



中国医学科学院阜外医院
Fuwai Hospital, CAMS,

Application of Percutaneous Mechanical Hemodynamic Support in China

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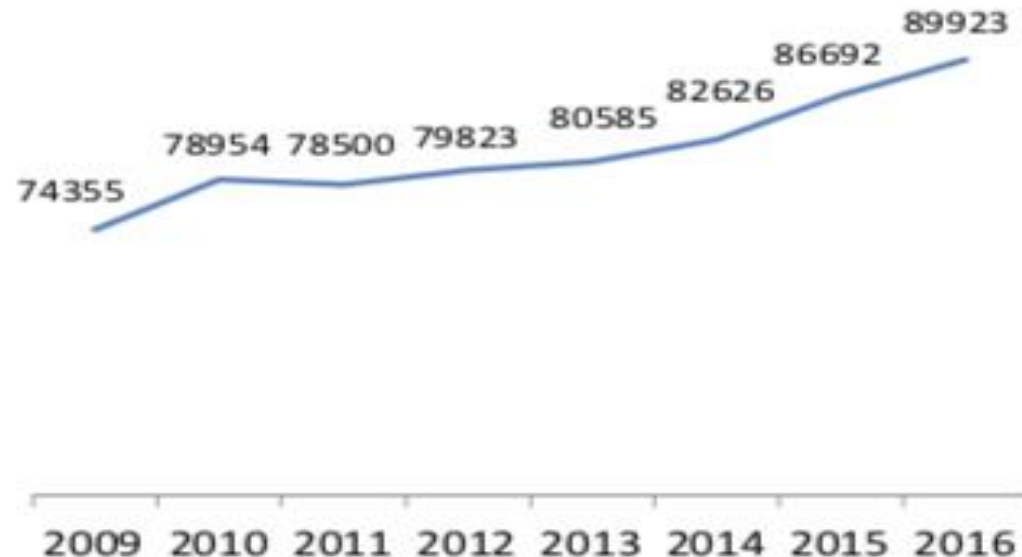
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- **I, Hanjun ZHAO, DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.**



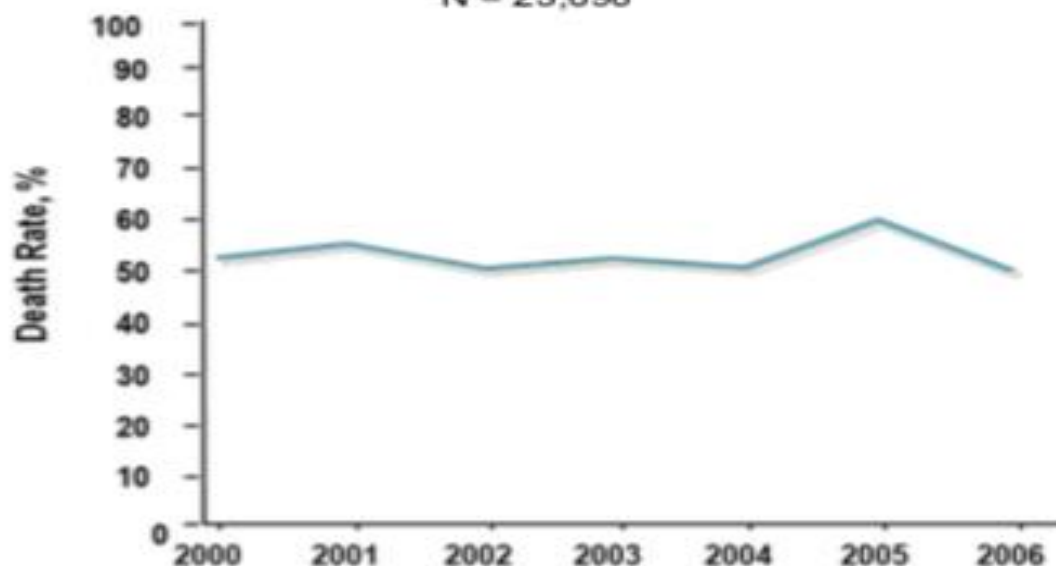
AMI Shock Mortality Unchanged in > 20 years

US AMI/CGS cases per year^{1,2}



High In-Hospital Mortality During AMI Cardiogenic Shock³

N = 23,696



1. Sandhu A, McCoy I, Negi S, et al. Use of Mechanical Circulatory Support in Patients Undergoing Percutaneous Coronary Intervention; Insights from the National Cardiovascular Data Registry. *Circulation*, 2015;132:1243-1251
2. Acute Cardiac Assist Report, *Health Research International* – August 2015
3. Jeger, et al. *Ann Intern Med*. 2008

AMI with Cardiogenic Shock

· 3208 ·

中华医学杂志 2018 年 10 月 23 日第 98 卷第 39 期 Natl Med J China, October 23, 2018, Vol. 98, No. 39

· 经验交流 ·

急性心肌梗死合并心源性休克患者临床特征和预后变化的单中心结果

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宇茹 柯福升 颜红丘

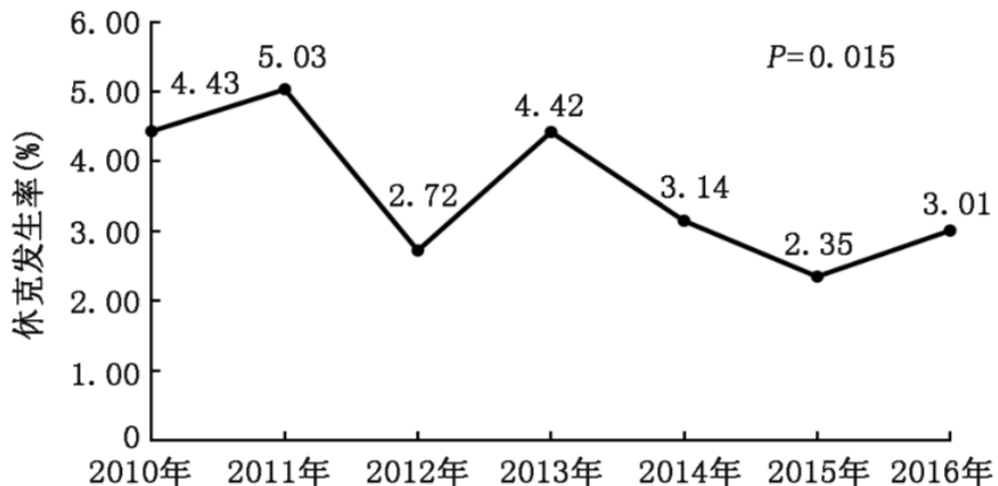


图1 急性心肌梗死合并心源性休克发生率的变化趋势

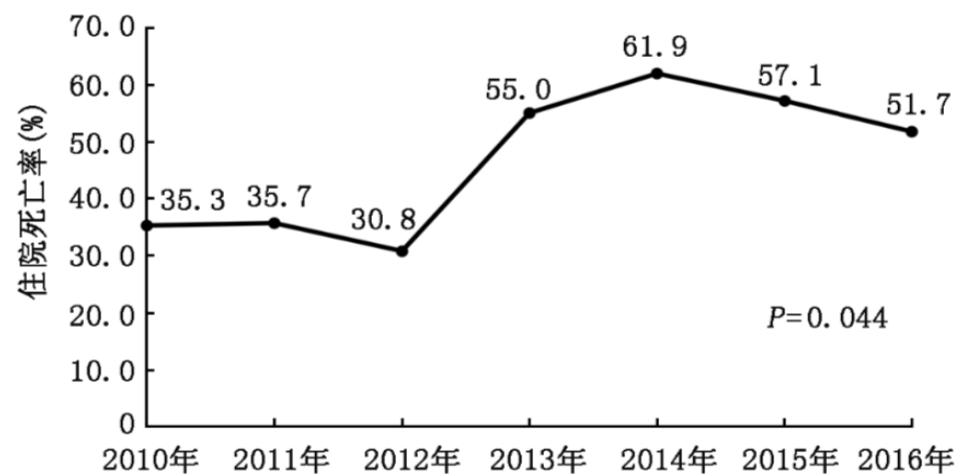
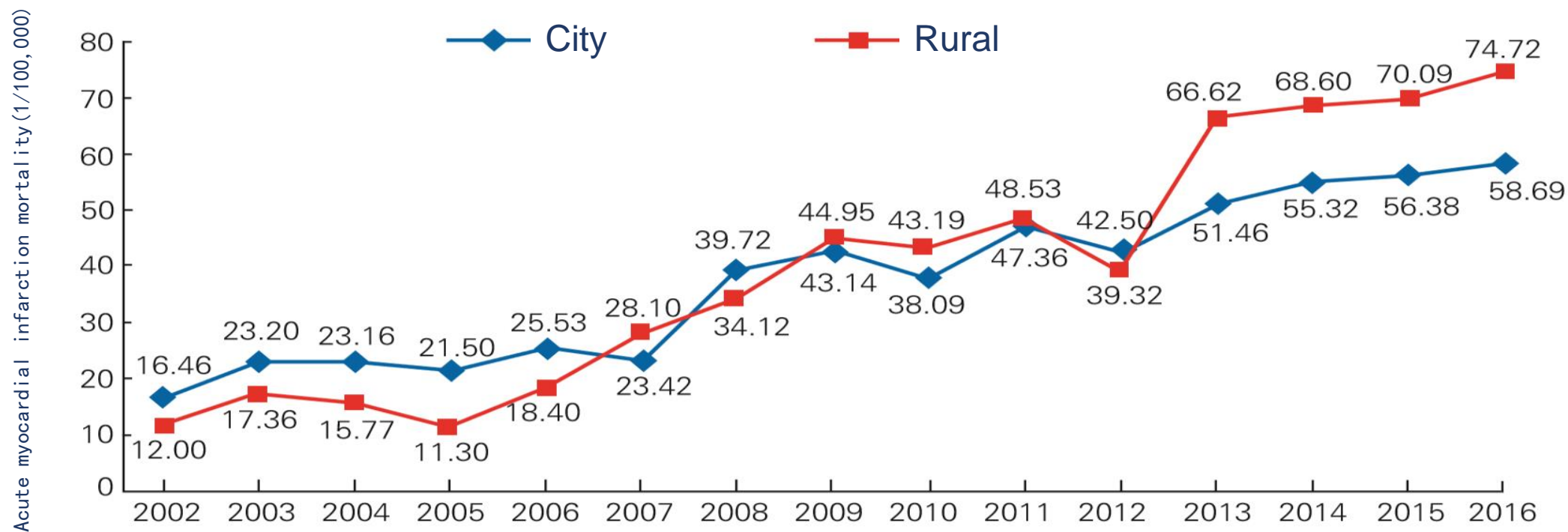


图2 急性心肌梗死合并心源性休克住院病死率的变化趋势

2018 Report on CVD in China

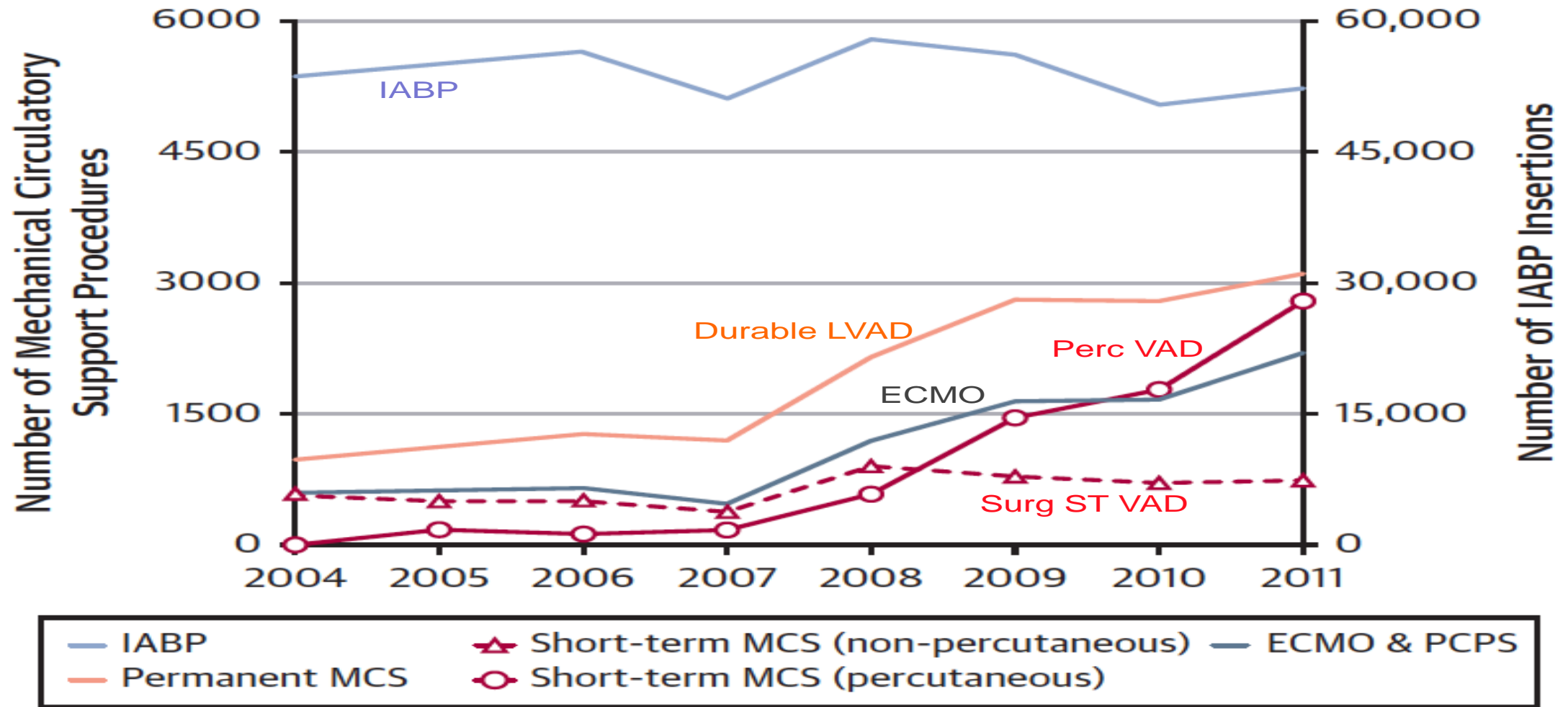
Changes of AMI Mortality Rates of Chinese Residencies in Cities or Rural Areas over 2002 to 2016



Hemodynamic effects of devices

	IABP	ECMO	TandemHeart®	Impella
PAOP	Slightly ↓	↓	↓	↓
LV preload	Slightly ↓	↓ ^a	↓	↓
Afterload	Slightly ↓	↑	↑	↔
Mean Arterial Pressure	↑	↑	↑ ↑	↑ ↑
LV stroke volume	Slightly ↑	↓	↓	↓
Cardiac Output	Slightly ↑	↑	↑ ↑	↑ ↑
Coronary perfusion	Slightly ↑	—	↑	↑
Oxygen Consumption	Slightly ↓	↓	↓	↓
Peripheral tissue perfusion	↔	↑	↑	↑

National trends in the utilization of short-term mechanical circulatory support



IABP in China?

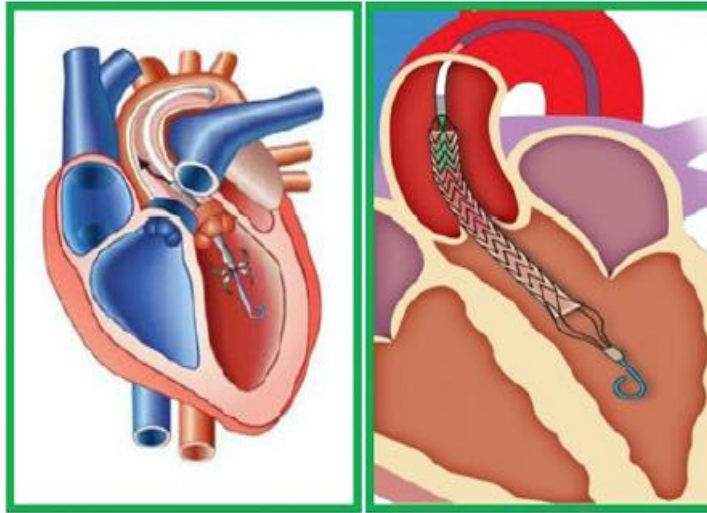
Continuous Flow Pumps

Pulsatile



IABP

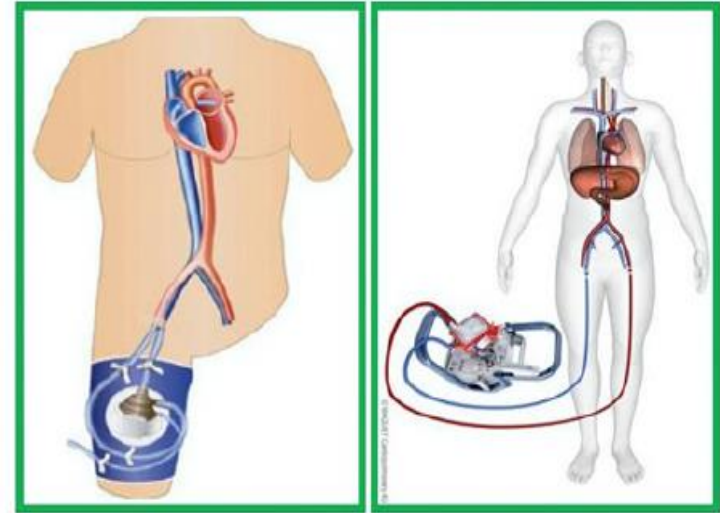
Axial-Flow



Impella CP

PHP *

Centrifugal Flow



TandemHeart

VA-ECMO

Intracorporeal

Extracorporeal

CAMI: IABP Application and Related Factors in Chinese Patients with AMI

· 26 ·

中华心血管病杂志 2018 年 1 月第 46 卷第 1 期 Chin J Cardiol, January 2018, Vol. 46, No. 1

·冠心病·

中国急性心肌梗死患者主动脉内球囊反搏应用现状及影响因素分析

吴娜琼 高展 郑杨 李卫 李军农 许海燕 程晓曙 吴元 王杨 王志杰

CAMI: IABP application

- 2013-2014, 107 Hospitals, n=26562 AMI (STEMI+NSTEMI) pts

IABP application	% (number)	Indication for IABP	% (number)
IABP application in AMI	3.0% (785/26562)	AMI with CS	26.5% (208/785)
AMI with cardiogenic shock (CS)	3.7% (984/26562)	AMI with mechanical complications	0.8% (6/785)
IABP application in AMI with CS	12.0% (118/984)	Prophylactic IABP	66.5% (522/785)
AMI with heart failure (Kiliip III/IV)	9% (2387/26562)	Kiliip I/II with LM disease	9.3% (73/785)
IABP application in AMI with HF	8.2% (196/2387)	Kiliip I/II with 3VD	16.3% (128/785)
IABP pre-PCI	49.9% (381/763)	others	40.9% (321/785)
IABP during PCI	27.5% (210/763)		
IABP post-PCI	9.0% (69/763)		
IABP without PCI	13.5% (103/763)		

CAMI: IABP Complications

- 2013-2014, 107 Hospitals, n=26562 AMI (STEMI+NSTEMI) pts

Outcomes	% (number)	Outcomes	% (number)
In-hospital death	19.4% (152/785)	Peripheral embolism	0.3% (2/785)
In-hospital onset of CS	25.8% (202/785)	Puncture site bleeding	1.0% (8/785)
mechanical complications	2.1% (16/785)	Urinary tract bleeding	0.1% (1/785)
Recurrent of ischemia	7.4% (58/785)	Gastric bleeding	4.2% (33/785)
Severe arrhythmia	20.8% (163/785)	Retroperitoneal Bleeding	0.3% (2/785)
Reinfarction	1.9% (15/785)	Other bleeding events	0.9% (7/785)
Ischemic stroke	1.5% (12/785)	Mild Hemoglobin ↓	2.3% (18/785)
Hemorrhagic Stroke	0.1% (1/785)	Moderate Hemoglobin ↓	1.1% (9/785)
Pulmonary embolism	0.1% (1/785)	Severe Hemoglobin ↓	1.1% (9/785)
		Blood transfusion	2.0% (16/785)

Clinical independent factors of application of IABP in AMI with CS

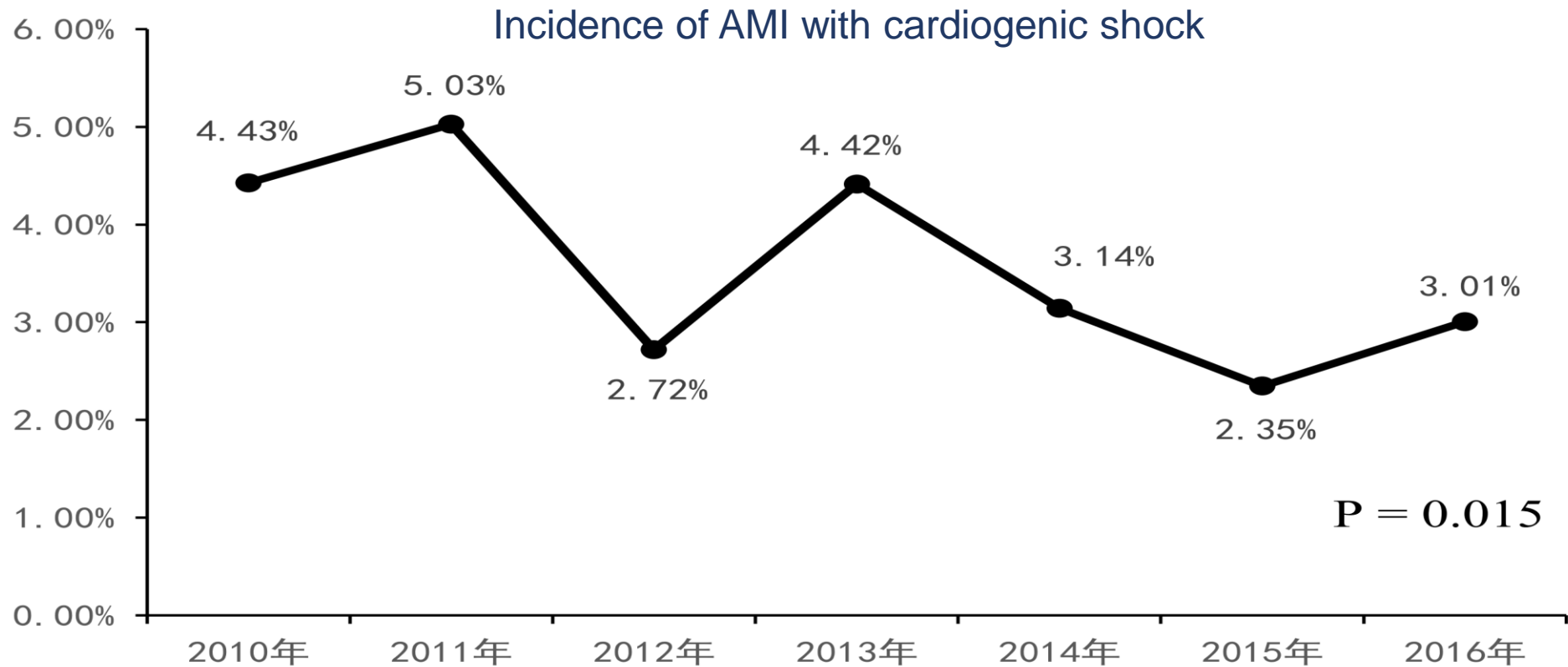
Variables	OR	95%CI	P value
Age	0.987	0.975-1.000	0.047
Dyslipidemia	2.858	1.397-5.846	0.004
LVEF	0.977	0.961-0.994	0.009
Dopamine infusion	2.517	1.500-4.224	0.001
LM disease	2.817	1.495-5.308	0.001
GRACE score	1.006	1.000-1.011	0.034
Emergent PCI	4.508	1.673-12.146	0.003
High volume center	2.562	1.498-4.384	0.001
Higher education level	2.183	1.056-4.509	0.016

Half Preventive IABP Implantation

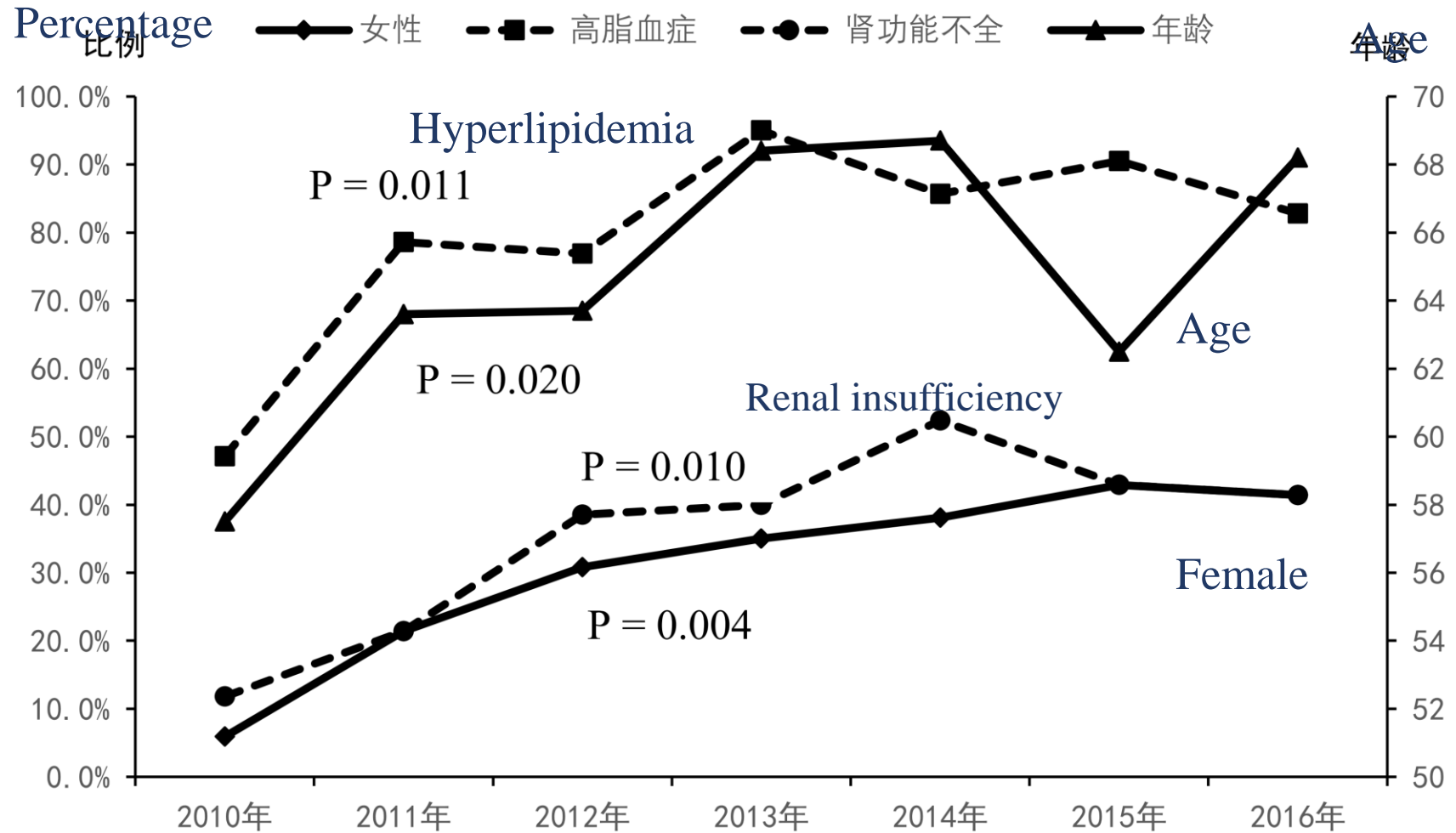
- 2013.1.-2014.9
- 26 592 patients
- IABP implantation: 3.0%
 - 49.9% preventive application
 - 0.8% mechanical complications.
 - 15.0% CS (accounted for 12.0% of all CS patients)

IABP for AMI with CS

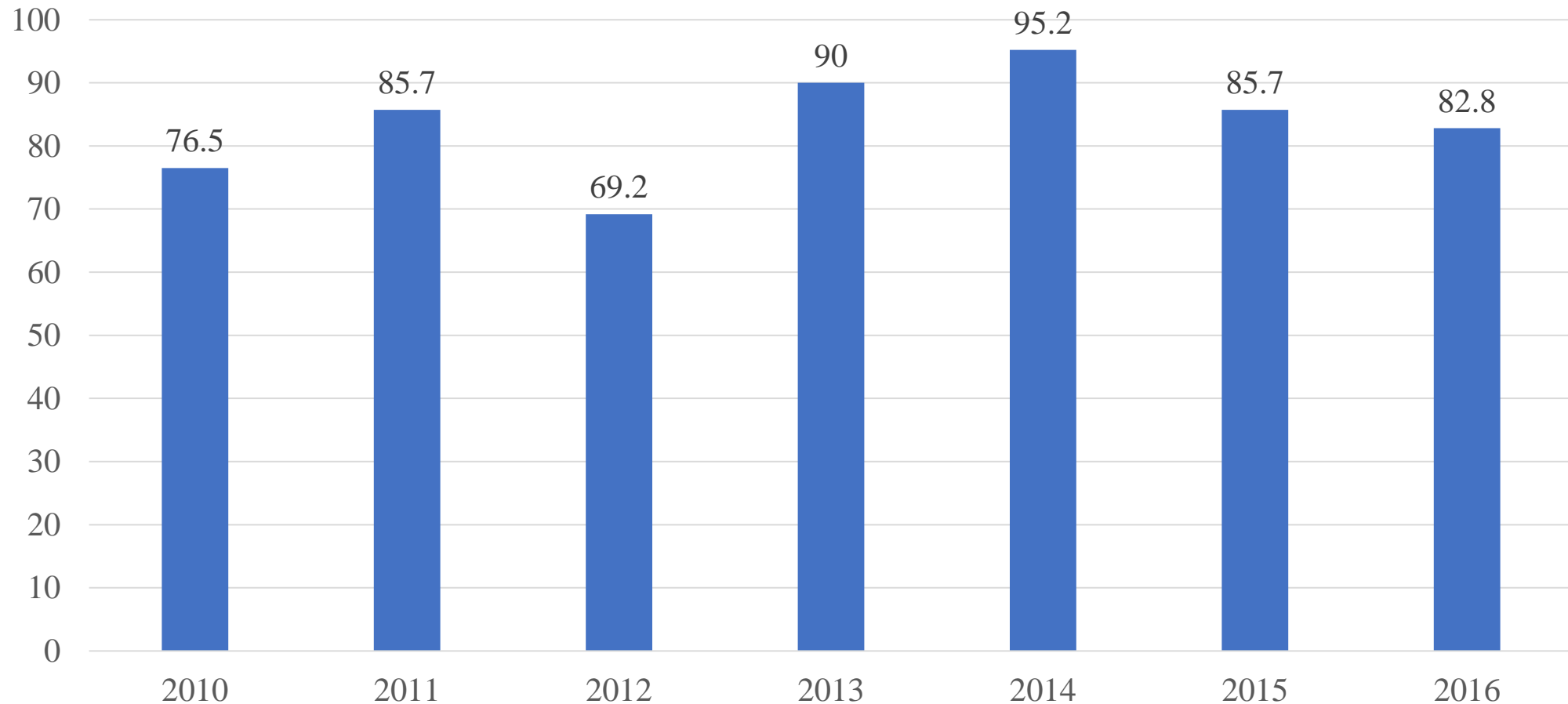
- 2010-2016 Fuwai Hospital, Emergent PCI for AMI, n=4400
- AMI with cardiogenic shock, 3.38% (149/4400)



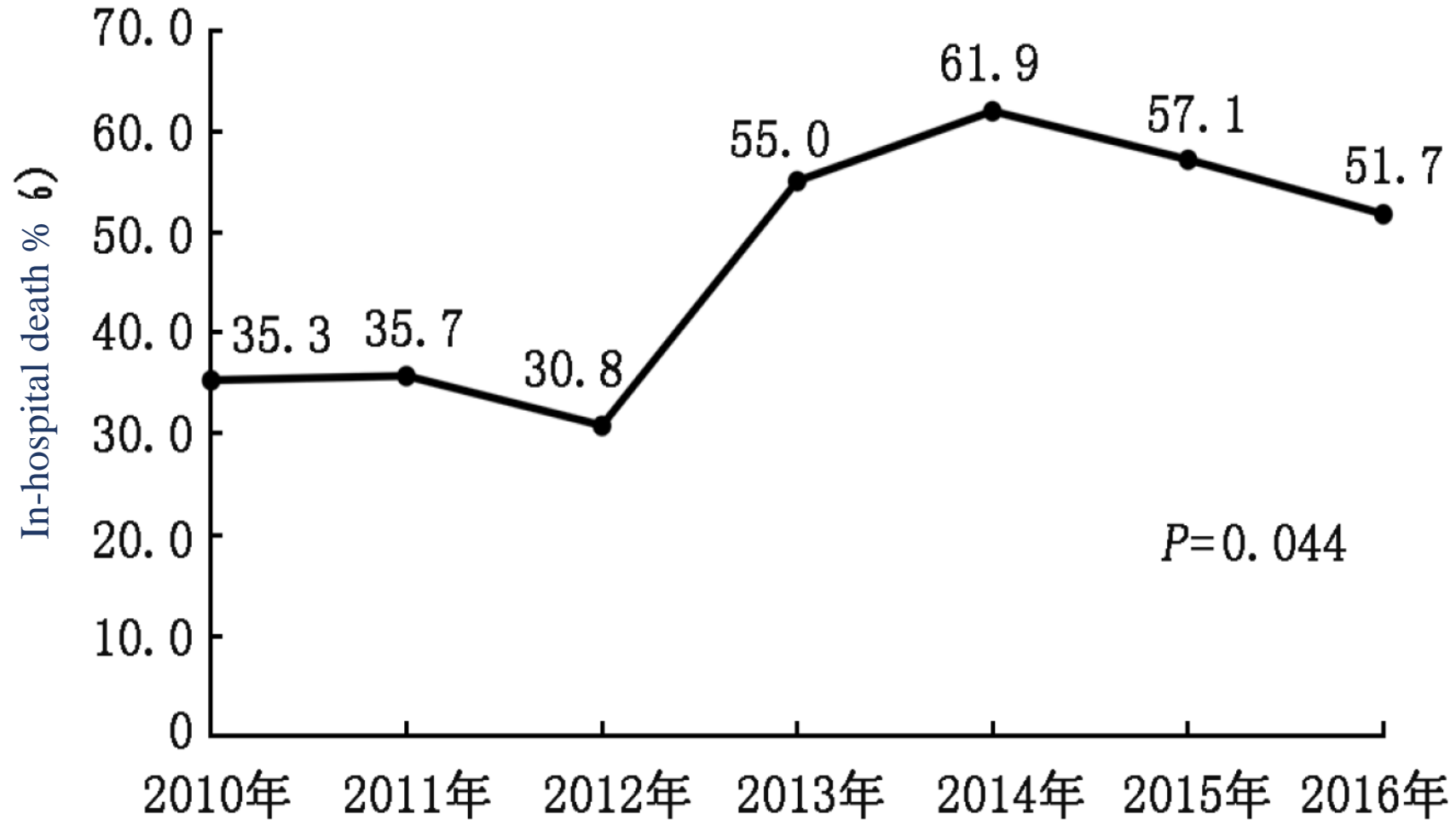
AMI with CS: Clinical Characteristics



High IABP implantation in AMI with CS



More In-hospital death of AMI with CS



ECMO in China?

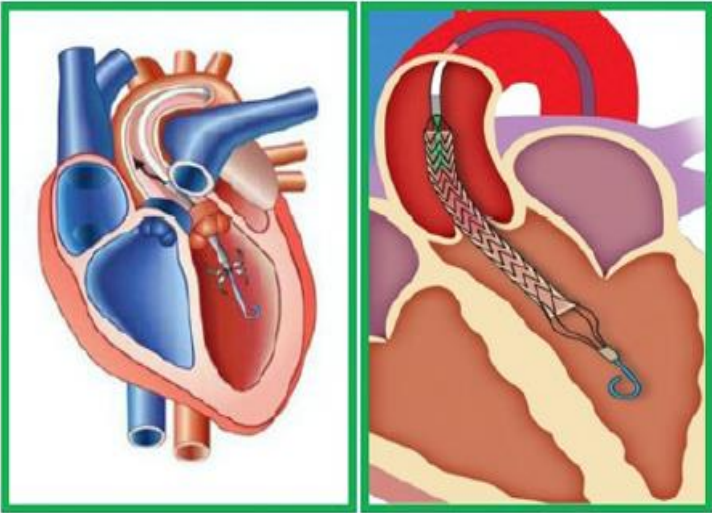
Continuous Flow Pumps

Pulsatile



IABP

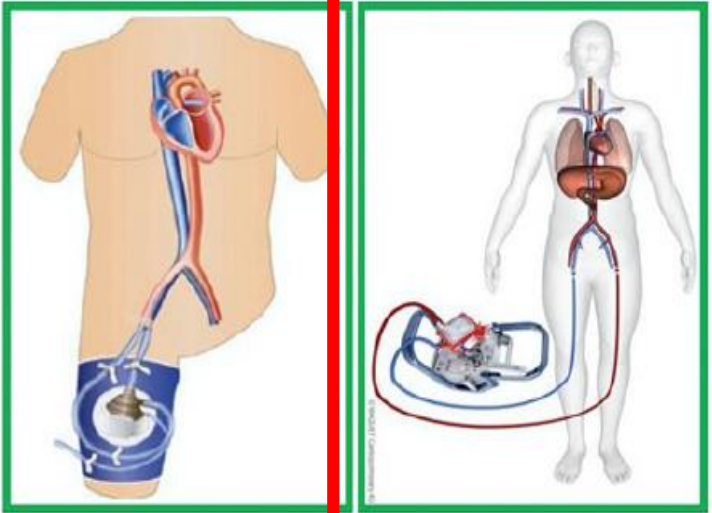
Axial-Flow



Impella CP

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Centrifugal Flow



TandemHeart

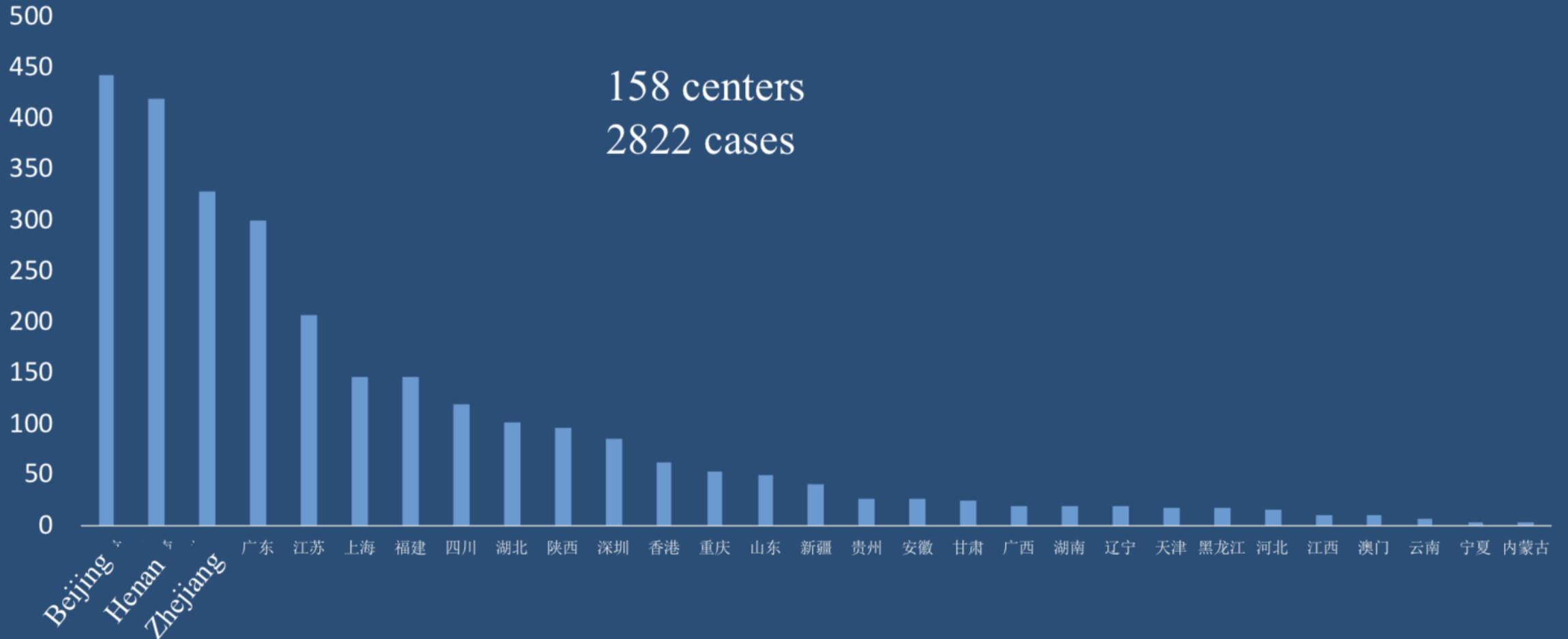
VA-ECMO

Intracorporeal

Extracorporeal

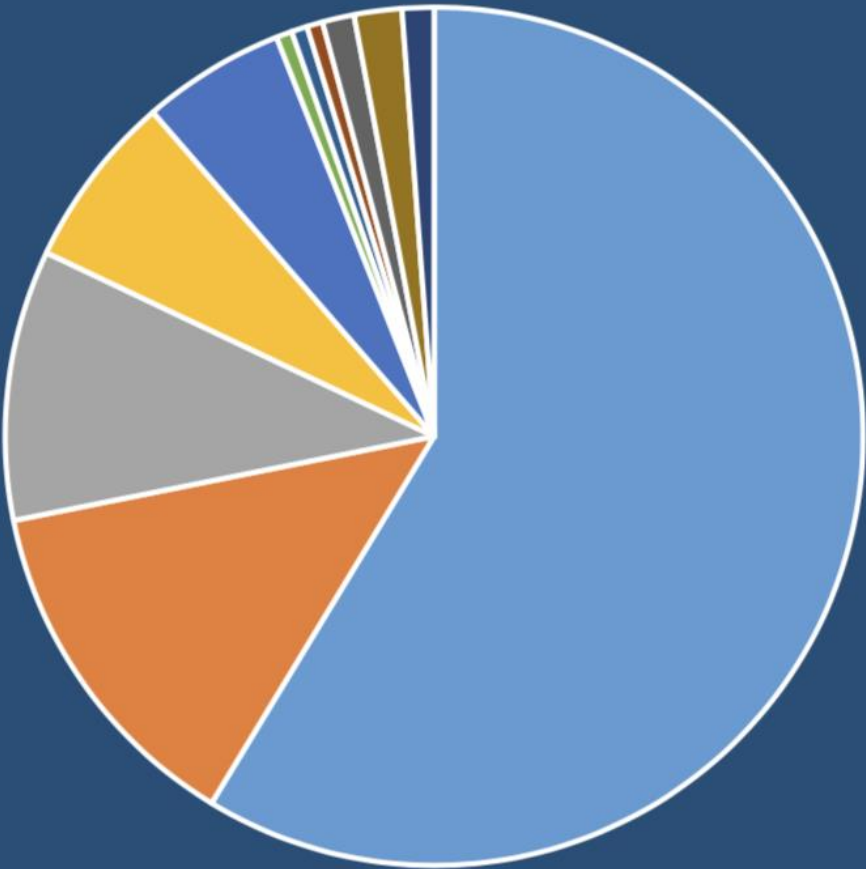
Nationwide data 2017.8-2018.8

Regions & volume of ECMO in China



Most of the centers less than 10 case/yr

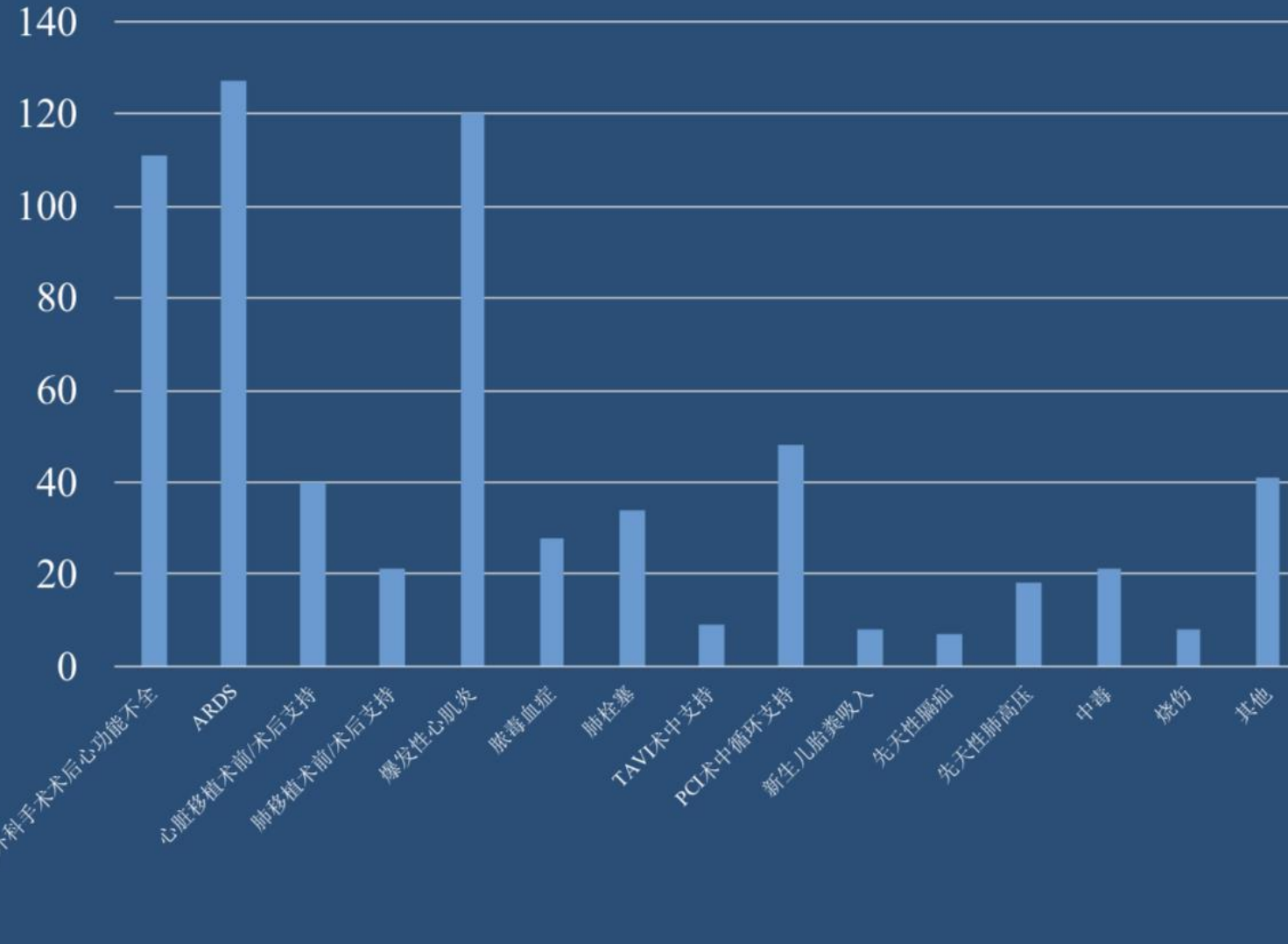
ECMO volume distribution



volume	centers
1-10	98
11-20	22
21-30	18
31-40	11
41-50	9
51-60	1
61-70	1
71-80	1
81-90	2
91-100	3
>100	2

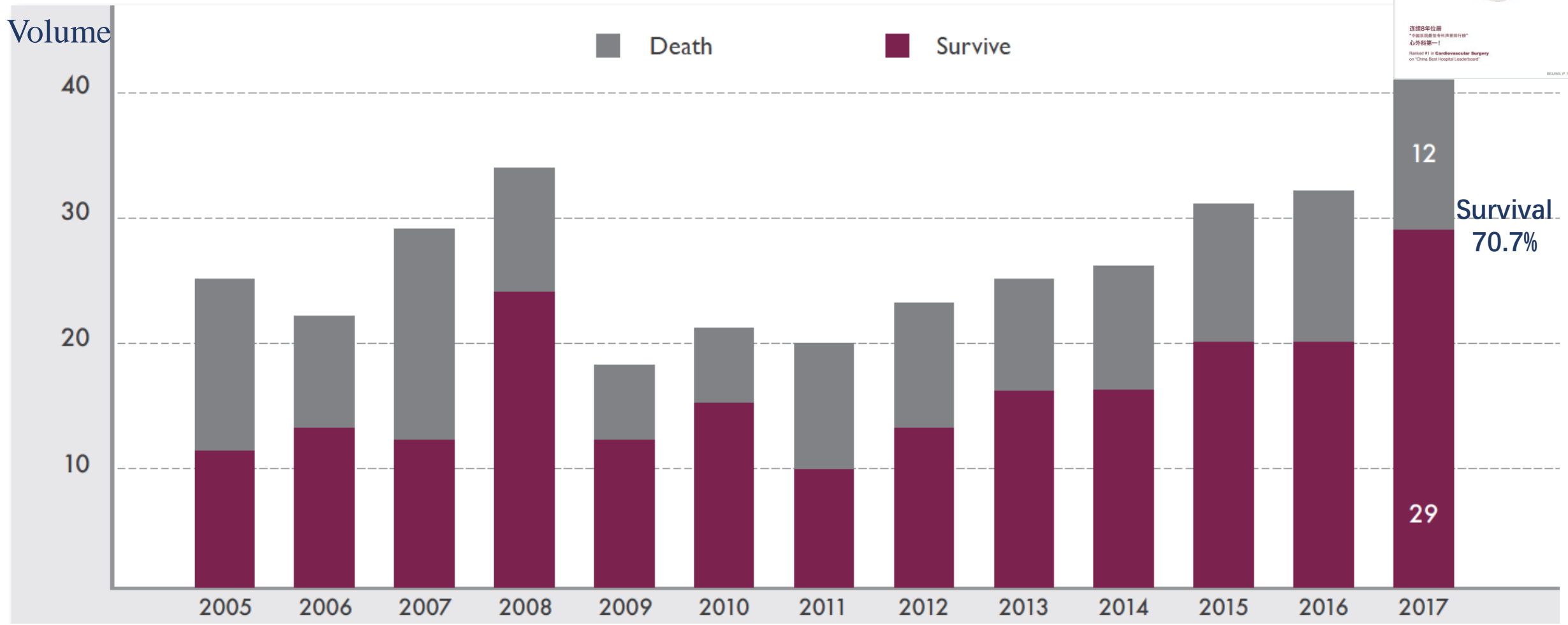
1-10 11-20 21-30 31-40 41-50 51-60 61-70 71-80 81-90 91-100 100以上

Indications for ECMO



Postcardiotomy heart failure	111
ARDS	127
Bridge or destination to heart transplantation	40
lung transplantation	21
Fulminanmyocarditis	120
Sepsis	28
Pulmonary embolism	34
Support for TAVI	9
Support for PCI	48
Meconium aspiration syndrome	8
Congenital diaphragmatic hernia	7
Congenital pulmonary hypertension	18
poisoning	21
Burn	8
其他	41

ECMO+IABP in Fuwai



Complications of IABP+ECMO @Fuwai

Complications, <i>n</i> (%)	All (<i>N</i> = 60)	Survivors (<i>N</i> = 26)	Nonsurvivors (<i>N</i> = 34)	<i>P</i>
Renal failure	24 (40)	4 (15)	20 (59)	0.001
Access-site bleeding	11 (18)	5 (19)	6 (18)	1.000
Gastrointestinal bleeding	4 (7)	3 (12)	1 (3)	0.307
Limb ischemia	13 (22)	5 (19)	8(24)	0.689
Thrombosis	9 (15)	5 (19)	4 (12)	0.482
Neurological complications	9 (15)	1 (4)	8(24)	0.064
MODS	10 (17)	0 (0)	10 (29)	0.003

Conclusions

- The high mortality of AMI-CS still a serious clinical challenge
- We need more effective and safe hemodynamic support devices
- The key of contemporary management strategy in AMI patients complicating CS is an organized approach with rapid diagnosis and prompt initiation of therapy to maintain BP and CO
 - A few available options at least
 - Understanding underlying mechanism and Individualization
 - Familiarity with assist devices critical
 - Tailor therapy based on clinical scenario and anatomy
 - Reassess rapidly and escalate to advanced therapies early before a downward spiral starts