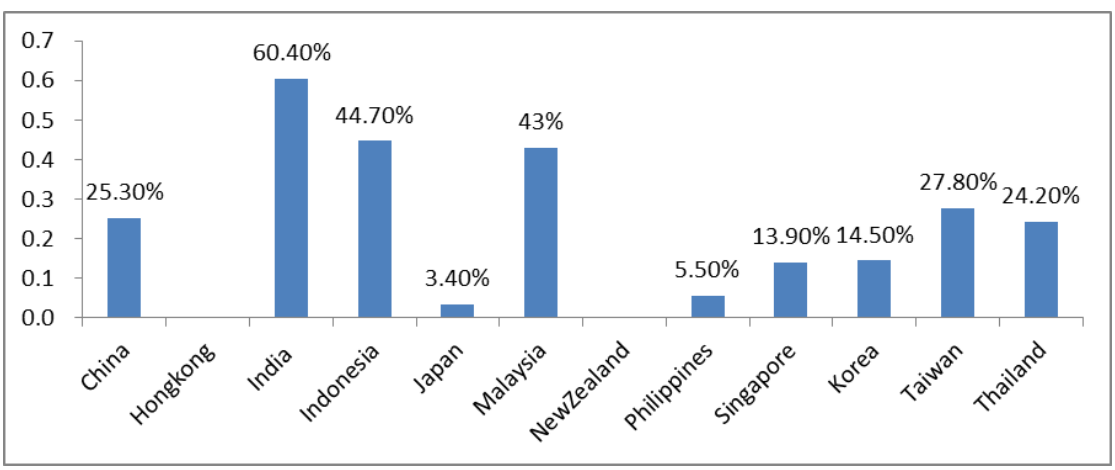

Figure 3: Increasing rate of CRT implantation in 2014 as compared with 2013

Table 1. The CIEDs implantation rates and implanting centres per million inhabitants for the year 2014 in 14 Asia-Pacific countries and regions

Countries and regions	Pacemaker implantation rate/ million inhabitants	Pacemaker implanting centres / million	ICD implantation rate/ million inhabitants	CRT implantation rate/ million inhabitants	ICD/CRT implanting centres / million
Australia	No data	No data	No data	No data	No data
Mainland China	43.7	0.7	1.7	2.0	0.3
Hong Kong	104.8	No data	15.1	No data	No data
India	25.8	0.7	2.6	2.3	0.3
Indonesia	2.8	0.05	0.08	0.2	0.02
Japan	454.2	No data	45.9	34.7	No data
New Zealand	492.3	2.6	137	40.3	1.5
Pakistan	12.2	0.13	0.55	0.2	0.02
Philippines	15.3	0.6	0.5	0.2	0.23
Singapore	119.4	0.9	52.8	26.8	0.9
South Korea	83.0	No data	15.6	3.7	No data
Taiwan	202.3	4.1	19.6	8.8	1.7
Thailand	45.9	1.0	10.4	1.8	No data
Malaysia	21.9	1.2	4.8	5.8	0.6

Table 2 The ablation procedure rate and centres per million inhabitants for the year 2014 in 13 Asia-Pacific countries and regions

Countries and regions	Ablation procedure rate/ million inhabitants	Ablation centres/ million inhabitants	AF ablation rate/ million inhabitants	AF ablation centres/ million inhabitants	AF ablation/ ablation procedure
Australia	No data	No data	No data	No data	No data
China mainland	73.9	0.57	13.6	0.3	18.4%
Hong Kong	No data	No data	No data	No data	No data
India	12.9	0.1	0.8	0.01	6.1%
Indonesia	1.6	0.01	0.02	0.01	9.0%
Japan	464.6	3.9	299.2	3.1	64.4%
New Zealand	278.5	No data	78	1.3	28%
Pakistan	3.8	No data	0	0	0
Philippines	0.8	No data	0.06	No data	7.8%
Singapore	120.5	0.5	18.5	0.4	15.3%
South Korea	137.6	1.3	36.5	0.76	26.5%
Taiwan	159.8	0.4	22.7	0.3	14.2%
Thailand	No data	No data	No data	No data	
Malaysia	20.4	No data	3.0	0.07	14.5%