



National Center for Cardiovascular Diseases
Fuwai Hospital Chinese Academy of Medical Sciences

2018 OUTCOMES



2018 OUTCOMES

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Department of Cardiovascular Medicine
Cardiovascular Institute & Fu Wai Hospital
Chinese Academy of Medical Sciences & Peking Union Medical College
National Center for Cardiovascular Diseases

Table of Contents

02 Overview of Department of Cardiovascular Medicine	05 Coronary Heart Disease Center
09 Cardiac Arrhythmia Center	12 Endocrinology and Cardiometabolic Disease Center
15 Pulmonary Vascular Diseases Center	18 Thrombosis and Vascular Medicine Center
22 Hypertension Center	25 Emergency and Intensive Care Center
26 Heart Failure Care Center	30 Premium care Medical Center
34 Key Laboratory of Clinical Research for Cardiovascular Medications, NHFPC & Phase I Ward	



Shengshou Hu, MD, FACC

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Director of National Center for Clinical Medicine Research of Cardiovascular Diseases
Director of National Center for Cardiovascular Diseases
President of Fuwai Hospital, CAMS
Director of State Key Laboratory of Cardiovascular Diseases

President's Address

Since 2008, the Department of Cardiovascular Medicine of Fuwai Hospital has released an annual report every year. Reporting outcomes is not only important for keeping our patients informed, but also for facilitating our relentless efforts to provide the highest quality and most efficient health care. 2018 outcomes have debuted, which summarized the efforts and achievements of department of cardiovascular medicine.

Since its establishment in 1956, Fuwai Hospital has been home to generations of physicians, working tirelessly for the prevention and treatment of heart disease. Through their efforts, Fuwai hospital has become a national leader in treatment, prevention, and research of cardiovascular disease.

In 2018, we have worked heartedly for providing more patients with better service and medical solutions. As the national leader in the field of cardiovascular diseases, we have been focusing on the latest technology application and quality improvement to maximize the efficacy of our treatment. Outcomes 2018 include some highlights of the last productive year. We will always adhere to the central philosophy of Fuwai hospital "Quality and Innovation", never forget the original intention and forge ahead with perseverance.

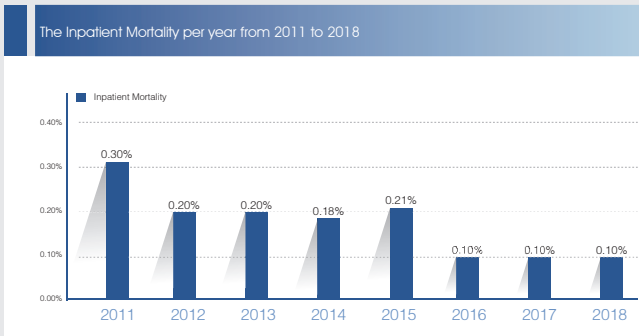
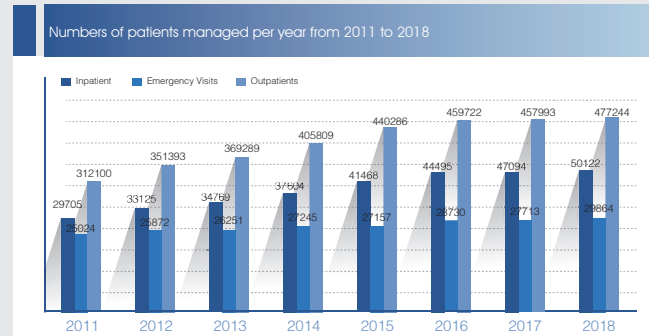
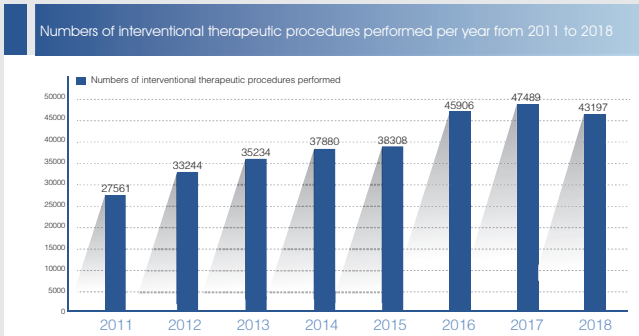
A handwritten signature in black ink, appearing to read 'Shengshou Hu'.

Overview of Department of Cardiovascular Medicine



The Department of Cardiovascular Medicine includes 9 treatment centers and 18 wards. During 2018, the Department of Cardiovascular Medicine managed 50,122 inpatient admissions and 477,244 outpatient visits. The Department of Cardiovascular Medicine is recognized as the leading department in China for the diagnosis and treatment of coronary artery disease, arrhythmia, heart failure, secondary hypertension, pulmonary hypertension and other complications of heart diseases.

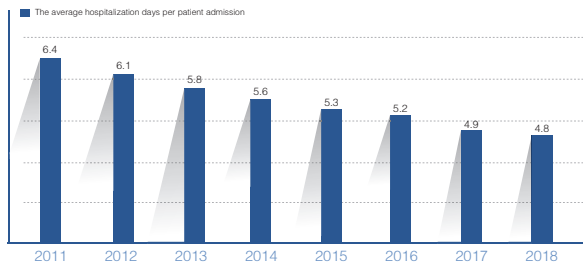
The inpatient mortality rate has been reduced to 0.1%, which meets the international standard. A total of 43,197 interventional therapeutic procedures were performed at the Department of Cardiovascular Medicine during 2018, indicating that our hospital has become one of the world's largest treatment centers.



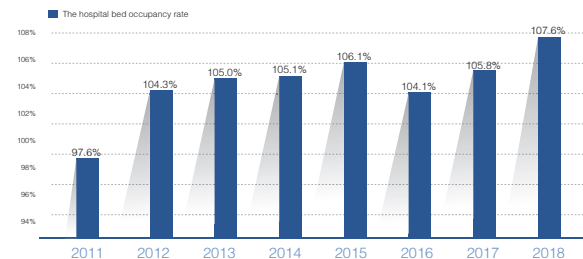
Coronary Heart Disease Center



The average hospitalization days per patient admission for the last 8 years



The hospital bed occupancy rate for the last 8 years



The Coronary Heart Disease Center of Fuwai Hospital was founded in 1978. Some of China's leading cardiologists, including Professors Shouqi Tao, Zaijia Chen, Yishu Xu, Jilin Chen, and Yuejin Yang were former directors of the center. Professor Shubin Qiao is the current director. The center was originally named as the Center for Diagnosis and Treatment of Coronary Heart Disease. It was renamed to its present name in 2003. The center is committed to achieving excellence in clinical care, research, and education. A total of 20 chief physicians work at the center currently, including 1 academician of engineering. Other staffs include 30 associate chief physicians. During the past year, a total of 56 graduate students (15 doctor degree and 41 master degree), and 138 fellows were trained at the center.

The center consists of 4 wards, 1 coronary care unit (CCU), with a total of 191 inpatient beds. The number of coronary angiography has increased by 0.37% in 2018, reaching 33,343; the number of percutaneous coronary intervention (PCI) was 18,467, increased 3.5% versus 2017, including 867 primary PCI cases. Transradial PCI (TRI) has accounted for 16,236 (91.5%) of all PCI procedures. More than 3/4 of TRIs were performed in high-risk patients with complex lesions, including 14,057 (76.1%) patients with multi-vessel disease, 888 (0.5%) patients with left main disease, and 2,189 (11.9%) patients with chronic total occlusion. Percutaneous transluminal septal myocardial ablation with alcohol for hypertrophic obstructive cardiomyopathy was performed in 7 patients. Quality of PCI has been improved continually, as evidenced by significantly decreased mortality rate for elective PCI (0.03%, 6/17,600) and low mortality rate for primary PCI (0.35%, 3/867). Both the quantity and quality of PCI procedures performed via transradial approach were higher than any other centers worldwide.

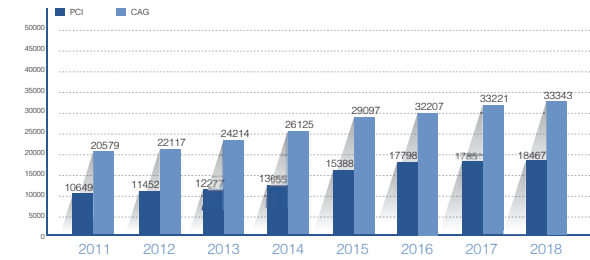




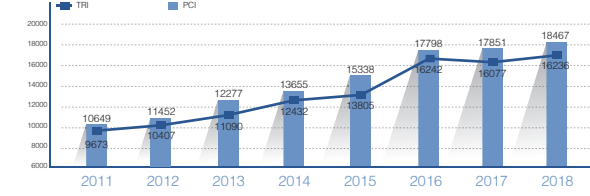
For many years, the center has conducted live broadcasts of complicated coronary PCI on the international conferences as China Heart Conference (CHC), China Interventional Therapeutics (CIT), Euro-PCR in Europe, Transcatheter Cardiovascular Therapeutics (TCT) in United States and Transcatheter Cardiovascular Therapeutics Asia Pacific (TCTAP) in Korea. By these academic activities, the center has gained global recognition and become the largest PCI and TRI center worldwide.

In 2018, several novel PCI techniques and devices were utilized in our center, such as CrossBoss/Stingray antegrade dissection reentry technique, robot assisted PCI, Impella assisted PCI. Clinical trials on domestic biodegradable scaffolds and quantitative flow ratio (QFR) have made great progress with results presented in both international conferences and journals. In 2018, the center received longitudinal funding from 18 different research grants, with a total of 17.74 million RMB. Five new lateral research projects are in progress. The center has published 96 research articles during 2018, including 45 indexed by the Science Citation Index (SCI), with a cumulative impact factor of 132.377.

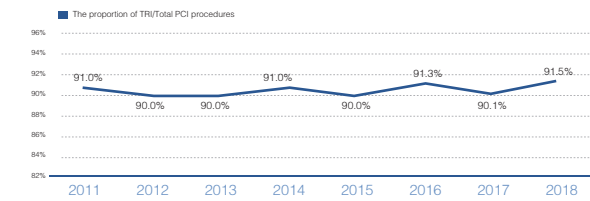
Numbers of coronary angiography (CAG) and percutaneous coronary intervention (PCI) procedures performed per year from 2011 to 2018



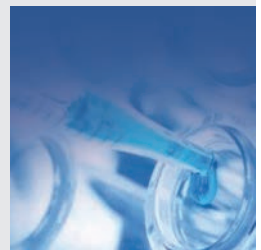
Numbers of PCI and TRI by transradial intervention (TRI) procedures performed per year from 2011 to 2018



The proportion of TRI/Total PCI procedures performed per year from 2011 to 2018



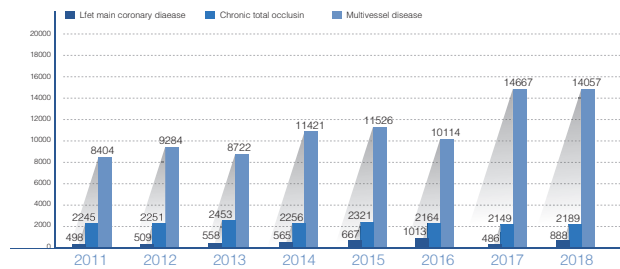
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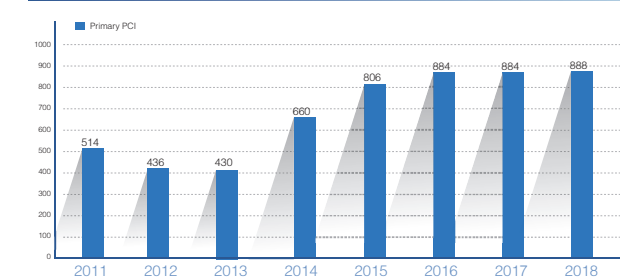


Cardiac Arrhythmia Center

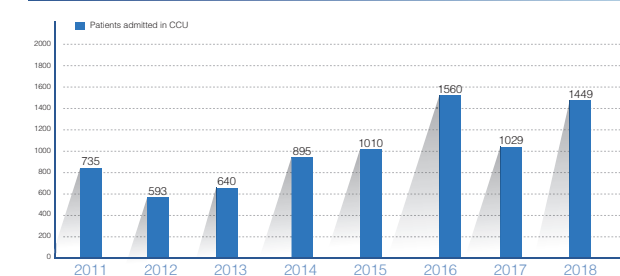
Numbers of patients with complex coronary artery disease who underwent PCI procedures per year from 2011 to 2018



Numbers of patients who underwent primary PCI procedures per year from 2011 to 2018



Numbers of patients admitted to the coronary care unit per year from 2011 to 2018



The clinical Electrophysiological Laboratory of Fuwai Hospital was founded in 1981, and was the only one domestic professional institution that engaged in research and treatment of cardiac arrhythmias at that time. Professor Xin Chen and Professor Fangzheng Wang, as the center directors in succession, led the clinical electrophysiological laboratory ever since it was established. Professor Shu Zhang is the current director of the Cardiac Arrhythmia Center. The Laboratory changed its name to Cardiac Arrhythmia Center since 2003. Currently, the center has 15 Chief Physicians including 3 professors who are recipients of special government allowance, 10 associate chief physicians, 23 doctoral students, and 16 graduate students. The center takes advantages of talented professionals that dedicate to collaborative operation and high technology adoption, and manage the variety of difficult arrhythmia cases with the "all-weather capability". Therapeutic range covers all types of arrhythmias. The curative efficacy and follow-up standards have reached to the international advanced levels.

Cardiac Arrhythmia Center now has 3 wards with over 120 beds. Since 2001, the center had conducted more than 50,000 cases of arrhythmia catheter ablations and implanted over 20,000 pacemaker/ICD units. In 2018, the center performed 2,283 pacemakers-ICD-CRTs implantation, including 415 ICD+CRT; 6,433 catheter ablation therapies were performed with 2,581 atrial fibrillation cases and 1,246 cases of ventricular arrhythmias. From the point view of quantity and quality, the center has long been

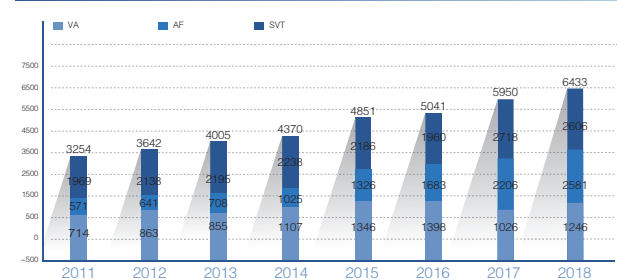


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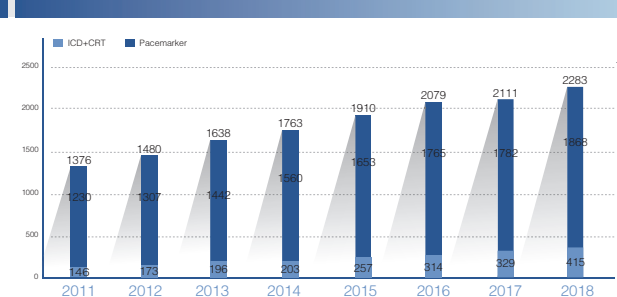
recognized as the No.1 arrhythmia management institute in the Asian-Pacific region, and it has stood among one of the largest arrhythmia interventional treatments centers in the world, as shown in Figures below. The center always actively develops and adopts new technologies for treatment of arrhythmias. In 2017, the center had successfully implanted the first subcutaneous ICD (S-ICD). Professor Zhang Shu as the Secretary-General has successfully presided over the 2015 World Congress of Arrhythmia in Beijing.

Moreover, the Center has successfully led key scientific programs of the national 10th five-year and 11th five-year projects, which focused on the incidence of atrial fibrillation and sudden cardiac death in China, and the findings derived from these two 5-year projects were published in internationally. At present, working together with other divisions, the center is taking the lead in three cornerstone programs of the national 12th five-year project. In 2018, the center obtained 7 scientific research grants sponsored by the government, a total of 144 million RMB funding and had published a total of 54 papers, including 21 SCI papers. Additionally, in the center, His-Bundle pacing technology has been widely developed and the Kodex-EPD™ system has been used to guide the His-Bundle pacing procedures for the first time in the world.

Numbers of radiofrequency catheter ablation procedures performed according to type of arrhythmia per year from 2011 to 2018
VA: Ventricular arrhythmia AF: Atrial fibrillation SVT: Supraventricular tachycardia



Numbers of devices implanted per year from 2011 to 2018



Endocrinology and Cardiometabolic Disease Center



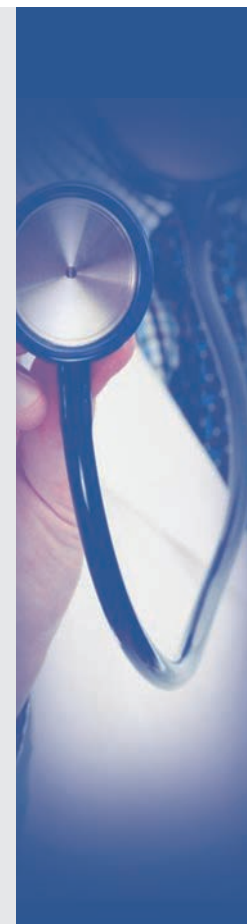
Endocrine and Cardiometabolic Disease Center (ECDC) , including ward 56A, 51A and 51B, is the first cardiometabolic clinical and researching center nationwide established in December 2018, National Cardiovascular Disease Center and Chinese Academy of Medical Sciences Fuwai Hospital. Professor Yi-da Tang as the director and professor Yanyan Chen and Yuanlin Guo as the deputy directors are the current supervisors of the center made up of Endocrinology and Cardiometabolic Disease Ward 1 (Yida Tang as the director and Naqiong Wu as the deputy director) with 42 beds and Ward 2 (Yanyan Chen as the director and Qihong Gong as the deputy director) with 41 beds.

Following the guidance of Chinese prevention strategy of cardiovascular and metabolic diseases, the ECDC organized a team specializing in the synthetic treatment and management of disturbance of carbohydrate metabolism, lipid metabolism and cardiovascular disorder to improve the quality of cardiometabolic diseases treatment by efficient management throughout. The clinical work in ECDC is major in high risk cardiovascular disease combined with carbohydrate and lipid metabolism disorder, including complex percutaneous cardiovascular intervention treatment and strict management of carbohydrate and lipid metabolism disorder. The prevention system of 6P-3G-4I include "Precision, Personalized, Prevention, Population, Policy" , "Good foods, Good environments, Good behaviors" and "Interpretation, Integration, Implementation and Innovation.

The treatment and management of atherosclerosis, valve disease and cardiomyopathy combined with various and multiple metabolic disorders is the specialty of ECDC. Precision antiplatelet treatment based on the platelet function and genomic test, complex percutaneous coronary treatment (chronic total

occlusion disease, unprotected left main disease, bifurcation disease, etc.), intracoronary artery image and physiology guidance intervention treatment (intravascular ultrasound, optical coherence tomography, flow fractional reserve, index of microvascular resistance) and one-stop strategy of percutaneous coronary intervention and endovascular aortic repair are performed in routine clinical practice of ECDC. Endocrinology and Cardiometabolic Disease Ward 1 performed 1611 coronary angiograph and 1527 coronary intervention treatment in 2018, the average baseline SYNTAX score was 14.7.

ECDC are experienced in treatment and management of diabetes, thyroid disease, obesity, hyperuricemia, dyslipidemia, familial hypercholesterolemia (FH), adrenal and pituitary diseases, endocrinal hypertension, hypoglycemia, parathyroid diseases, osteoporosis and other endocrinal diseases. ECDC initiate the plasma exchange therapy for FH in China (since 2015). Further indications, mechanisms and effect of plasma exchange are being investigated. Besides, ECDC promotes diabetes management by information technology. Individual-based treatment for early-stage patients, peri-operation patients and chronic patients ensure reliable glucose control. The insulin pump intensive treatment in newly diagnosed type 2 diabetes was the characteristic treatment of the center. "The standardized systemic management of hyperglycemia in the whole hospital" , was kept conducting. All wards in the whole hospital were covered with monitoring instrument. which helped achieving better glycemic control, reducing perioperative complication and shortening hospitalization days as consequence. Treatment of cardiovascular diseases combined with irregular thyroid function, which takes the leading position nationwide, is also the characteristic treatment of ECDC.



Pulmonary Vascular Diseases Center



Focusing on the systemic research of cardiometabolic disease, ECDC keep on exploring the mechanisms in occurrence and development of diseases and potential treating targets. Technique of pathophysiology, molecular biology, laboratory animal science and metabonomics are applied in various stages of experiments. Cohorts are built to investigate clinical characteristics of patients with cardiovascular disease combined with various and multiple metabolic disorders and to explore integrated management and brand-new therapeutic patterns. Besides traditional carbohydrate and lipid metabolism disorder, ECDC focus on the interaction between thyroid dysfunction, liver metabolic disorder, intestinal flora disorder and cardiovascular diseases.

Pulmonary Vascular Diseases Center of Fuwai Hospital, founded in 1972, is the earliest clinical research base for cardiopulmonary circulation in China. It was formerly known as Research Laboratory for Cor Pulmonale and Pulmonary-Cardiac Circulation and was renamed as Pulmonary Vascular Diseases Center in 2003. Professor Rusheng Cai, Professor Xiansheng Cheng and Professor Baiping Chen served as the directors of the center successively and the current director of the center is Professor Jianguo He. There are currently 4 chief physicians, 3 associate chief physicians, 8 PhD candidates, 2 graduate students, 2 specialized training doctors and 8 visiting doctors in the center in 2018.

The center has a ward with 38 beds where various pulmonary vascular and right heart diseases, such as pulmonary embolism, pulmonary hypertension and right heart disease, are treated. The center has achieved a number of pioneering work in the field of pulmonary vascular disease in China. In 1964, the first case of pulmonary embolism without cardiopulmonary disease in China was diagnosed by the center and thrombolytic therapy for acute pulmonary embolism was first carried out in 1990. The first monograph in pulmonary vascular disease was published by PVD center in 1993. In 1997, PVD center performed the first pulmonary endarterectomy for chronic thromboembolic pulmonary hypertension and started the first national multi-center clinical trial of pulmonary embolism in the same year. Also, PVD center first used Amplatz thrombectomy for large-area pulmonary embolism in 1997 and first established the sleep monitoring center in the cardiovascular department. The above pioneering work has made significant contributions to guiding the development of pulmonary vascular disease field, improving the level of prevention and treatment of pulmonary vascular disease and promoting the standardized diagnosis and treatment for pulmonary vascular

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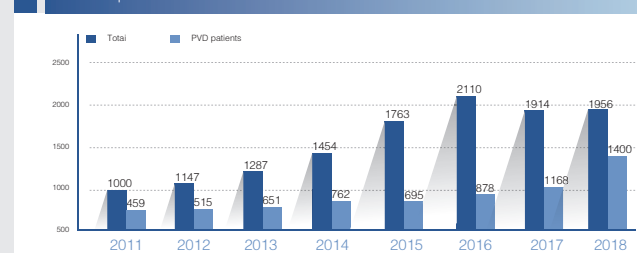
disease in China. In 2018, a total of 1,956 patients were admitted, including 1,400 patients with pulmonary vascular disease and 432 interventional procedures were performed, including right heart catheterization, pulmonary angiography, endomyocardial biopsy and intrapulmonary biopsy. In 2018, 40 cases of percutaneous balloon angioplasty (BPA) and pulmonary stenting were performed. The results of BPA, especially among patients with chronic thromboembolic pulmonary hypertension, were satisfactory, the cost was significantly lower than that of the peers, and no obvious complications occurred. PVD center has improved the treatment of pulmonary vascular disease and established a more complete strategy of diagnosis and treatment of it. With the improvement of prognosis in patients with pulmonary hypertension, the number of patients with severe pulmonary hypertension is increasing. The treatment for severe pulmonary hypertension is one of the specialty of our ward. Our ward first carried out intravenous application of Vitavir and alternative intravenous and subcutaneous application of Remodulin and established a treatment system for severe pulmonary hypertension, which greatly improved the treatment for advanced pulmonary hypertension. As for pulmonary hypertension screening, in 2018, we improved the screening method and cooperated with Peking University Hospital to diagnose 3 cases of methylmalonic aciduria. The pulmonary hypertension of those cases was significantly improved after treatments of the cause. With increasing awareness of the disease, great progress has also been made in the diagnosis and treatment of pulmonary venous occlusive disease.

Pulmonary vascular center is a specialized training base for pulmonary vascular disease with 6 specialized trainers and teachers. In 2018, 8 pulmonary vascular specialists and 15 pulmonary vascular professionals were trained throughout the country. Furthermore, the center held 4 academic lectures, 2 training courses

and a professional lecture tour of pulmonary vascular disease in the country. Moreover, the 2018 Right Heart and Pulmonary Vascular Disease Forum of Fuwai Hospital and the Pulmonary Vascular Forum of China Heart Congress, which achieved great success and influence and promoted the standardization of the diagnosis and treatment of pulmonary hypertension in China, was held by PVD center in 2018 as well.

In 2018, PVD Center has applied for 5 government sponsored programs, including 2 national-funded programs, 1 Beijing-municipal-funded programs and 2 programs funded by Chinese Academy of Medical Sciences. The center also newly applied for one programs funded by companies. In 2018, the center has published 12 papers, including 6 papers indexed by SCI with a cumulative impact factor of 48.482.

Total number of discharged patients of Pulmonary Vascular Diseases (PVD) center and the number of patients with PVD from 2011 to 2018



Thrombosis and Vascular Medicine Center

Thrombosis and Vascular Medicine Center (TVMC) of Chinese Academy of Medical Sciences Fuwai Hospital was founded in 2013. It is a multidisciplinary center involving clinical care, basic research and epidemiological study, with a Chinese Academy of Medical Sciences Key Laboratory of Pulmonary Vascular Medicine embedded in it. The director, Professor ZhiCheng Jing, is one of the first tenure-track professors of Peking Union Medical College. The deputy director is Dr. Lu Hua. Current faculty members include 1 professor, 2 chief physicians, 4 associate chief physicians, 2 associate research fellows and 1 associate chief technician. The mission of the Center is to focus on patient benefits driving medical innovation. The faculty aim to build a world-class medical center for thrombosis and hemostasis disease, Eisenmenger's syndrome, pulmonary vascular disease, myocarditis and myocardiopathies.

The Center offers specialist outpatient clinics for pulmonary embolism, pulmonary artery hypertension and anticoagulation. The inpatient ward accept patients who need specialist management, including pulmonary embolism, deep vein thrombosis, intracardiac and arterial (including coronary artery) thrombosis, all classes of pulmonary hypertension (including pediatric pulmonary hypertension and chronic thromboembolic pulmonary hypertension), hemoptysis, hemorrhagic disease and right heart disease, myocarditis and myocardiopathies. Multiple diagnostic and treatment approaches are available, including pulmonary embolism thrombolysis, right heart catheterization test, acute pulmonary vasodilator test, percutaneous coronary intervention treatment, inferior vena cava angiography and filter placement, pulmonary artery angiography, balloon pulmonary angioplasty, endomyocardial biopsy and percutaneous atrial septostomy etc. Genetic molecular diagnosing for thrombophilia, inherited

pulmonary hypertension and pulmonary vascular disease in Chinese population is also provided.

In 2018, the Center has undertaken more than 20 global multi-center clinical trials for new drug development. The refined balloon pulmonary angioplasty (BPA) has been performed in many patients with chronic thromboembolic pulmonary hypertension, pulmonary vasculitis, fibrosing mediastinitis or other chronic pulmonary obstructive vasculopathies etc. It has significantly changed their symptoms and prognosis. The diagnostic accuracy and therapeutic efficacy have been further improved with the assistance of new imaging techniques such as intravenous ultrasound and optical coherence tomography. For severe and difficult cases, the Chinese first series of hybrid or bridging operations of BPA and pulmonary endarterectomy have been successfully achieved, in cooperation with the surgical team. The Center is a nationwide leader in BPA, in terms of both patient volume and procedure difficulty. The perioperative complications and mortality rate were comparable to the world-class level. The Center has guided and facilitated BPA procedure in more than 20 hospitals and published 5 books on BPA.

In 2018, the Center run projects supported by the Major Program of the National Natural Science Foundation (NNSF) for Orphan Diseases, Distinguished Young Scholars Fund of NNSF, Key Program of NNSF, Major Program of International Cooperation of NNSF and several other funding. It has established the world-class cohorts, bio-bank and immortalized lymphoblast cell lines for rare pulmonary vascular and thrombosis disease. On the other hand, the lab is using multiomic approaches (whole genome sequencing, proteomics, metabolomics),



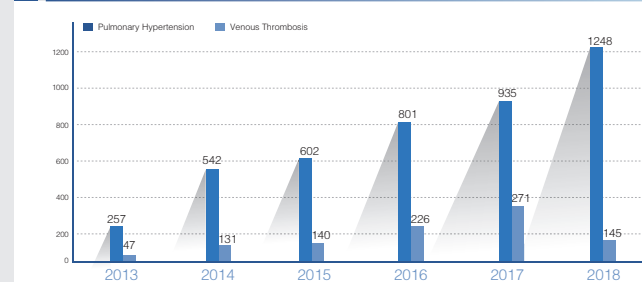
transgenic mice models and patient-specific induced pluripotent stem cells to explore gene editing and cell transplantation therapy for patients. The genetic consulting platform has served more than 1000 pulmonary hypertension patients for family planning.

In 2018, the Center has accomplished the first large-scale study using whole exome sequencing in Chinese idiopathic pulmonary hypertension (IPAH) patients. It has identified BMP9 as a novel IPAH predisposition gene. The result is recently published on European Respiratory Journal with an editorial from Prof. Nicholas W. Morrell "the finding of patients with mutations in BMP9, with reduced BMP9 levels, indicates that supplementing BMP9 in these individuals would be an attractive precision medicine approach". The first-author Dr. Xiao-Jian Wang was invited to give a talk on this study in the session of Basic & Translational Science Hot Line Presentation on the 2018 ESC Congress.

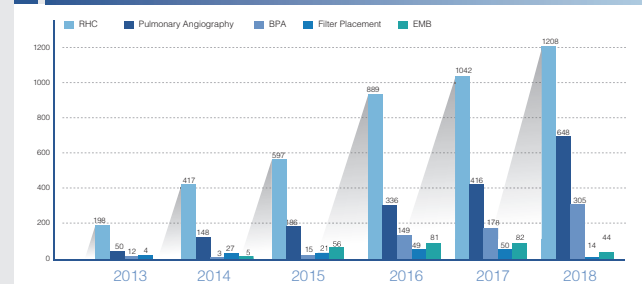
The Center is passionate about teaching and supporting career paths for young scientists, undergraduate and graduate students. Multiple positions are available to graduate students and post-docs from worldwide. The course, Thrombosis and Hemostasis: From Bench to Clinic, established and annually updated by the Center, is open to all students in Peking Union Medical College.

In 2018, a series of the Long March conferences have been held nationwide, contributing to the establishment of Chinese Pulmonary Vascular Science, the specialist training and enhancing international academic communications.

Pulmonary Vascular Disease in Inpatient Ward



Major Pulmonary Vascular Interventional Procedures



Hypertension Center

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The Hypertension Center was established in 2003, and was previously named the Institute of Hypertension. Professors Lisheng Liu, Deyu Zheng, Guozhang Liu, Rutai Hui were former directors of the Center. Professor Jun Cai is the current director. Professor Xianliang Zhou and Lei Song are the current vice director. The staffs working at the center now include 2 emeritus professors, 4 chief physicians, 5 associate chief physicians. There were 6 in-hospital doctoral students, 8 graduate students.

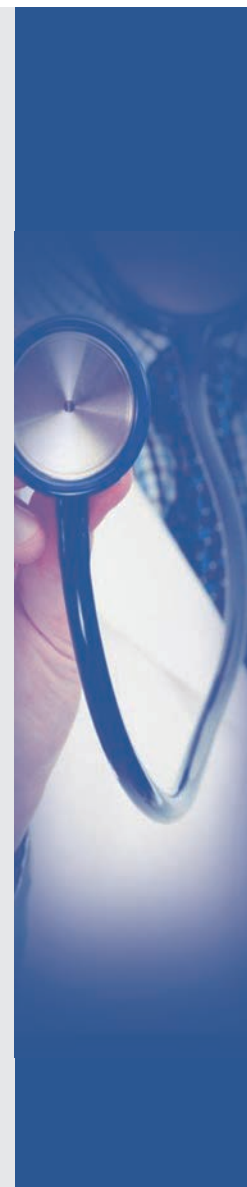
The center specializes in the research and treatment of hypertension, and includes a ward with 38 inpatient beds. This has become one of the largest centers in the Asia-Pacific region specializing in the management of hypertension and peripheral vascular disease. The staff members have extensive experience in the standard management of secondary hypertension, resistant hypertension, and peripheral vascular disease. The center has a prestigious leading role in the field of hypertension treatment, providing interventional diagnosis and treatment of peripheral vascular disease.

Ambulatory blood pressure monitoring (ABPM), blood pressure monitoring of four limbs, arterial stiffness monitoring, endothelial function testing and sleep respiratory monitoring have been performed for numerous patients in the center, as well as pressure titration of CPAP for patients with moderate to severe obstructive sleep apnea. Depending on the laboratory findings and nuclear medicine results of plasma renin, aldosterone, urine aldosterone, plasma catecholamine, urine metanephrines and normetanephrines, as well as serum cortisol, urine free cortisol and 1-mg overnight dexamethasone suppression test (DST), together with iodine-131-labeled metaiodo-benzylguanidine (MIBG) adrenal medulla imaging, many cases of primary aldosteronism, pheochromocytoma

and Cushing's syndrome have been diagnosed during the last year. Most diagnoses and treatments worldwide of Takayasu arteritis were achieved in our center, since the use of 18 F - fluorodeoxyglucose positron emission imaging (18F-FDG PET), which providing early diagnosis and monitoring of disease activity, greatly improving the diagnosis and treatment of Takayasu arteritis. From 2014, the center has explored the application of precise medicine and genetic diagnosis technology in young refractory hypertension patients, made the diagnosis and treatment standards of secondary hypertension, refractory hypertension to reach the international advanced level. The number of cases managed is currently increasing by 30% per year. A total of more than 4000 peripheral arterial angiography and over 2500 therapeutic renal artery interventions were performed so far, with a complication rate lower than 1.5% and mortality rate of 0.13%, which is lower than that reported by other international centers. Long-term treatment outcomes are also good compared with other centers internationally.

The hypertension center also has an extremely experienced, skilled nursing care team specializing in preoperative and postoperative care of patients under interventions for hypertension, aortic dissection, peripheral arterial disease, et al. The nurse team strongly backs up and advances diagnosis and treatment of hypertension and peripheral arterial disease in our center. Additionally, research teams of the center endeavored to conduct basic researches and clinical application studies majorly on secondary hypertension and complicated hypertension, which obtained several science and technology achievement awards at national, ministerial and medical college levels, respectively.

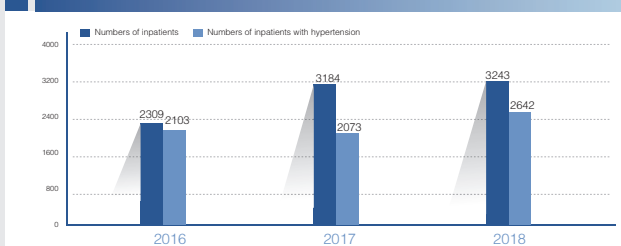
In 2018, the Center organized and participated in 5 projects supported by National Natural Science Foundation of China including 1 "National Science Fund



Emergency and Intensive Care Center

for Distinguished Young Scholars” project, 1 “Beijing Municipal Outstanding Young Scientists” project, 1 “Capital Fund for Medical Development and Research” project. The annual scientific research funds increased by over 50 million yuan. In 2018, our center published 16 SCI articles (including those accepted) in professional and authoritative journals such as Microbiome (IF 9.3) and Hypertension.

Numbers of inpatients of hypertension center for the last 3 years

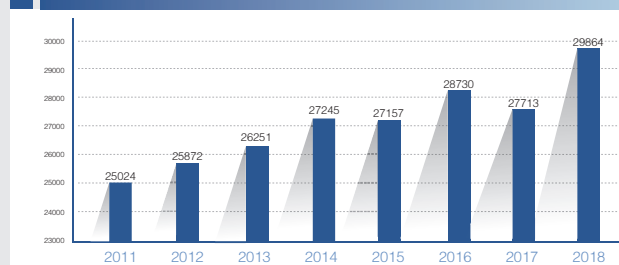


The Emergency and Intensive Care Center of Fuwai Hospital consists of the Emergency Room, ICU and an Emergency Ward. It is one of the largest centers specialized in the clinical management and research of acute severe cardiovascular disease. There are many experienced clinical experts and a variety of advanced equipment. A total of 29,864 patients were treated in the Emergency Room in 2018 with more than 99% survival rate in severe and critical patients. The Emergency Room is experienced in treating Acute Coronary Syndrome, Aortic Dissection, Hypertension emergency, Acute Heart Failure. The ICU and the Emergency Ward are experienced in treating end-stage ischemic heart disease, cardiomyopathy, valvular heart disease, aortic dissection, and acute coronary syndrome. In 2018 1,178 inpatients have been admitted.

The Chest Pain Center which base on emergency department are serviced for patients with a set of symptoms that include chest pain and chest tightness for improving the process of diagnosis and increase the accuracy and effectiveness of treatment.

This center is also very active in clinical and basic research. There are several projects founded by national grants, clinical trials at III-IV phase for cardiovascular medicines and international multicenter trials. In 2018, the center had published 7 papers.

Numbers of patients treated in the emergency room per year from 2011 to 2018



Heart Failure Care Center

Heart Failure Care Unit (HFCU), the predecessor of Heart Failure Center, was initially founded in September, 2002 and renamed Heart Failure Center in 2012. It is one of the characteristic departments in Fuwai Hospital and the first professional medical center established in China focus on prevention, diagnosis, treatment and research for heart failure (HF). Over the past 16 years, the center has done a lot of works on medical practice, scientific research and teaching for HF and made remarkable achievements in China.

The current director of the Center is Jian Zhang and deputy director is Yuhui Zhang. The Center has a skilled medical and scientific research team for heart failure including 5 chief physicians, 4 associate chief physicians, 4 attending physicians and 1 deputy director nurse at present. Moreover, there are 1 post-doctoral student, 6 doctoral students and 6 master students been studying and 9 self-recruited professional physicians on HF been training in the Center in 2018. There is a ward, namely, HFCU, associated with the Center, with 36 beds available since December, 2018.

With regard to clinical works, around 800 patients have been admitted to HFCU in 2018, of which about 700 patients have been diagnosed with HF. The etiology of HF included coronary artery disease, cardiomyopathy, valvular heart disease, congenital heart disease, hypertension, infective endocarditis, pericardial diseases, and so on. By means of ultrasound-guided endocardial myocardial biopsy combined with various cardiac imaging and gene detection, the ability of identifying the cause of HF and the diagnosis and differential diagnosis of cardiomyopathies with different types has markedly improved. Swan-Ganz floating catheter is routinely used to evaluate and monitor hemodynamics of patients with HF to guide clinical management. On the basis of guideline-directed medical

therapy, some non-medical device treatments such as bedside hemofiltration or ultrafiltration, non-invasive ventilation, intra-aortic balloon pump (IABP), extracorporeal membrane pulmonary oxygenation (ECMO), percutaneous left ventricular assist device (LVAD) have been actively carried out in some patients with refractory HF and several patients in critical condition have been successfully rescued in the Center.

In terms of scientific researches, the Center has been undertaken the National Key Research & Development Program of the 13th Five-year Plan Period, study on the prevention and control of major chronic non-communicable diseases, research on long-term management and evaluation of chronic HF and establishment of quality control system, and the registry study on the application of ultrafiltration in the management of patients with acute decompensated HF and water and sodium retention has also been performed in 2018. Furthermore, the Center has achieved 2 new projects supported by grants from the National Natural Science Foundation of China (General Program) in 2018. Moreover, several multi-center clinical trials on new medication for HF at home and abroad have been performed in the Center, such as recombinant human Neuregulin-1 injection, oral soluble guanylyl cyclase stimulator-Vericiguat, sodium-glucose-linked transporter-2 blocker- Empagliflozin, etc. In 2018, the Center has published 10 papers.

As for social activities, the Center has hosted the China International Heart Failure Congress (CIHFC) 2018 & 3rd Annual Scientific Meeting of Chinese Heart Failure Association (CHFA), Chinese Medical Doctor Association (CMDA), and undertaken the Heart Failure Forum in China Heart Congress (CHC) 2018. As the rotating President of the General Assembly, Professor Zhang Jian presided over the 29th Great Wall International Conference of Cardiology in 2018. Moreover, relying on

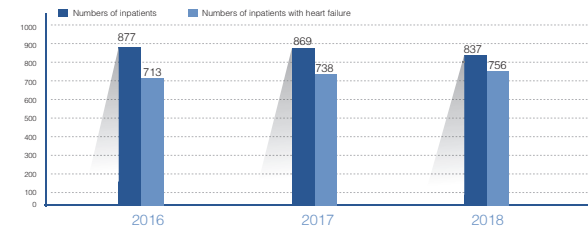




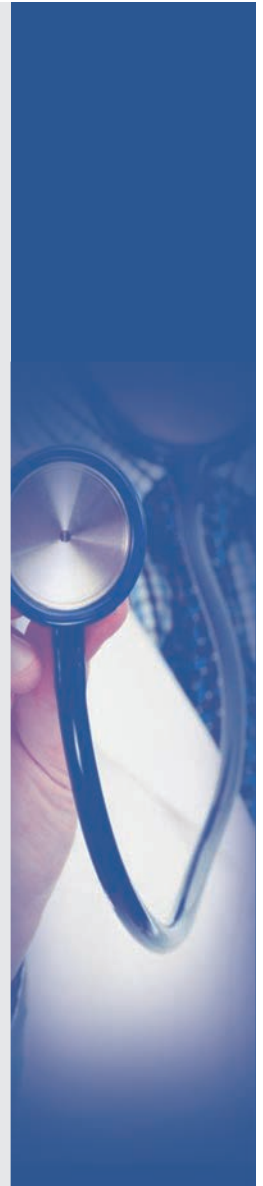
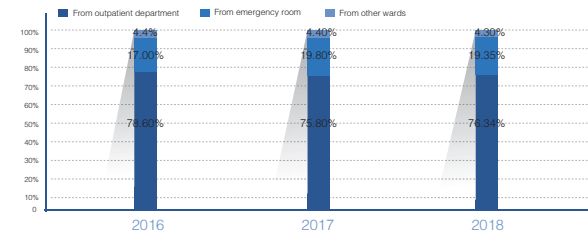
the International Academy of Heart Failure (IAHF) and the Heart Failure Web, the Center has carried out a wide range of professional education programs for physicians in HF nationwide in 2018, which has helped to increase the level of standardized diagnosis and treatment of HF for physicians and made great contributions to improve the overall situation of prevention and treatment of HF in China.

Above all, the Heart Failure Center will continue to work hard with rigorous working attitude and advanced medical technology to provide comprehensive and high-quality medical services to the majority of patients with HF in our country. While further promoting the clinical application of new drugs and new technologies, the Center will also pay attention to early prevention and treatment of HF, holistic management and comprehensive rehabilitation of patients with HF, and strive to make new greater contributions to the development of HF in our country.

Numbers of inpatients of Heart Failure Care Center for the last 3 years



The origins of the inpatients of Heart Failure Care Center for the last 3 years



Premium care Medical Center

Premium Care Medical Center in National Center for Cardiovascular Disease and Fuwai Hospital of Chinese Academy of Medical Sciences was founded in 2004 which consists of 2 internal medicine wards, outpatient service, cardiac specialist examination office and intractable disease consultation center. The director of the center is Professor Aimin Dang, and deputy directors are Professor Xiaohong Huang and Professor Feng Liu. It has 3 chief physicians, 6 associate chief physicians, and 4 senior attendings.

The clinical advantage of the center is comprehensive treatment and management of cardiovascular diseases (CVD) for elderly, union rounds, cardiac specialist examinations (early screening for CVD), intractable disease consultations, VIP health care and international medical services.

1. Comprehensive treatment of cardiovascular diseases for elderly include: (1) Coronary heart disease: the center carried out evaluation and revascularization of difficulty cases, including elderly patients (>75 years of age), reduced cardiac function (LVEF<35%) cases, chronic total occlusion of coronary, severe coronary artery calcification, left main trunk and bifurcation lesions. All of these accounted for about 70% of the total cases. (2) Hypertension: overall assessment of target organ damages and individualized optimal management were carried out whereas gradual development of ambulatory blood pressure monitoring, arterial stiffness and vascular endothelial function tests, sleep respiratory monitoring were also conducted in the center. (3) Arrhythmia: comprehensive treatment and individualized anticoagulation plan for elderly patients with atrial fibrillation, the installation of artificial pacemakers in patients with high-risk arrhythmia. (4) Heart failure: comprehensive management and long-term follow-up for senile end-stage heart failure with multiple organ dysfunction. The center carries out

high-quality diagnosis and treatment services throughout the year. The number of percutaneous coronary intervention has reached more than 2,000 and 2852 patients were treated in the special internal medicine wards in 2018. It is widely praised for exquisite skills.

2. Union rounds: The joint medical team composed of academicians, well-known cardiologists in various fields of internal medicine and surgery regularly participated in the union rounds for patients with intractable disease and guided precision medicine.

3. Cardiac specialist examinations: In view of the current advancement of the cardiovascular prevention and control system, the special specialist examination program was set up to screen patients with cardiovascular diseases.

4. VIP health care and international medical services: Experts in our hospital serviced for about 69392 cases in VIP outpatient department in 2018. Relying on the enormous potentiality of the national team in the cardiovascular field in China, intractable disease consultation center was established, and there were about 500 consultations in 2018. The center has been responsible for health care for VIP and was widely praised.

Based on clinical characteristics and strength, the center spared no effort to strive for research work to provide a solid theoretical basis for the prevention, early screening, diagnosis, rational treatment and rehabilitation of CVD in the elderly. In 2018, it has undertaken one national key R&D project, one National Natural Science Foundation project and three provincial and ministerial projects. 3 SCI papers and several key journal articles were published. Many experts in our center hold the important part-time positions in the domestic academic communities



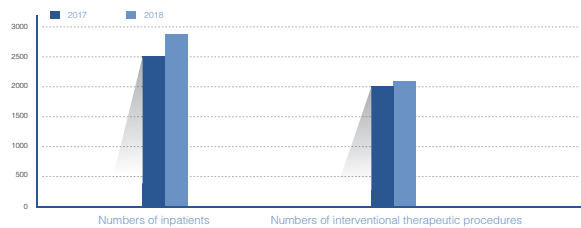
and serve as editors in several mainstream journals.

The center has 3 doctoral supervisors while it has taken on responsibility for the training of resident and advanced physicians in the hospital. The center focused on the cultivation of young doctors and assigned young physicians abroad for further studies periodically to achieve extensive academic exchanges and discussions with foreign colleagues.

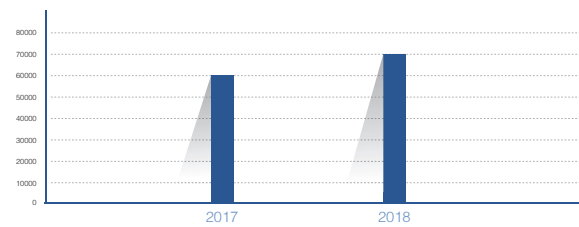
We successfully hosted Cardiovascular Aging and Geriatric Cardiovascular Diseases Forum and Fuwai Forum of Elderly Cardiovascular Disease for several consecutive years. It has a good reputation and has become an extraordinary forum in this field in China.

With the guidance and support of the leaders and colleagues, the center will further actively explore the special care medical system in the new era to provide multi-dimensional medical services with highest quality so as to contribute to the development of our hospital.

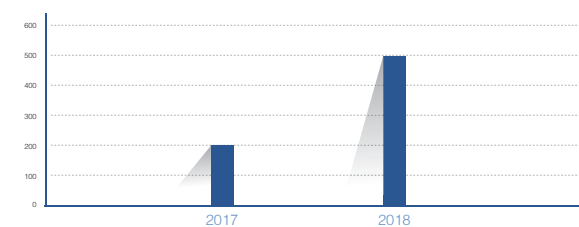
Numbers of inpatients and interventional therapeutic procedures performed in the last 2 years



Numbers of VIP outpatients in the last 2 years



Numbers of consultation cases in the last 2 years



Key Laboratory of Clinical Research for Cardiovascular Medications, NHFPC & Phase I Ward



Key Laboratory of Clinical Research for Cardiovascular Medicines (used to be Clinical Pharmacology Laboratory/Center) was founded in 1983, under the advocacy of famous cardiovascular specialist Shouqi Tao. In December 2001, as the Chinese first specialized in medical clinical research, Key Lab was approved by Ministry of Health. Professor Yishi Li was the first director of the Lab. Professor Youhong Jia was appointed to be the director of phase I ward in Feb 2019. The first-class research team, first-class research facilities, and first-class management have been built in our Lab, through the clinical research on different categories of cardiovascular disease related medicines. For the medical and health affairs of our country, it has been a state of the art of research platform for innovation. With opening to the society, it provides public welfare research and services for medical clinical research.

In the past few decades, the ability of clinical evaluation of medicines have been continuously improved in Key Lab. It has already had the early phase clinical research ability for cardiovascular innovative candidates, including FIH(First in Human), phase II and III safety / effectiveness clinical evaluation; At the same time, we have the ability of comprehensive evaluation of large-scale multi-center clinical trials with clinical outcome events as the end point. It will provide full process and high quality clinical evaluation technology support for China's self-developed cardiovascular innovative medicines. Since 2000, nearly 300 clinical trials for new drugs have been completed in Phase I-IV, involving more than 100 new drug products, covering almost all varieties of cardiovascular medicines in the world. Our Lab plays as the guiding role of clinical evaluation for cardiovascular drugs.

According to the requirement of ISO17025/15189 certification, key laboratories established a medical testing platform for clinical trial with excellent personnel, scientific management, good equipment, accurate and reliable test results. It has four affiliated laboratories: Lab of Drug Metabolism, Lab of Clinical Detection, Pharmacogenomics & Proteomics Lab and Lab of Therapeutic Drug Monitoring (TDM). In 2008, Key laboratory was first approved by the ISO 17025 Laboratory (CNAS) accreditation / metrology certification. And on-site review was passed in 2017. The ISO 17025 laboratory accreditation / metrology certification continuously issued by the China National Accreditation Service for Conformity Assessment (certificate number: CNAS L3456). It indicates

that our Lab and foreign laboratories are at the same level of management, and the testing results have been internationally recognized.

In 2018, Key Lab is responsible for monitoring therapeutic drugs for Hospital. The total 3615 cases are for year of 2018, including 1206 digoxin cases, 931 ciclosporin cases, 1177 FK506 cases, and 301 vancomycin cases. Genotyping was carried out for clinical samples 42 subjects in this year, for providing guidance on individualized clinical application of Warfarin.

In 2018, 1 state-sponsored research projects was ongoing. As an open research platform, Key Lab also responsible for: one topic of capital characteristics, one project from Chinese Pharmacological Society, and 7 phase I-IV drug clinical trials. Commissioned by the CFDA, Key lab is the lead in the revision of Chinese' GCP regulations. And we have started to solicit online comments. Participated in writing one professional book.

Numbers of patients undergoing therapeutic drug monitoring per year from 2011 to 2018

