

**Journal of the Hong Kong College of**  
**CARDIOLOGY**



Proceedings of  
7th Asian Preventive Cardiology  
and  
Cardiac Rehabilitation Conference  
cum  
11th Certificate Course in Cardiac Rehabilitation  
8-11 November 2018  
Hong Kong

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# **Journal of the Hong Kong College of Cardiology**

## **Proceedings of 7th Asian Preventive Cardiology and Cardiac Rehabilitation Conference cum 11th Certificate Course in Cardiac Rehabilitation**

8-11 November 2018  
Hong Kong Convention and Exhibition Centre  
Hong Kong

### **Towards Further Risk Reduction: Novel Risk Factors, Novel Targets and Novel Tools**

**Organized by**  
Hong Kong College of Cardiology

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# Journal of the Hong Kong College of Cardiology



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The Journal of the Hong Kong College of Cardiology publishes peer-reviewed articles on all aspects of cardiovascular disease, including original clinical studies, review articles and experimental investigations. As official journal of the Hong Kong College of Cardiology, the journal publishes abstracts of reports to be presented at the Scientific Sessions of the College as well as reports of the College-sponsored conferences.

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## Title Page

- Include full name(s), degree(s) and affiliation(s) of author(s); list under file.
- Give a running title of 3 to 6 words.
- At the bottom of the page, include information about grants, if applicable.
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## Abstract

- Abstract should be after title page and numbered page 1.
- It should not exceed 250 words for major articles; case reports should have abstracts of no more than 100 words.
- At the end of the abstract, provide a maximum of 6 key words suitable for indexing.
- Abbreviations should be kept to a minimum and must be explained when they first appear; after first use, abbreviations alone may be used.
- Standard abbreviations should be used for all measurements (SI units).

## Text

- The text should follow the abstract and begin on a new page, as should References, Tables, and Legends.
- Abbreviations not defined in the abstract should be explained when they first appear in the text.
- References should be cited in numerical order, as should tables and figures.

## References

- Number in the order in which they appear in the text.
- Abbreviate titles of periodicals according to the style of the Index Medicus.
- Follow the format (arrangement, punctuation) shown below:

### Periodicals

1. Lewis T. Paroxysmal tachycardia. *Heart* 1909;1:43-72.  
(if more than three authors, please use "et al." after the third).

### Books (edited by other authors of article)

2. Furman S. Pacemaker follow-up. In Barold SS, (eds): *Modern Cardiac Pacing*. Mount Kisco, New York, Futura Publishing Company, 1985, pp. 889-958.

### Books (identical author and editor)

3. Chung EK. *Principles of Cardiac Arrhythmias*. Baltimore, MD, Williams & Wilkins, 1977, pp. 97-188.

## Abstracts

4. Same as periodicals and followed by "(abstract)".

## Tables

- Tables should supplement, but not duplicate, the text.
- Tables should be numbered consecutively in order of appearance in the text.
- Each table must be given an Arabic numeral and a title, placed at the top of the page.
- Abbreviations used in the table should be foot-noted and explained in the order in which they appear in the table, if they have not been previously used.
- Any material which is not self-explanatory should be foot-noted as well.

## Legends

- Be sure that legends and figures correspond.
- Identify all abbreviations used in a figure at the end of each legend, if the abbreviation has not been used in the text.
- Be sure abbreviations used for measurements are standard SI unit.

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- Submit either 3 black and white glossy prints or 2 prints and one photocopy, preferably of 13 cm x 18 cm (5" x 7") size.
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# 7th Asian Preventive Cardiology and Cardiac Rehabilitation Conference cum 11th Certificate Course in Cardiac Rehabilitation



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## Preface

It is our great pleasure to welcome you to this biennial scientific conference, the 7th Asian Preventive Cardiology and Cardiac Rehabilitation Conference (APCCRC) cum 11th Certificate Course in Cardiac Rehabilitation. With the concerted effort of the Hong Kong College of Cardiology and 20 supporting organizations including the government and non-government organizations, academic and patient groups, we hope to dedicate and contribute to the prevention of cardiovascular diseases in Hong Kong, Asia and other parts of the world.

The APCCRC has continued to grow in scale in past years and is now one of the major international scientific meetings in the field of preventive cardiology and cardiac rehabilitation. The central theme of our conference this year is on "Towards Further Risk Reduction: Novel Risk Factors, Novel Targets and Novel Tools". We are honoured to gather a group of dedicated experts again to present a 4-day program which covers a wide spectrum of topics of interest, latest advances, technologies and controversies.

The conference will begin with the Hong Kong Heart Foundation Lecture "The Global Burden of Cardiovascular Disease" delivered by a renowned keynote speaker, Prof. Diederick GROBBEE from the *University Medical Center Utrecht, The Netherlands*. There are more than 60 abstracts submitted by local and overseas colleagues from over 10 regions and countries. They will compete for the Prof. Chu-Pak LAU Best Paper Award in Preventive Cardiology and Dr. Suet-Ting LAU Best Paper Award in Cardiac Rehabilitation.

To enhance public education in cardiovascular health, there will be concurrent Public Conference Programme conducted in Cantonese for the local public to improve their knowledge and skills in self-management.

Please also take the opportunity to have social networking and local gastronomic experience.



**Dr. Ngai-yin CHAN**  
Co-Chairman  
Executive Committee



**Prof. Leonard Sheung-wai LI**  
Co-Chairman  
Executive Committee

In the treatment of patients with type 2 diabetes and established CV disease receiving standard of care,<sup>1,§</sup> **CV death can strike at any time**

# BATTLE CV DEATH NOW MORE THAN EVER<sup>§</sup>

**JARDIANCE demonstrated  
38% RRR in CV death<sup>1,2</sup>**

Established HbA1c efficacy<sup>2</sup>

Demonstrated safety profile<sup>1,2</sup>

Convenient, once-daily oral dosing<sup>2</sup>



**American Diabetes Association**

recommends empagliflozin to reduce CV death (Level of evidence: A)<sup>3,4\*\*\*</sup>

**Jardiance<sup>®</sup>**  
(empagliflozin)

CV=cardiovascular; RRR=relative risk reduction; CVD=cardiovascular disease.

Reference: 1. Zinman B, et al. *N Engl J Med*. 2015;373(22):2117-2126. 2. Jardiance Hong Kong Prescribing Information. 3. American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycaemic treatment. *Diabetes Care* 2018;41(Suppl.1):S73-S85. 4. American Diabetes Association Standards of Medical Care in Diabetes. Introduction. *Diabetes Care* 2018;41(Suppl. 1):S1-S2.

<sup>1</sup> JARDIANCE demonstrated RRR in CV death in adult patients with insufficiently controlled type 2 diabetes (baseline HbA1c 7-10%) and established CV disease (coronary artery disease, peripheral artery disease, or a history of myocardial infarction or stroke).

<sup>2</sup> Standard of care included CV medications and glucose-lowering agents given at the discretion of physicians.<sup>1</sup>

<sup>3</sup> Empagliflozin versus placebo on top of standard of care.<sup>1</sup>

<sup>4</sup> In patients with type 2 diabetes and established atherosclerotic CVD.

<sup>§</sup> Level of evidence: A = Clear evidence from well-conducted, generalizable randomized controlled trials that are adequately powered.

<sup>§</sup> On top of standard of care.<sup>1</sup>

#### JARDIANCE<sup>®</sup>

**Presentation:** Empagliflozin. Film-coated tablet 10 mg and 25 mg. **Indications:** Adjunct to diet and exercise to improve glycaemic control in adults with type 2 diabetes mellitus as monotherapy or as combination therapy with other glucose-lowering medicinal products including insulin. **Dosage and administration:** Recommended starting dose is 10 mg once daily. For patients who tolerate 10 mg and need additional glycaemic control, their dose can be increased to 25 mg once daily. Can be taken with or without food. **Contraindication:** Hypersensitivity to empagliflozin or to any of the excipients. **Special warnings and precautions:** Should not be used in patients with type 1 diabetes or for the treatment of diabetic ketoacidosis. Should be discontinued immediately in patients where diabetic ketoacidosis is suspected or diagnosed. In patients tolerating empagliflozin whose eGFR falls persistently below 60 ml/min/1.73 m<sup>2</sup> or CrCl <60 ml/min, the dose of empagliflozin should be adjusted to or maintained at 10 mg once daily. Should be discontinued when eGFR is persistently below 45 ml/min/1.73 m<sup>2</sup> or CrCl persistently below 45 ml/min. Should not be initiated in patients with eGFR below 60 ml/min/1.73 m<sup>2</sup> or CrCl <60 ml/min; ESRD or patients on dialysis; children and adolescents; aged 85 years and older; severe hepatic impairment. Elevated haematocrit was observed in the treatment. Caution should be exercised in patients at risk for volume depletion. Temporary interruption of treatment until the fluid loss is corrected or in patients with complicated urinary tract infections. Counsel patients on routine preventative footcare as lower limb amputations has been observed with another SGLT2 inhibitor. Caution in patients with NYHA III and IV cardiac failure. Avoid use in patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption. A lower dose of the sulphonylurea or insulin may be considered to reduce the risk of hypoglycaemia when used in combination with empagliflozin. Test positive for glucose in urine. Avoid use during pregnancy; breast-feeding. Caution when driving or operating machines. **Interactions:** Diuretics, insulin & insulin secretagogues. May decrease efficacy with inducers of UGT enzymes. **Adverse reactions:** Very common: hypoglycaemia when used with sulphonylurea or insulin. Common: vaginal moniliasis, vulvovaginitis, balanitis and other genital infection, urinary tract infection, thirst, pruritus (generalised), increased urination, serum lipids increased. Uncommon: volume depletion, dysuria, blood creatinine increased, glomerular filtration rate decreased, haematocrit increased. Rare: diabetic ketoacidosis. **Note:** Before prescribing, please consult full prescribing information.



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**EXTENDED  
LABEL**

for the treatment of  
patients with insufficiently  
controlled type 2 diabetes  
with established CVD.<sup>^</sup>

JARDIANCE has shown effect  
on glycaemic control and CV events.<sup>2†</sup>

## PROGRAMME

### (A) 11th Certificate Course in Cardiac Rehabilitation (8-9 November 2018)

**THURSDAY, 8 NOVEMBER 2018**

**Venue: S421, Hong Kong Convention and Exhibition Centre**

0800	REGISTRATION	
0900-1030	WORKSHOP I – Advance in Evidence I <i>Chairperson: Prof. Leonard Sheung-Wai LI</i> 1. Topic TBC 2. Aquatic Therapy in Cardiac Rehabilitation 3. Coronary Collateral Formation by Physiological Ischemic Training	Speaker TBC Dr. Mohamad Yatim SAARI Prof. Jianan LI
1030-1100	TEA BREAK	
1100-1230	WORKSHOP II – Quality of Life <i>Chairperson: Dr. Mohamad Yatim SAARI</i> 1. Sexual Health among Cardiac Survivors 2. Driving	Dr. Mohamad Yatim SAARI Dr. Angus CHU
1230-1400	LUNCH BREAK	
1400-1530	WORKSHOP III – Diet and Cardiovascular Health <i>Chairperson: Ms. Vivien LAU</i>	Ms. Vivien LAU
1530-1600	TEA BREAK	
1600-1730	WORKSHOP IV – Psychological Approach in Managing Cardiac Anxiety <i>Chairperson: Dr. Willy Chung-Hin WONG</i>	Dr. Willy Chung-Hin WONG

**FRIDAY, 9 NOVEMBER 2018**

**Venue: S421, Hong Kong Convention and Exhibition Centre**

0830	REGISTRATION	
0900-1030	WORKSHOP V – Advance in Evidence II <i>Chairperson: Prof. Leonard Sheung-Wai LI</i> 1. High-intensity Interval Training in Cardiac Rehabilitation 2. Bedside Exercise Device for Organ Transplantation Rehabilitation in Early Postoperative Period 3. What to Expect during Cardiac Rehabilitation?	Prof. Leonard Sheung-Wai LI Dr. Ssu-Yuan CHEN Dr. Farzaneh TORKAN
1030-1100	TEA BREAK	
1100-1230	WORKSHOP VI – Work and Challenging Situations <i>Chairperson: Dr. Suet-Ting LAU</i> 1. Cardiac Rehabilitation for Athletic Individuals 2. Flying – Aviation Medicine 3. Challenge in High Altitude Related Medical Emergency - Regcognise, Remedy and Risk Reduction	Dr. Tee Joo YEO Dr. Mohammad FALLAH Dr. Man-Kam HO
1230-1400	LUNCH BREAK	
1400-1530	WORKSHOP VII – Exercises <i>Chairperson: Dr. Suet-Ting LAU</i> 1. Exercise in ICU 2. Physical Activity in Cardiac Patients (Aerobic, Resistance Activities) 3. Cardiovascular Impacts of Long Term Endurance Exercise: Implications of the Athlete's Heart	Dr. Visal KANTARATANAKUL Dr. Farzaneh TORKAN Dr. Gary MAK
1530-1600	TEA BREAK	
1600-1730	WORKSHOP VIII – Practical Session <i>Chairperson: Ms. Aggie KWAN</i>	Cardio-Pulmonary Special Group of Hong Kong Physiotherapy Association



## **(B) 7th Asian Preventive Cardiology and Cardiac Rehabilitation Conference (10-11 November 2018)**

### **SATURDAY, 10 NOVEMBER 2018**

0730	Foyer	REGISTRATION	
0800-0920	S421	BREAKFAST SYMPOSIUM <i>Chairperson: Dr. Kwok-Keung CHAN</i>	
		1. The Amazing Heart Failure Journey over the Last 30 Years: From Digoxin to Devices	Prof. Roy GARDNER
		2. Navigating into New Era of LDL-C Lowering with Novel Treatments	Prof. Tony KEECH
		3. A Paradigm Shift in the Management of Asian Patients with Type 2 Diabetes	Prof. David SIU
		4. PCSK9 Inhibition in Acute Coronary Syndrome	Dr. Chor-Cheung TAM
0920-1040	S421	JOINT SESSION WITH SINGAPORE HEART FOUNDATION: EXERCISE AND CARDIAC REHABILITATION <i>Chairpersons: Dr. Ngai-Yin CHAN Dr. Swee Yaw TAN Dr. Tee Joo YEO</i>	
		1. Physical Activity and Coronary Calcification	Dr. Swee Yaw TAN
		2. The Role of Technology in Exercise Promotion	Dr. Tee Joo YEO
		3. Does Low Intensity Exercise Improve Physical Performance among Cardiac Survivors?	Dr. Mohamad Yatim SAARI
		4. Cardiac Exercise Self-Efficacy on Cardiac Patients	Prof. Apple CHENG
0900-1030	S428	ABSTRACT PRESENTATION (Joint with 22nd ASM of ICSM) <i>Chairpersons: Dr. Ching-Lung CHEUNG Dr. Li-Wah TAM Dr. Ming-Ho WONG</i>	
		1. Factors Associated with Persistent Smoking in Patients with Established Cardiovascular Diseases (CVD) and Individuals at High Risk for CVD: Post-hoc Analysis of the EUROACTION Plus Varenicline Study	Dr. Natasha PRIMADITTA
		2. Effectiveness of Process Optimizing and Mobile App Monitoring on Door-to-balloon Time in ST-elevation Myocardial Infarction Patients	Ms. Jian-Guo YANG
		3. Clinical Pathway in Heart Failure Effectively Increases the Utilization of Evidence Based Heart Failure Medications Resulting in Better Patient Outcome	Dr. Yue-Hong CHENG
		4. Exercise Training Program in Patients with NYHA III Class Systolic Heart Failure - Parallel Comparison to the Effects of Resynchronization Therapy	Ms. Edyta SMOLIS-BAK
		5. High Serum Uric Acid is Associated with Dyslipidemia, Overweight/Obesity and Elevated Arterial Stiffness: A Cross-sectional Study in a Coastal Chinese Population	Ms. Yin YUAN
		6. Outcome of Phase II Cardiac Rehabilitation on 6 MWT and Physical Fitness Changes in Patients after Percutaneous Coronary Intervention (PCI)	Ms. Ruiwen ZHANG
		7. Deletion of Telomere-Rap1 Aggravates Adverse Cardiac Remodeling During Aging	Mr. Hao LIU
		8. Association of Alendronate and Risk of Cardiovascular Mortality in Patients with Hip Fracture	Dr. C.W. SING
		9. KLF2 Suppresses Vascular Calcification through Inhibition of Endothelial BMP/Smad Pathway	Ms. Juan HUANG
1040-1115	S423- S424	TEA BREAK / EXHIBITION / POSTER VIEWING	
1115-1255	S421	JOINT SESSION WITH JAPANESE ASSOCIATION OF CARDIAC REHABILITATION: CARDIAC REHABILITATION IN HEART FAILURE <i>Chairpersons: Dr. Ngai-Yin CHAN Dr. Yutaka KIMURA Dr. Shintaro KINUGAWA Dr. Kin-Ming TAM</i>	
		1. Exercise Intolerance in Heart Failure	Dr. Shintaro KINUGAWA
		2. Exercise Capacity and Nutritional Status in Heart Failure Patients	Dr. Hirokazu SHIRAISHI
		3. Cardiac Rehabilitation for LVAD Recipients	Dr. Katherine FAN
		4. Management of Deteriorating Renal Function in Heart Failure Patients	Prof. Patrick MARK

1115-1245	S428	ABSTRACT PRESENTATION – BEST PAPER AWARDS	
		<i>Chairpersons: Dr. Suet-Ting LAU</i>	
		<i>Dr. Kai-Hang YIU</i>	
		<i>Judges: Prof. Bernard CHEUNG</i>	
		<i>Prof. Diederick GROBBEE</i>	
		<i>Dr. Suet-Ting LAU</i>	
		<i>Dr. Kai-Hang YIU</i>	
		1. Efficacious Psychological Group Intervention for Cardiac Patients with Type D Personality	Mr. Isaac Chak-Yan KWOK
		2. Evaluation of the Accuracy of Anthropometric and Adiposity Indices in Predicting Diabetes Mellitus in Thai Adults with Hypertension: Thai National Health Examination Survey 2009 (NHES-IV)	Mr. Hung Nguyen NGOC
		3. Do Interactive Exergames Find their Application in Cardiac Rehabilitation? A Pilot Study	Ms. Edyta SMOLIS-BAK
		4. Cumulative Rheumatic Inflammation Modulates the Bone-Vascular Axis and Risk of Coronary Calcification: A Novel Pathophysiological Paradigm	Dr. Will Yap-Hang CHAN
		5. The Effect of Early Outpatient Rehabilitation Program on Health-Related Quality of Life Among Heart Transplant and Lung Transplant Recipients	Dr. Dae-Gil KWON
		6. Use of Frailty Screening as Risk Stratification for Advanced Heart Failure Patients in Hong Kong – A Novel Approach for A Chronic Problem	Dr. Katherine FAN
1255-1400		LUNCH BREAK	
1400-1445	S421	OPENING CEREMONY	
1445-1530	S421	SYMPOSIUM 1 – Hong Kong Heart Foundation Symposium	
		<i>Chairpersons: Dr. Yuk-Kong LAU</i>	
		<i>Dr. Wai-Kwong CHAN</i>	
		The Global Burden of Cardiovascular Disease	Prof. Diederick GROBBEE
1530-1600	S423- S424	TEA BREAK / EXHIBITION / POSTER VIEWING	
1600-1730	S421	SYMPOSIUM 2 – Controversies in Cardiovascular Risk Factors	
		<i>Chairpersons: Dr. Suet-Ting LAU</i>	
		<i>Dr. Albert Wai-Suen LEUNG</i>	
		<i>Dr. Godwin LEUNG</i>	
		1. Anti-smoking: The Battle Continues	Dr. Judith MACKAY
		2. Alcohol, Diet and Supplements: What is New?	Prof. Chu-Pak LAU
		3. The Environment and Health: Exposomics	Prof. Diederick GROBBEE

## SUNDAY, 11 NOVEMBER 2018

0800	Foyer	REGISTRATION	
0900-1015	S421	SYMPOSIUM 3 – Novel Therapeutic Targets in Preventive Cardiology	
		<i>Chairperson: Dr. Shu-Kin LI</i>	
		1. Innovations in Cardiovascular Prevention	Prof. Diederick GROBBEE
		2. Stroke Prevention in Atrial Fibrillation in Asian Population	Prof. Cheuk-Man YU
		3. New Strategies for Cardiovascular Risk Reduction in Diabetes	Dr. Godwin LEUNG
1015-1045	S423- S424	TEA BREAK / EXHIBITION / POSTER VIEWING	

1045-1235	S421	<p>SYMPOSIUM 4 – From Basics to Advances in Cardiac Rehabilitation</p> <p><b>Chairpersons: Dr. Eddie Siu-Lun CHOW</b>  <b>Dr. Raymond Chi-Yan FUNG</b>  <b>Dr. Shu-Keung KWONG</b></p> <ol style="list-style-type: none"> <li>1. Are Wearable Technologies the Future of Cardiac Rehabilitation?</li> <li>2. Cardiac Rehabilitation for Cardiac Resynchronization Therapy Recipients</li> <li>3. Cardiac Rehabilitation using Wearable Sensor for Monitoring Physical Activity</li> <li>4. Current Evidence of Submaximal Exercise Parameters as Surrogate Indicators for Assessing Cardiorespiratory Fitness</li> <li>5. Does Pharmacological Exercise Mimetics Exist?</li> </ol>	<p>Dr. Visal KANTARATANAKUL</p> <p>Dr. Hirokazu SHIRAISHI</p> <p>Dr. Yutaka KIMURA</p> <p>Dr. Ssu-Yuan CHEN</p> <p>Dr. Shintaro KINUGAWA</p>
1235-1400	S421	<p>LUNCH SYMPOSIUM (Sponsored by AstraZeneca)</p> <p><b>Chairperson: Dr. Chung-Seung CHIANG</b></p> <p>Oral Anti-Platelet Therapy – Key Insights &amp; Implications</p>	<p>Prof. Cheuk-Man YU</p>
1400-1510	S421	<p>SYMPOSIUM 5 – Hypertension Symposium</p> <p><b>Chairperson: TBC</b></p> <p>Debate on the New American Hypertension Guidelines:</p> <ol style="list-style-type: none"> <li>1. European Perspective</li> <li>2. Hong Kong Perspective</li> </ol> <p><b>Panel Discussion</b></p> <p><b>Panelists: Dr. Kam-Tim CHAN</b>  <b>Dr. Chung-Seung CHIANG</b>  <b>Dr. Kin-Lam TSUI</b>  <b>Dr. Chris WONG</b></p>	<p>Prof. Diederick GROBBEE</p> <p>Prof. Bernard CHEUNG</p>
1510-1540	S423-S424	TEA BREAK / EXHIBITION / POSTER VIEWING	
1540-1710		<p>SYMPOSIUM 6 – Cardiac Imaging Symposium – What Have We Learnt from the Big Heart Data?</p> <p><b>Chairpersons: Dr. Carmen Wing-Sze CHAN</b>  <b>Dr. Andrew Ying-Wah LI</b></p> <ol style="list-style-type: none"> <li>1. Big Data and Cardiovascular Disease</li> <li>2. Influence of Ambient Air Pollution on Cardio Morpho-functional Phenotypes: Insights From the UK Biobank Population Imaging Study</li> <li>3. Harnessing the Power of Artificial Intelligence in Cardiac Imaging Analysis: How to Analysis 20,000 CMR Studies a Day?</li> </ol>	<p>Dr. Swee Yaw TAN</p> <p>Dr. Nay AUNG</p> <p>Dr. Nay AUNG</p>
1710-1720		Closing Remarks and Lucky Draw	Dr. Ngai-Yin CHAN

*\*Programme is subject to change without prior notice.*





## (C) 公眾研討會暨工作坊

日期：2018年11月11日  
時間：早上9時至下午1時  
對象：心臟病患者及其家屬

0845		登記	
0900	S426-S427	開幕典禮	陳藝賢醫生
0900-1045	S426-S427	研討講座 認識心臟衰竭	陳曉藍醫生 (東區尤德夫人那打素醫院 心臟科專科醫生)
		膽固醇追擊手：生物製劑	李家輝醫生 (心臟科專科醫生)
1100-1300	S426-S427	工作坊A – 慢活、養生、養心	吳兆文博士 (香港大學社會工作及 社會行政學系副教授)
	S428	工作坊B – 強肌、強心	謝學章先生 (香港復康會社區復康網絡 註冊物理治療師)

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**ABSTRACTS**

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**WORKSHOP II – QUALITY OF LIFE**

**1.**

**Driving**

A CHU

Tuen Mun Hospital, Hong Kong

The needs to counsel patients with chronic medical conditions to understand their risk of driving or their potential legal eligibility to drive has become more and more important because patients are deterring from retirement due to social reasons and older drivers with higher prevalence of chronic illness will continue to drive while more younger patients at their working age developed chronic illness. Nonetheless, counseling would not be effective without a good understanding of the current legal requirements on medical fitness to drive although it has remained unchanged for the past few decades. The law statement is simple yet it is too broad and not specific enough to be applied in medical setting. To enhance patients' understanding of their own risk of driving with respect to their medical condition and to provide instruction on what to do, a return-to-drive counseling service has been developed in Tuen Mun Hospital for the past few years. In this workshop, the current legal requirement in Hong Kong will be explored and the approach on this issue in our daily practice and common challenges will be discussed.

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**WORKSHOP III: DIET AND CARDIOVASCULAR HEALTH**

**2.**

**Diet and Cardiovascular Health**

V LAU

Private Practice, Hong Kong

Cardiovascular diseases (CVD) are among the leading causes of mortality in Hong Kong. While improving food selection can reduce the risk of CVD, doing so requires proper advice and information from nutrition professionals. This workshop aims at reviewing the relationship between CVD and diet and providing practical dietary advice to maintain heart health. Popular dietary patterns such as the Dietary Approach to Stop Hypertension (DASH) diet and the Mediterranean diet will be discussed, and general guidelines in maintaining cardiovascular health will be summarised. Furthermore, some popular diet myths will be debunked and guidance in reading nutrition labels will be provided.

**ABSTRACTS**

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**WORKSHOP IV: PSYCHOLOGICAL APPROACH IN MANAGING CARDIAC ANXIETY**

**3.**

**Psychological Approach in Managing Cardiac Anxiety**

WCH WONG

Private Practice, Hong Kong

Cardiac anxiety is categorized as 'Anxiety Disorder due to Another Medical Condition' in the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition published by American Psychiatric Association. A number of cardiovascular disorders such as congestive heart failure, pulmonary embolism, arrhythmia such as atrial fibrillation are known to include anxiety as a symptomatic manifestation. There is difficulty in making this diagnosis and some aspects should be considered. This includes the presence of a clear temporal association between the cardiovascular disorder and the anxiety symptoms, the presence of symptoms that are atypical of a primary anxiety disorder and the presence of evidence in the literature that the cardiovascular disorder causes anxiety. The anxiety or panic attacks must not be better explained by a primary anxiety disorder. The assessment could be performed using Cardiac Anxiety Questionnaire which is an 18-item self-report inventory that measures anxiety related to cardiac symptoms. As cardiac anxiety causes clinically significant distress or impairment in social, occupational, or other important areas of functioning, and anxiety exerts negative acute and long-term effects on the outcome of cardiac rehabilitation, medical treatment of cardiac anxiety is indicated. This involves a combination of pharmacological and psychological treatment. Regarding the pharmacological treatment of cardiac anxiety, the main categories of medications used are antidepressants, beta-blockers and benzodiazepines. Antidepressants include selective serotonin reuptake inhibitors and newer atypical antidepressants. Although beta-blockers do not affect the emotional symptoms of anxiety, they can relieve the physical symptoms of anxiety such as increased heart rate and trembling

voice. Benzodiazepines provide relief of acute anxiety. They have physiological effects such as immediate lowering of the catecholamine level and decreasing coronary vascular resistance. Apart from pharmacological treatment, psychological treatment is also useful for cardiac anxiety. Psychotherapy such as cognitive behavioural therapy is a form of intervention which has a positive effect on the quality of life of patients with cardiac anxiety. There was evidence that mindfulness-based stress reduction program was useful. There has also been evidence showing that aerobic exercise treatment may have beneficial effect on anxiety. The management of cardiac anxiety highlights the importance of collaboration between cardiologists and psychiatrists.

**ABSTRACTS**

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**WORKSHOP V: ADVANCE IN EVIDENCE II**

**4.**

**What to Expect during Cardiac Rehabilitation?**

F TORKAN

Cardiac Rehabilitation Department of Milad Subspecialty Hospital, Iran

Cardiovascular disease especially coronary heart disease is a major problem in many countries. The incidence of cardiovascular disease has changed dramatically in Iran. Now, coronary heart disease is the most common and serious problem (Iranian Heart Journal 2004). Post myocardial infarction survivors suffer a re- infarction 5 times the healthy population. Secondary prevention protocols can help the patients to live healthier with fewer morbidity and mortality. Cardiac rehabilitation decreases coronary heart disease mortality for nearly 26%.

Cardiac rehab is designed to be a positive, constructive experience that helps patients recovers from a heart event or surgery. In cardiac rehab, patient learn about taking care of himself by managing cardiovascular events risk factors, adopting heart-healthy habits, getting physically active and reducing stress. Yes! cardiac rehabilitation program patient should understand his or her heart condition, and managing medications.

Cardiac Rehabilitation program consist of:

1. in-patient programs with an early assessment for risk factor management and mobilization,
2. transition cares and discharge planning design for daily activities like driving, lifting, sexual activity and so on,
3. out-patient rehabilitation and secondary prevention, the patients are assessed for risk factors and they will be divided into different categories.

Necessary interventions for minimizing the effects of risk factors explained to patients such as non pharmacologic interventions or a healthier life style (quitting tobacco use, healthier diet, regular physical activity, weight management, stress reduction).

In this stage, the patients undergo medical evaluation and exercise testing and based on the results, exercise plan is prescribed and ECG monitoring and medical

supervision applied when indicated.

In Tehran, in a study on 2137 subjects (35-65 years), the prevalence of cardiovascular risk factors is as follows:

Hypertension 31.3%, Isolated systolic hypertension 8.2%, Smoking 13.3%, borderline high total cholesterol 34.3%, high total cholesterol 27.4%, borderline-high LDL 28.4%, high LDL cholesterol 21.2%, low HDL 5.8%, borderline high triglyceride 4.7%, diabetes mellitus 9.2%, overweight 39.8%, obesity 23.4%, and lack of leisure time physical activity 88.9% (Oratii et al).

So controlling risk factors is the main goal in cardiac rehabilitation program.

Future direction should be efforts for changing life style habits in the population for primary prevention.

The effectiveness of secondary prevention measures, the costs of disease and its consequences compared to the costs of prevention, the KAP analysis on the target population can help a fruitful organization.

In a study on 118 coronary artery disease patients in Shahid Rajaee Hospital in Iran , after the monitoring period, BMI, weight, waist circumference, and waist to hip ratio decreased ( $p<0.001$ ) however, these indices returned to the pre rehabilitation period after 12 months (Masoumi 2015).

In another study on 8 weeks exercise rehabilitation on 100 patients (Farahani 2013), 10% increase in METs was noticed compared to pre exercise situation ( $p=0.001$ ), also a 6% decrease in resting heart rate and 18% increase in maximal attainable heart rate were noticed. Also a slight decrease in systolic blood pressure and improvement in lipid profile were occurred.

In a good cardiac rehabilitation program patient should get enough information of

- Best kind of plan for physical activity, Type, Safety, Stretching & Flexibility Exercises.
- Coping with Feelings, Reducing Stress, Quitting Smoking, Eating Well and Losing Weight

In one word back to healthy life style.

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**ABSTRACTS**

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**WORKSHOP VI: WORK AND CHALLENGING SITUATIONS**

**5.**

**Cardiac Rehabilitation for Athletic Individuals**

TJ YEO

Department of Cardiology, National University of Heart Centre, Singapore

This talk will elaborate on

- beneficial effects of exercise for cardiac patients
- case study on athletic individuals with heart disease
- risk stratification and exercise prescription in this cohort
- recommendations for activity / competitive sport in athletes with heart disease

**6.**

**Flying – Aviation Medicine**

M FALLAH

"Aviation Medicine" Department, Iran Air Medical Center, Iran

More than 4 billion travelers in 2017 going through 37 million business flights have travelled around the world; many of the travelers have cardiovascular disorders. Cardiovascular diseases are the first cause of mortality in many countries, for the safety of these patients, paying attention to the presence of these patients in business flights and doing preemptive actions in case of reducing the risk in flights for this group, has been an important subject to aviation organizations and airline companies. The most important cause of cardiovascular symptoms aggravating in sick travelers is "hypoxia hypobaric" caused by low air pressure in the cabin when the airplane reaches the height around 8000 feet. This condition can cause physiologic changes in cardiovascular and respiratory system based on the kind and intensity. Also, the occurrence of psycho stress before and in the flight and on the possibility of blood coagulation aggravating caused by immobilization during long flights are two other important reasons causing higher risk for these patients during travelling. That is why international aviation organizations tried lowering the risk during the flight by codifying special aviation limits for sick travelers and imparting them as preemptive actions to airline companies. Adding to the point, despite the progress in aircraft navigation industry, for increasing the flight's safety, another kind of flight limitation belongs to cabin crew and pilots. Alongside of the preemptive actions starting from 2000, great airline companies have done an efficient action for lowering the possibility of death between travelers during cardiopulmonary resuscitation. The action is to put automatic external defibrillation in the cabin and teach the instruction of using it to the crew. Analyzing the amount of cardiovascular physiologic changes in the flight, evaluating the effect made by the aviation factors in aggravating the symptoms of the disease, introducing the flight limitations for the cabin crew and sick travelers and evaluating the function of automatic external defibrillation are the subjects that will be analyzed in this article.

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**7.**

**Challenge in High Altitude Related Medical Emergency –  
Recognise, Remedy and Risk Reduction**

MK HO

Private Practic, Hong Kong

A sequence of physiological change over the body will happen in the hypobaric and hypoxic environment in high altitude that above 2500 meter. Failure to acclimatization will impose a significant threat to those people who travel to such high altitude. A unique type of altitude sickness will happen in those non-acclimatize travelers which may lead to a life-threatening and even fatal consequence. The recognition for such illness, remedial policy and risk reduction in itinerary planning is crucial for the high altitude hiking trip. An overview of the topic of high altitude related medical emergency will be discussed.

**ABSTRACTS**

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**WORKSHOP VII: EXERCISES**

**8.**

**Physical Activity in Cardiac Patients (Aerobic, Resistance Activities)**

F TORKAN

Cardiac Rehabilitation Department of Milad Subspecialty Hospital, Iran

Physical inactivity is an independent risk factor for coronary heart disease. 22% of cardiovascular diseases stem in physical inactivity. The optimal amount of physical activity is controversial and is an area of challenge. Physical activity also has an impact on secondary prevention. The exercise prescription can be divided in two sets of programs, named "in patient" and "out patient" programs. The exercise prescription depends on when or whether a cardiac event has occurred before and also depends on the exercise capacity of the patient and should be individualized. A sub-maximal exercise stress test helps exercise capacity. Exercise tolerance test can help classifying the individuals into categories for special needs on medical supervisions or ECG monitoring during exercise. Also, the contraindications and special precautions have to be addressed in some conditions. Some situations such as silent angina, congestive heart failure, pacemakers, implantable cardiac defibrillators and cardiac transplant are aspects of cardiac patients that need special attention. For each stage of prescription the FITT (Frequency, Intensity, Time, and Type) should be identified. These special programming will be reviewed in the presentation. Aerobic exercise is the main part of activity in cardiac patients. Aerobic training consists of legs & arms activities in any session, it can be "Interval training" with short duration and high intensity or "continuous training" with long duration and moderate intensity. The advantages of interval training are more intense exercise stimuli on peripheral muscles with lower cardiovascular strain and also its suitability for patients with very low baseline functional capacity. The duration should be 15 minutes per session. Aerobic exercise may be introduced as suitable modalities like indoor cycling, the most walking at different speeds( indoor and outdoor) or less suitable type's modalities like outdoor cycling, jogging or swimming. Before activity, risk thresholds should be evaluated (ventricular arrhythmias and ischemia, BP changes and hypertensive response). If there is any risk, target heart rate in exercise is absolutely limited to 40 % of MHR and if there is not any risk, target heart rate is recommended to 60% MHR. Resistance training is a very important part in

cardiac rehabilitation program. It is consisting of "Muscular strength training" and "Muscular endurance training". Resistance training causes preventing and managing a variety of chronic medical conditions and modifies coronary risk factors and it also improves independence in the elderly. Resistive training decreases in cardiac demands in daily activities which need weight lifting and sustaining endurance in sub- maximal exercise. This exercise is recommended for patients with moderate to good LV function and exercise capacity above 5METs without angina symptoms or ischemic ST depression. Contraindication of resistance training should be considered as followed:

- Unstable angina
  - Un-controlled arrhythmia-
  - LV outflow obstruction -
  - Recent CHF not effectively treated-
- Severe valvular disease
- Uncontrolled HTN (SBP $\geq$ 160 mmHg/ DBP $\geq$ 105 mmHg)

The older patients with this type of training, get dramatic improvement in muscular strength and endurance, increased gait speed, improved BMD, decreased risk of falling; And also cardiac transplant recipients get offset side effects of prednisolone on muscle mass and bone density. The course of resistance training should be in Phase II and types of this kind can be with elastic bands, light free weights and wall pulleys. Resistance training should not begin until 2-3 weeks after AMI and weight machines are allowed 4-6 weeks after AMI. In post CABG patients, ROM and very light free hand weights is recommended and also in this group moderate to heavy resistance training is not allowed until 3 months because it may cause pulling on the sternum. The older and frail patients and cardiac patients need to start at lower weights with 1 set of 10-15 reps weight, increased slowly as the adaptation is achieved. The patients are instructed to raise weights with slow, controlled movements to full extension, exhale during exertion phase of the lift, avoid straining and Valsalva maneuver, minimize rest periods to increase endurance, stop exercise upon alarming signs or symptoms and avoid tight gripping of the weight handles. In this workshop we show all kinds of these exercises in practical type for cardiac patients. As a result all kinds of physical activities are recommended for cardiac patients in scientific and correct manners.

**9.**

**Cardiovascular Impacts of Long Term Endurance Exercise: Implication of the Athlete's Heart**

G MAK

Private Practice, Hong Kong

Regular endurance exercise induces significant cardiovascular adaptations including high parasympathetic tone, heart chambers enlargement with eccentric hypertrophy, increase of overall plasma volume resulting in a high cardiac output and rest and especially on exercise. The degree of adaptive changes varies with gender, age, body size, ethnicity, sports discipline, intensity and duration of exercise as well as the level of fitness. These adaptive changes would result in physiological and structural cardiovascular changes that might create confusions and mis-interpretations when one performs Pre-participation Physical Evaluation. Major progress and research in these areas will be discussed with reference to the updated guidelines.

**ABSTRACTS**

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**BREAKFAST SYMPOSIUM**

**1.**

**The Amazing Heart Failure Journey over the Last 30 Years: From Digoxin to Devices**

R GARDNER

University of Glasgow, United Kingdom

Chronic heart failure is a major global health problem and affects 2% of adults in developed countries, with this figure rising to around 7-10% in older adults. This prevalence is expected to rise over the coming decades due to the combination of an aging population and declining fatality rates in other cardiovascular diseases that predispose to the development of heart failure. However, developments over the past thirty years have revolutionised heart failure management and we now have a wealth of evidence-based treatments that offer significant reductions in morbidity and mortality for our patients. With such an array of therapies now available, this presentation will provide an overview of the amazing heart failure journey over the last 30 years, with a hint of what we might expect in the future.

**2.**

**Navigating into New Era of LDL-C Lowering with Novel Treatments**

T KEECH

NHMRC Clinical Trials Centre, The University of Sydney, Australia

CVD remains the largest single cause of premature adult death globally. In spite of the proven efficacy of cholesterol lowering with statin therapy in 28 large trials, including those showing that high-intensity statins are even more efficacious, the residual risk of CVD remains very high. Some modest additional benefit can be obtained by the addition of a cholesterol absorption inhibitor, but the big breakthrough has been the recent evidence that further profound cholesterol lowering with PCSK9 inhibition can offer major additional benefits. Both the FOURIER trial evaluating evolocumab among 27,564 patients with established vascular disease, and the ODYSSEY trial evaluating alirocumab among 18,924 patients with ACS have shown 15% reductions in composite CVD events over just 2-3 years of treatment on top of high quality background statin treatment. In FOURIER, the benefits after the first year continued to increase; these being more than 30% further risk reduction for MI and stroke in years 2 and 3. Each of these PCSK9 inhibitors was able to lower LDL-C to unheard of low levels, with many subjects reaching LDL-C levels of 1.0 mmol/L (40 mg/dL) or less on treatment. This proved to be very safe, with PCSK9 inhibitor therapy being well tolerated with no excesses of serious adverse events reported, apart from local injection site reactions (generally without the need to stop treatment). The LDL-C reductions with treatment have been durable over time, and the major challenge to access has been the updating of guidelines with the new findings plus negotiating the approvals and costs of therapy in each country. It is to be hoped that as physicians become familiar with the use of PCSK9 inhibitors, their use will increase among those patients most at risk of further CVD events i.e. those with prior CVD, familial hypercholesterolaemia, and other high risk conditions.

**3.**

**PCSK9 Inhibition in Acute Coronary Syndrome**

CC TAM

Queen Mary Hospital, Hong Kong

Acute coronary syndrome (ACS) is usually caused by atherosclerotic plaque rupture resulting in thrombosis of coronary artery and myocardial necrosis. Lipid management is pivotal in primary and secondary prevention of ACS and statins have been shown to improve clinical outcome. However, despite modern revascularization technology, potent antiplatelet agents, neurohormonal modulation and statins, long term major cardiovascular event rate is still high. Proprotein convertase subtilisin/kexin type 9 (PCSK9) is a chaperone to destroy low density lipoprotein (LDL) receptor. A loss-of-function mutation of PCSK9 increases LDL receptors and markedly lower circulating LDL level translating into very low incidence of atherosclerosis. Numerous research have been performed in PCSK9 inhibition and monoclonal antibody to PCSK9 emerges to be an effective mean to reduce LDL level. Two PCSK9 inhibitors Alirocumab and Evolocumab were approved for treatment in ACS patients who required additional LDL lowering to reduce future cardiovascular risks. In multiple studies, they reduced LDL by 50-70% with or without background treatment of statins. They also decreased coronary plaque volume and were effective in patients with familial hypercholesterolemia and statin intolerance. In clinical outcome studies involved more than 40,000 high cardiovascular risk individuals (including ACS), both agents reduced long term cardiovascular events. Treatment related adverse events were minimal. In the journey of lipid lowering therapy research, numerous studies confirmed the 'lower is better' theory of relationship between LDL and cardiovascular events. PCSK9 inhibitors emerge to be strong weapons for ACS secondary prevention. Nevertheless, as treatment cost is

relatively high and hence identifying patients potentially derive maximum benefit becomes essential. Clinical risk factors (e.g. TRS2P score), baseline LDL and pathogenic genetic mutations are important for consideration. Future research may identify other potential factors such as biomarkers, proteomics, genomics etc for use of PCSK9 inhibitors in some if not all patients with coronary artery disease.



**ABSTRACTS**

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**JOINT SESSION WITH SINGAPORE HEART FOUNDATION:  
EXERCISE AND CARDIAC REHABILITATION**

**4.**

**The Role of Technology in Exercise Promotion**

TJ YEO

Department of Cardiology, National University of Heart Centre, Singapore

This talk will focus on:

- The importance of physical activity and exercise
- Overview of current technology (with emphasis on wearables) in exercise promotion
- Review of evidence (reliability, validity, effectiveness)

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**5.**

**Cardiac Exercise Self-Efficacy on Cardiac Patients**

A CHENG

Faculty of Medicine, The Nethersole School of Nursing, The Chinese University of Hong Kong, Hong Kong

**Background:** Empowering patients with coronary heart disease (CHD) to perform adequate physical activity is a main goal of cardiac rehabilitation (CR) programme. Self-efficacy, one's belief in his or her ability to perform and succeed in a particular situation, could influence the self-reported physical activity level. This study aims to examine the association between the exercise self-efficacy, objectively assessed physical level and exercise capacity of CHD patients participating in a CR programme.

**Method:** We recruited 110 Chinese adults (age: 63.7±10.4 years old) with clinical diagnosis of CHD and participating in a CR programme. The self-efficacy for exercise of participants was measured by the Cardiac Exercise Self-efficacy Scale. The physical activity level and exercise capacity was measured by an activity tracker and 10-metre incremental shuttle walk test, respectively. Multiple regression models were used to adjust covariates of physical activity level and exercise capacity.

**Results:** The CHD patients walked a mean 9893±4476 steps per day, in which 60.3% of them walked ≥7500 steps/day. Higher exercise self-efficacy was significantly associated with higher odds of adequate walking activity (OR = 2.30, 95% CI: 1.05 - 5.02) after adjusting for age, sex and body mass index. The CHD patients also completed a mean 512.0±175.3 meters in the incremental shuttle walk test. After adjusting for age, sex, physical activity level and body mass index, the exercise self-efficacy was significantly associated with the exercise capacity of CHD patients (beta = 0.24, p<0.05).

**Conclusion:** CHD patients with poor exercise self-efficacy have an intensify risk of inadequate physical activity. For optimal care of CHD patients, assessing and promoting exercise self-efficacy is suggested to be incorporated in CR programme.

**ABSTRACTS**

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**JOINT SESSION WITH JAPANESE ASSOCIATION OF CARDIAC REHABILITATION:  
CARDIAC REHABILITATION IN HEART FAILURE**

**6.**

**Exercise Intolerance in Heart Failure**

S KINUGAWA

Department of Cardiovascular Medicine, Faculty of Medicine and Graduate School of Medicine, Hokkaido University Hospital, Japan

Exercise capacity is limited in patients with heart failure (HF). Limited exercise capacity is associated with disease severity and symptom, which is the NYHA functional class itself. Furthermore, it is an independent predictor for the prognosis of patients with HF. That is, the lower the peak oxygen uptake, the poorer the prognosis has been shown. Several factors including cardiac function pulmonary function, central hemodynamics, pulmonary circulation, and peripheral skeletal muscle function are associated with oxygen uptake. On the other hand, given that the pathology of HF leads to systemic organ damage, it is clear that oxygen uptake is a very good indicator of the condition of HF. Especially, skeletal muscle abnormalities rather than other factors play an important role on the reduced oxygen uptake. Various skeletal muscle abnormalities including abnormal energy metabolism, transition of myofibers from type I to type II, mitochondrial dysfunction, reduction in muscular strength, and muscle atrophy have been reported in patients with HF. However, the mechanism by which these abnormalities are caused has not been clarified. In this session, I will outline the importance and mechanism of skeletal muscle abnormalities in HF.

**7.**

**Exercise Capacity and Nutritional Status in Heart Failure Patients**

H SHIRAIISHI

Department of Cardiovascular Medicine, Kyoto Prefectural University of Medicine, Japan

It is well known that exercise tolerance is a prognostic factor of patients with heart failure (HF), and skeletal muscle indices are associated with exercise tolerance besides cardiac and pulmonary functions. Chronic HF is often accompanied with substantial skeletal muscle weakness, caused by immune activation, neuro-hormonal factors, decreased anabolic hormone activities, low physical activity, malnutrition and sarcopenia. Nutrition status in acute heart failure patients is more easily aggravated, compared with that in chronic heart failure patients. Nutrition therapy combined with cardiac rehabilitation could be more effective than nutrition therapy alone, and it should be carried out by a multidisciplinary team. In our hospital, we evaluate nutrition status from laboratory data and oral intake calories derived from clinical records, exercise tolerance by cardiopulmonary exercise test and skeletal muscle volume by bio-impedance method, grasping power, and knee extension power during hospital stay in HF patients. Appropriate nutrition counseling based on these data could be effective to improve exercise tolerance and enteral nutrients or supplements were considered in patients with malnutrition. I will introduce our approach towards nutrition status and skeletal muscle indices of HF patients in this symposium.

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**8.**

**Cardiac Rehabilitation for LVAD Recipients**

K FAN

Gratham Hospital, Hong Kong

In appropriately selected advanced heart failure (HF) patients, treatment with left ventricular assist device (LVAD) is associated with significant improvements in physical function and quality of life (QoL). However, despite these improvements, impairments persist with functional capacity frequently <50% of predicted and gains in both physical function and QoL lagging behind those of the transplant recipients. Exercise-based cardiac rehabilitation (EBCR) has been demonstrated to improve functional capacity and quality of life in heart failure but there are limited data on the effect of EBCR in patients with advanced HF and LVAD. Few studies demonstrated EBCR following LVAD implantation is associated with greater improvement in functional capacity compared by standard therapy. One potential benefit of cardiac rehabilitation in this patient population is reversal of skeletal muscle atrophy that occurs due to extended periods of poor peripheral perfusion and prolonged sedentary behavior. The importance of skeletal muscle function in patients receiving LVADs is gaining increased attention. Skeletal muscle weakness is an important marker of frailty and has been associated with an increased risk of poor clinical outcomes following LVAD implantation. With better knowledge of functional impairments that persist with LVAD support and their impact on health status and clinical outcomes, the growing population of patients living with LVADs may be able to realize the benefits of exercise therapies tailored specifically to their needs. The goal is to maximize the benefit and exercise training is likely one important step.

**9.**

**Management of Deteriorating Renal Function in Heart Failure Patients**

P MARK

University of Glasgow, United Kingdom

Worsening renal function (WRF) is a major challenge for clinicians managing patients with heart failure. The causes of WRF are often multifactorial but often include hydration status, concomitant medication, intrinsic renal disease, comorbid conditions such as diabetes, as well as haemodynamic responses to heart failure treatment such as renin angiotensin system inhibition and diuretics. It is important to recognise WRF and have a systematic approach to ensure wherever possible that patients are maintained on therapies which have demonstrated to reduce mortality, hydration status/decongestion is optimised, whilst ensuring that complications of WRF such as hyperkalaemia and uraemia are managed safely.

**ABSTRACTS**

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**SYMPOSIUM 2: CONTROVERSIES IN CARDIOVASCULAR RISK FACTORS**

**10.**

**Anti-smoking: The Battle Continues**

J MACKAY

Asian Consultancy on Tobacco Control, Hong Kong

The tobacco epidemic is increasing. Even if smoking prevalence is reduced, global population numbers are expanding in low and middle-income countries. Therefore, for the next few decades there will be more, not less numbers of smokers, bringing a massive burden upon health systems. This will be compounded by the introduction of new tobacco products, such as e-cigarettes and heat-not-burn products. Obstacles to tobacco control include medicine's focus on cure not prevention; lack of health knowledge; lack of funds; but perhaps most formidable is the tobacco industry's promotion and interference with tobacco control policy, including the use of mis-economic arguments. According to WHO, the industry seeks to hijack the political and legislative process; it exaggerates the economic importance of the industry; it manipulates public opinion to gain the appearance of respectability; it fabricates support through front groups; it discredits proven science and economic evidence; and it intimidates governments with litigation or the threat of litigation, or trade threats. All of these tactics are constantly occurring in Asia. There is disturbing evidence that other industries involved with non-communicable diseases, such as the fast food, sugar and alcohol, are now behaving in very similar ways. A megabyte of prevention now will prevent a gigabyte of health-care costs of curative medicine in the future. The 'best buys' in tackling the epidemic have long been known. World Health Organization has adopted its' one and only international treaty – the WHO Framework Convention on Tobacco Control, now ratified by over 180 countries, making it one of the fastest UN treaties of all time. The best way of further reducing the tobacco epidemic would be for all countries to fully implement the WHO FCTC, to which they are signature, and thus committed.

The industry itself confirms the most important actions to be taken by the industry 'scream test.' If an action is effective in reducing tobacco use, such as tax increases, smoke-free areas, plain packaging and bans on promotion, the industry will 'scream' and oppose the measure. If an action is not likely to reduce tobacco use, such as bans on sales to minors, and traditional health education in schools, the industry is quiet and does not oppose such measures. Bloomberg Philanthropies and the Bill and Melinda Gates Foundation now provide half the world's funding for tobacco control in low and middle income countries, but funding from national governments has been woefully inadequate. It has been long coming in public health, but more and more countries are now announcing an 'Endgame' goal of a smoking prevalence below 5%. For this to be achieved, known strategies such as legislation and taxation need to be fully implemented, but novel ideas for action need to emerge. Just as the mosquito is the vector for malaria, so the tobacco industry is the vector for the tobacco epidemic. Unless this is recognised, and industry tactics exposed and negated, it is unlikely the tobacco epidemic will ever be eliminated. Prevention of all non-communicable diseases is intensely political. This epidemic will be solved in the corridors of power, not in the corridors of hospital and clinics. The role of health professionals is vital. Not only is there the need for curative practice and solid cardiovascular research, but cardiologists need to adopt novel roles and become political advocates speaking with the voice of authority, experts on policies, business and trade disputes, learn to present economic arguments to ministers of finance and trade, and how to investigate and challenge a very powerful tobacco industry.

**11.**

**Alcohol, Diet and Supplements: What is New?**

CP LAU

The University of Hong Kong, Hong Kong

A balanced diet rich in fibres, green vegetables and fruits, unsaturated fat, and calories from appropriate proportion of protein, fat and complex carbohydrate is the cornerstone for cardiovascular (CV) health. This diet should minimize on salt, saturated and trans-fat, and sugar consumption. This is a more plant-based diet that is relatively rich in vitamins and minerals. Reduction of CV disease has been observed with some dietary pattern such as adherence to the Mediterranean diet. Vitamins, minerals and antioxidants are used in up to half of the United States and European populations for perceived CV health benefits, despite conflicting outcome in clinical trials. A recent systematic meta-analysis on randomised controlled trials (RCT) shows the following: Folic acid and B-vitamins may have benefit on reduction of strokes but not in mortality, no overall effect on CV disease prevention using multi-vitamins, vit C, D,  $\beta$ -carotene, calcium and selenium, but an increased risk of antioxidant mixtures and niacin for all-cause mortality. There are also conflicting results on the commonly promoted supplements for CV health such as fish oil, co-enzymeQ10, vitamin D, magnesium, red yeast rice, antioxidant vitamins (A and E), garlic, resveratrol, and flaxseed. Moderate alcohol consumption, defined as 1 standard drink for women and 2 standard drinks for men per day is widely advised for CV health promotion. Cohort studies have suggested a potential benefit on CV disease reduction, but results are often confounded by the self-selected populations of subjects who drink moderately versus those who do not, including differences in health consciousness and social engagement. Alcohol is addictive, and is incriminated in traffic accident, and when taken in excess, carries harm to

the liver and brain. A recent randomization study suggests the lowest risk of CV outcome occurred in abstainers and any alcohol will increase blood pressure and BMI. While dietary supplements give a sense of empowerment to individuals on their heart health, it has to be understood that a good diet will more than supply their necessary daily requirements. Supplementation is not necessary and may potentially carry harm. Both the US and European guidelines do not endorse alcohol use for heart health.

**ABSTRACTS**

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**SYMPOSIUM 3 : NOVEL THERAPEUTIC TARGETS IN PREVENTIVE CARDIOLOGY**

**12.**

**Stroke Prevention in Atrial Fibrillation in Asian Population**

CM YU

The Chinese University of Hong Kong, Hong Kong

Atrial fibrillation (AF) is the commonest cardiac arrhythmia being encountered in clinical practice. It is an endemic disease with increasing health burden in the ageing population worldwide. The objective of this lecture is to present a concise overview of AF in Asian population. This lecture will also focus on AF management with the use of new oral anticoagulants (NOACs), with reference to the recent evidence-based clinical studies and various international AF management guideline (ESC, APHRS and EHRA), and discuss the management in special situation (renal dysfunction, concomitant use of drugs and safety measures) which cardiologist and clinicians may come across in their daily practice.

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**13.**

**New Strategies for Cardiovascular Risk reduction in Diabetes**

GTC LEUNG

The Chinese University of Hong Kong, Hong Kong

Type 2 diabetes mellitus (T2DM) is becoming a global epidemic and have high cardiovascular disease (CVD) mortality. After several large cardiovascular outcome trials with mostly neutral results, 2 recent studies of the sodium-glucose co-transporter 2 (SGLT2) inhibitors, empagliflozin and canagliflozin, reported significant favorable effects on cardiovascular outcomes (the primary composite endpoint being 3-point MACE). In addition, significant reductions of hospitalizations for heart failure were observed in secondary endpoint. Following the EMPA-REG OUTCOMES and CANVAS/CANVAS-R OUTCOMES trials, several critical questions remain, with substantial clinical implications. Firstly, the applicability of findings to real-world clinical practice is unclear. Secondly, it is unknown whether the observed benefits are specific to specific compound or represent a class effect. Finally, since these 2 outcome trails mainly included patients with established CVD, it remains to be seen if similar benefits can be expected in T2D patients with a broader cardiovascular risk profile. In CVD-REAL, a multinational, real-world study, SGLT-2 inhibitors, including dapagliflozin, were shown to reduce the risk of hospitalisation for heart failure and all-cause mortality. In CVD-REAL Nordic study, dapagliflozin was associated with significantly lower risk of hospitalisation for heart failure, MACE, and all-cause mortality compared with DPP-4 inhibitors. The above studies have confirmed that the efficacy and benefits of SGLT-2 inhibitors observed in clinical trials are consistent with the real-world experience. Top-line data of the DECLARE (Dapagliflozin Effect on Cardiovascular Events)-TIMI 58 trial have just been

announced. DECLARE-TIMI 58 is the largest, longest, and broadest cardiovascular outcomes trial to date with an anti-diabetic agent. Approximately 60% of the subjects in the study had multiple cardiovascular risk factors and 40% had established cardiovascular disease. There was a statistically significant reduction in the composite endpoint of hospitalization for heart failure or cardiovascular death, one of the two primary efficacy endpoints. Additionally, fewer major adverse cardiovascular events were observed for the other primary efficacy endpoint, however, this did not reach statistical significance. Overall, these trials provide convincing evidence that SGLT2 inhibitors offer cardiovascular protection in type 2 diabetes.

**ABSTRACTS**

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**SYMPOSIUM 4: FROM BASICS TO ADVANCES IN CARDIAC REHABILITATION**

**14.**

**Cardiac Rehabilitation for Cardiac Resynchronization Therapy Recipients**

H SHIRAISHI

Department of Cardiovascular Medicine, Kyoto Prefectural University of Medicine, Japan

Cardiac resynchronization therapy (CRT) is recommended for the patients with advanced stage of heart failure with reduced ejection fraction (HFrEF). Despite of high medical cost, about one third of patients with implanted device are non-responder of CRT. Cardiac rehabilitation (CR) for the patients with HFrEF is established by several guidelines, but CR program has been underutilized after CRT implantation. For the maximizing of effectiveness of CRT, CR should be carried out by a multidisciplinary team. In our hospital, about 70% of patients after CRT underwent cardiopulmonary exercise test (CPX) for the evaluation of exercise capacity and optimization of CRT device setting. Nutrition status and skeletal muscle evaluation, such as knee extension power, hand grasp are also measured and optimal CR program is planned during hospital stay. I will show the optimization of CRT, CR program based on CPX data and skeletal muscle evaluation, appropriate nutrition counseling, and tele-monitoring using information derived from device parameters in this session.

**15.**

**Does Pharmacological Exercise Mimetics Exist?**

S KINUGAWA

Department of Cardiovascular Medicine, Faculty of Medicine and Graduate School of Medicine, Hokkaido University Hospital, Japan

Exercise capacity is limited in patients with heart failure (HF), which is closely associated with disease severity and prognosis. The limited exercise capacity is mainly due to skeletal muscle abnormalities rather than lowered resting cardiac function and disturbed central hemodynamics. Skeletal muscle abnormalities include atrophy, impaired energy metabolism, mitochondrial dysfunction, and fiber type switch. Unfortunately, their mechanism has not been determined, and there is no pharmacological therapy for the limited exercise capacity in HF patients. Exercise training is only effective therapy for it. Exercise therapy for HF is thus important, but basic research to develop alternative therapy is also important. We identified brain-derived neurotrophic factor (BDNF) as one of the proteins that was secreted from skeletal muscle cells as a myokine. BDNF was abundant in slow oxidative fibers, which implies that BDNF is related to mitochondrial function and exercise capacity. The protein expressions of BDNF in skeletal muscle were significantly lower in the mice with HF. The administration of rhBDNF to HF mice improved exercise capacity via increasing the protein expressions of AMPK $\alpha$ -PGC1 $\alpha$  and mitochondrial function in skeletal muscle. Our findings indicate that BDNF could become a pharmacological target for improving the mitochondrial oxidative function of skeletal muscle in patients with HF.

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**SYMPOSIUM 5 – HYPERTENSION SYMPOSIUM**

**16.**

**Debate on the New American Hypertension Guidelines: Hong Kong Perspective**

B CHEUNG

The University of Hong Kong, Hong Kong

The latest American guidelines (ACC/AHA) on the prevention, detection, evaluation and management of high blood pressure marked a paradigm shift in the management of hypertension. The new definition of hypertension includes a systolic blood pressure of 130-139 mmHg or a diastolic blood pressure of 80-89 mmHg. What used to be regarded as prehypertension is now included in the definition of hypertension. This makes a sizeable proportion of the general population hypertensive. In USA, 45.6% of the adult population is deemed to be hypertensive. This is fine in a society in which a disease label entitles people to be reimbursed for medical treatment but for Hong Kong, most of Europe and Australasia, where healthcare is provided by the government, this may be less welcome. Using the previous cut-offs for hypertension (140/90 mmHg), the Hong Kong Population Health Survey 2014-15 revealed a 28% prevalence of hypertension, only half of whom had been previously diagnosed. With the new American definition of hypertension, the prevalence is substantially higher. For instance, only 16% of Hong Kong people aged 65-84 have a 'normal' systolic blood pressure, i.e., less than 120 mmHg. Nevertheless, tackling hypertension at an earlier stage is cheaper and more effective than treating the complications of hypertension. The characteristics of Americans with 'Stage 1 Hypertension' are interesting. Most are overweight and below the age of 60; few have any cardiovascular complications yet. This highlights the fact that obesity is the precursor of hypertension in many of the patients. Management of Stage 1

Hypertension must therefore rely heavily on lifestyle changes. Fortunately, hypertension at this early stage is easy to control and potentially reversible. For those with a certain level of cardiovascular risk (e.g. 10-year atherosclerotic cardiovascular disease risk of 10% or higher), drug treatment should be considered. Our network meta-analysis of clinical trials suggested that the ACC/AHA target of <130/80 mmHg is associated with reduction in the risk of cardiovascular events and is therefore an evidence-based target. In clinical practice, one has to balance the potential benefits against adverse effects and patient acceptance and tolerability.

ABSTRACTS

SYMPOSIUM 6: CARDIAC IMAGING SYMPOSIUM –  
WHAT HAVE WE LEARNT FROM THE BIG HEART DATA?

17.

**Influence of Ambient Air Pollution on Cardio Morpho-functional Phenotypes: Insights From the UK Biobank Population Imaging Study**

N AUNG

William Harvey Research Institute Barts and The London School of Medicine and Dentistry, Queen Mary University of London, United Kingdom

**Background:** Exposure to ambient air pollution is strongly associated with increased cardiovascular morbidity and mortality. Little is known about the influence of air pollutants on cardiac structure and function. The aim of the study was to explore the relationship between chronic past exposure to traffic-related pollutants and the cardiac chamber volume, ejection fraction, and left ventricular remodelling patterns after accounting for potential confounders.

**Methods:** Exposure to ambient air pollutants including particulate matter and nitrogen dioxide (NO<sub>2</sub>) was estimated from the Land Use Regression models for the years between 2005 and 2010. Cardiac parameters were measured from cardiovascular magnetic resonance imaging studies of 3920 individuals free from pre-existing cardiovascular disease in the UK Biobank population study. The median (interquartile range [IQR]) duration between the year of exposure estimate and the imaging visit was 5.2 (0.6) years. Multivariable linear regression models were fitted to investigate the relationship between cardiac parameters and traffic-related pollutants after adjusting for various confounders.

**Results:** The studied cohort was 62±7 years old, and 46% were men. The median (IQR) annual average concentration of the two main pollutants - fine

particulate matter (PM<sub>2.5</sub>) and NO<sub>2</sub> - were 9.9 (1.32) µg/m<sup>3</sup> and 28.2 (11.4) µg/m<sup>3</sup>, respectively. In fully adjusted models, PM<sub>2.5</sub> concentration was significantly associated with larger left ventricular end-diastolic volume and end-systolic volume (effect size = 0.82%, 95% CI, 0.09-1.55%, P=0.027; and effect size = 1.28%, 95% CI, 0.15-2.43%, P=0.027, respectively, per IQR increment in PM<sub>2.5</sub>) and right ventricular end-diastolic volume (effect size = 0.85%, 95% CI, 0.12-1.58%, P=0.023, per IQR increment in PM<sub>2.5</sub>). Likewise, higher NO<sub>2</sub> concentration was associated with larger biventricular volume. Distance from the major roads was the only metric associated with lower left ventricular mass (effect size = -0.74%, 95% CI, -1.3% to -0.18%, P=0.01, per IQR increment in distance). Neither left and right atrial phenotypes nor left ventricular geometric remodelling patterns were influenced by the ambient pollutants.

**Conclusions:** In a large asymptomatic population with no prevalent cardiovascular disease, higher past exposure to PM<sub>2.5</sub> and NO<sub>2</sub> was associated with cardiac ventricular dilatation, a marker of adverse remodelling that often precedes heart failure development.

**Clinical Implications:** The association between ambient air pollution and adverse cardiac phenotypic changes in individuals without prevalent cardiovascular disease suggests that air pollution should be recognized as a major modifiable risk factor that needs to be targeted via public health measures. These cardiac morphological alterations were apparent despite relatively low exposure levels meeting the current air quality standards, making a strong case to double efforts to control emission of the noxious pollutants.

18.

**Harnessing the Power of Artificial Intelligence in Cardiac Imaging Analysis: How to Analysis 20,000 CMR Studies a Day?**

N AUNG

William Harvey Research Institute Barts and The London School of Medicine and Dentistry, Queen Mary University of London, United Kingdom

The past decade has seen a tremendous growth in the utility of cardiovascular magnetic resonance (CMR) for the diagnosis and risk stratification of coronary artery disease and heart muscle diseases. Current approaches in the CMR image analysis and interpretation involve several steps of manual annotations and measurements which consume costly human and time resources, and introduce imprecisions due to inter-observer variability. Delegation of the manual contouring task to an automated tool would not only save physician time but also enhance the efficiency and reproducibility of CMR reports, thereby, improving the standards and timeliness of patient care. Automation of CMR image segmentation has been the holy grail for developers and researchers working in the image-processing domain. Bias in repeated measurements of clinically important parameters such as left ventricular ejection fraction can range from -11.7% to 12.8% even among expert readers (1). These differences are significant enough to alter clinical decisions including potentially life-saving therapies such as implantable cardioverter-defibrillator (ICD). In the era of big data from the healthcare industry and mega imaging cohort studies such as the UK Biobank (CMR studies N = 100,000), automated and streamlined image segmentation and quality control is urgently needed. Recently, an exciting and highly powerful computational technique called deep learning has made a significant impact in several diverse

fields, achieving near-human level performance in image classification, speech recognition, natural language processing and autonomous driving. The core of this technique is a network of artificial neurons in various configurations which allow flexible and nearly limitless capacity to learn almost any form of mathematical function. Using a specially designed neural network adapted from VGG16 (2) and DeepLab (3) network architectures, our CMR image analysis consortium for the UK Biobank has successfully implemented a fully-automated segmentation of all four chambers of the heart in the entire cardiac cycle. Each study can now be annotated in ~ 2.5 seconds on a single GPU-powered computer (vs ~30 minutes for a human analyst) and this process can be greatly accelerated by parallel processing on cloud computing platforms. Reproducibility analyses showed that our neural network performs at least as well as human experts (intra-class correlation coefficient [ICC] of 0.89 to 0.98 and mean DICE similarity coefficient of 0.89 to 0.95, where 1 represents 100% agreement for both ICC and DICE). This presentation will focus on the implementation of automated image analysis pipeline for more than 20,000 CMR studies currently available from the UK Biobank. Potential future applications of deep learning for derivation of novel imaging phenotypes, identification of pathologies and image quality control will also be discussed briefly.

**ABSTRACTS**

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**PUBLIC CONFERENCE**

**1.**

**What is Heart Failure?  
Everything You Need to Know About the Failing Pump**

RHL CHAN

Pamela Youde Nethersole Eastern Hospital, Hong Kong

Heart failure is now recognized as a major and growing public health problem that results in significant morbidity and mortality in the aging populations. There has been considerable progress in the treatment of heart failure including medications, device therapy and surgery in the last two decades. Nevertheless, heart failure is still associated with a very poor prognosis. Heart failure may result from other health conditions that directly affect the cardiovascular system, including hypertension, coronary artery disease, and valvular conditions. While heart-related diseases can lead to CHF, there are other apparently unrelated conditions that may increase the risk, for example, obesity, diabetes and thyroid disease etc. It is important to identify heart failure by its various manifestations to achieve the effective treatment in the early stage. Different modalities of investigations are available for the work up and they are essential in guiding the management strategies. The outlook for heart failure is incredibly variable. It largely depends on what stage of the condition is in and whether there is presence of concomitant illnesses. The condition can be improved greatly by lifestyle modification, medication, and surgery.

**2.**

**Latest Weapon Against Bad Cholesterol: PCSK9 Inhibitor**

VKF LEE

Private Practice, Hong Kong

Lipids are important chemicals both in the composition and in the functioning of living organisms. In the human body, lipids exist in various forms such as triglycerides, phospholipids and cholesterol. Although these lipids serve important physiological functions, excessive cholesterol and triglyceride may lead to atherosclerosis and cause coronary disease, stroke and peripheral vascular disease. Lately, there are rumors in the media that the role of cholesterol in the pathogenesis of atherosclerosis has been fabricated by pharmaceutical companies to boost the sale of statins. These unfounded claims are merely based on weak logical inductions, misunderstanding of the United States Dietary Guidelines and ill-formed conclusions derived from low quality observational studies. Numerous randomized controlled trials, which are scientifically more robust than observational studies, have confirmed that lowering cholesterol with drugs prevents death, coronary disease and stroke. The current available drugs for hypercholesterolaemia are drugs that inhibit liver cholesterol synthesis such as statins and drugs that reduce dietary cholesterol absorption from the gut such as ezetimibe. In patients who are not tolerant of the side effects of these drugs or in patients whose cholesterol cannot be adequately controlled, a new biweekly injection called PCSK9 Inhibitor is now available. It is a biologic medication made of antibodies that are directed at increasing cholesterol receptors at the liver and enhances clearing of cholesterol from the blood stream by the liver. In clinical trials, this drug has been shown to reduce cholesterol by a further 59% when added to statin and this leads to a reduction in myocardial infarction, unstable angina, coronary revascularization and death. Apart from mild injection site reactions, there are no increased side effects with PCSK9 inhibitors. PCSK9 is an important addition to the armamentarium against hypercholesterolaemia and atherosclerosis.

**3.**

**Mindfulness, Downshifting and Cardiac Rehabilitation**

SM NG

Department of Social Work & Social Administration, The University of Hong Kong, Hong Kong

The workshop is experiential in nature. First, a brief introduction of mindfulness will be given - its origin/history and subsequent clinical applications in various health and mental health conditions. Second, some mindfulness practices will be taught and tried out by the participants, including sitting meditation and its variations, mindfulness in daily life, and qigong as a body/mind/spirit practice. Baduanjin is selected for illustrating qigong. Last, the spiritual domain will be deliberated. Mindfulness can be seen as a form of secular Buddhist meditation practice. Some scholars criticize modern mindfulness-based interventions being overly decontextualized. To conclude the workshop, ideas on optimally re-contextualizing mindfulness will be discussed.

**4.**

**Muscle Strengthening Exercise**

JHC TSE

The Hong Kong Society for Rehabilitation, Hong Kong

After a cardiac condition, patients may receive conflicting advice from different source about the level of activity that is acceptable. Or not to "get exhausted" at all. This kind of information are not only confusing but can also promote fear and inactivity to the cardiac patient. In previous year, resistance exercise was not endorsed as an appropriate intervention for the prevention of cardiovascular disease risk factors. However, recent research has shown that resistance exercise performed with a lighter load and higher repetitions does have a beneficial effect on risk factors-such as reducing plasma glucose and insulin levels, increasing high-density lipoprotein cholesterol levels, and lowering blood pressure-without altering cardiovascular function in healthy subjects. Also, resistance training with weights, elastic bands, or your own body weight may help you regain the physical strength and confidence to do the daily tasks you performed before your heart problem or surgery. On the other hand, regular exercise will make your heart and coronary arteries healthier. It helps increase strength, lower blood pressure, relieve stress, and control your weight. Cardiac rehabilitation lowers the risk for future hospital stays and worsening heart problems. This workshop will focus on learning safe, handy and home friendly exercise for the strengthening exercise for the cardiac patient. It is specifically designed for beginners and people who did not have regularly exercise. Moreover, it included general stretching exercise, warm up and cool down and exercise science for cardiac patient.

ABSTRACTS

ABSTRACT PRESENTATION – BEST PAPER AWARDS

1.

**Efficacious Psychological Group Intervention for Cardiac Patients with Type D Personality**

ICY KWOK,<sup>1</sup> KC LEUNG,<sup>2</sup> KW MA,<sup>2</sup> S KAUR,<sup>2</sup> MY SO,<sup>3</sup> JTC FAN<sup>3</sup>

<sup>1</sup>Department of Clinical Psychology, Tung Wah Eastern Hospital; <sup>2</sup>Department of Medicine and Rehabilitation, Tung Wah Eastern Hospital; <sup>3</sup>Department of Clinical Psychology, Pamela Youde Nethersole Eastern Hospital, Hong Kong

**Introduction:** Recent cardiac studies have drawn attention to Type D (distressed) personality as a potential risk factor for cardiovascular diseases. Type D personality has been found to be related to lower quality of life, poor treatment adherence and unhealthy lifestyle. An efficacious psychological intervention ("Heart and Mind") was implemented in the Cardiac Rehabilitation and Resource Centre at Tung Wah Eastern Hospital to improve emotion coping and disease management skills of patients with Type D and non-Type D personality. Differences between personality traits may affect psychological outcomes of the intervention.

**Objectives:** To evaluate the overall efficacy of the current psychological group intervention on patients with Type D personality, in comparison with non-Type D personality.

**Methods:** Eleven "Heart and Mind" were conducted by a clinical psychologist

from 2016-18. Each consisted of four 2-hour weekly sessions and a booster session two months later. Patients were assigned to either Type D or non-Type D personality group, after completing the Type D Personality Scale-14 at intake. They also filled in the Cardiac Depression Scale (Short-Form CDS), Cardiac Anxiety Questionnaire (CAQ), Life Satisfaction Scale (LSS), and Positive Emotion Scale (PES) at 4 different time points.

**Results:** Fifty-two patients participated in the "Heart and Mind". There are no significant differences in age and education between Type D and non-Type D personality groups (Figure 1). Type D participants showed greater drop on CDS scores across time as compared with that of non-Type D participants (p = 0.017) (Figure 2). When comparing the results between the intake and booster session, CAQ-Total of Type D participants significantly dropped by 10% (p<.001). LSS and PES increased significantly from 64% to 69% (p<.05) and from 49% to 58% (p<.01) respectively. For non-Type D participants, CAQ-Total decreased by 8% (p<.01), while PES increased 10% (p<.001) (Table 1 & 2, Figure 2 & 3). Both mood improvement and life satisfaction were maintained in both groups after 2 months.

**Conclusion:** "Heart and Mind" are beneficial for both patients with or without Type D personality, in terms of reducing patients' cardiac depression and anxiety, promoting life satisfaction and positive emotions.

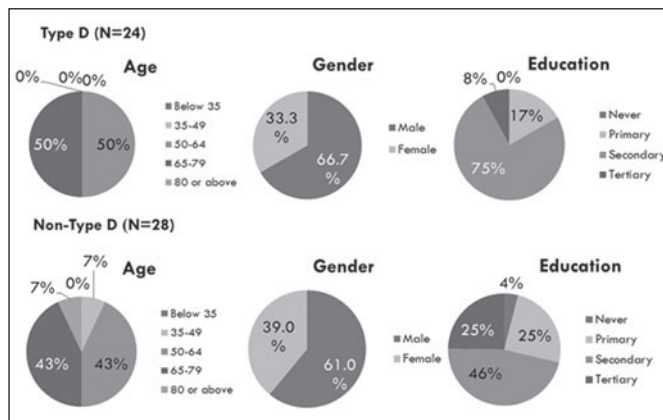


Figure 1. Demographics of "Heart and Mind"

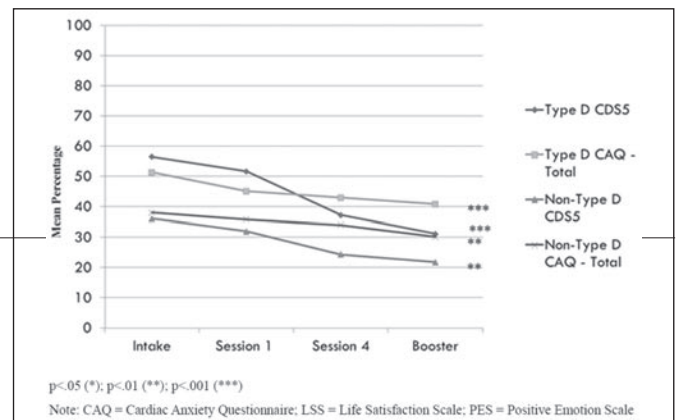


Figure 2. Mean Percentage of the Outcome Measures at Different Assessment Time Points (Intake vs Booster)

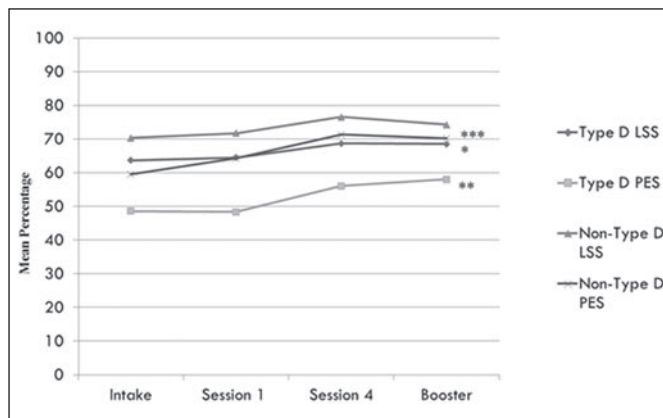


Figure 3. Mean Percentage of the Outcome Measures at Different Assessment Time Points (Intake vs Booster)

Table 1

Measures (Type D)	N	Repeated Measure ANOVAs		Post- hoc Test		
		F	p- value	Mean Difference		
				Intake – Booster	Intake – 4 <sup>th</sup> session	4 <sup>th</sup> session – Booster
CDS5	24	36.790	<0.001***	8.875***	6.750***	2.125
CAQ-Total	24	10.556	<0.001***	10.463**	8.421**	2.042
LSS	24	3.835	0.013*	-4.792	-5.000*	-0.208
PES	24	7.756	<0.001***	-9.479*	-7.500	-1.979

Table 2

Measures (Non-Type D)	N	Repeated Measure ANOVAs		Post- hoc Test		
		F	p- value	Mean Difference		
				Intake – Booster	Intake – 4 <sup>th</sup> session	4 <sup>th</sup> session – Booster
CDS5	28	11.726	<0.001***	5.000***	4.107*	0.893
CAQ-Total	28	4.706	0.004**	7.846*	3.968	3.879
LSS	28	2.725	0.072	-3.929	-6.250*	2.321
PES	28	11.803	<0.001***	-10.714**	-11.786***	1.071



ABSTRACTS

2.

**Evaluation of the Accuracy of Anthropometric and Adiposity Indices in Predicting Diabetes Mellitus in Thai Adults with Hypertension: Thai National Health Examination Survey 2009 (NHES-IV)**

HN NGOC,<sup>1</sup> W KRIENGSINYOS,<sup>1</sup> N ROJROONGWASINKUL,<sup>1</sup> WAEKPLAKORN<sup>2</sup>

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**Objectives:** Numerous studies revealed the correlation of anthropometric and adiposity indexes with cardiovascular risks and DM, that triggered by excessive body fat. This study examined the accuracy of nine adiposity indices in predicting DM among Thai hypertensive adults.

**Methods:** Data were obtained from the NHES-IV. Eligible Thai hypertensive adults >18 years old were collected the demographics' information, anthropometric and biochemical parameters. Hypertension was identified by the average blood pressure  $\geq 130/85$  mmHg or lowering medication consumption. DM was diagnosed with fasting blood glucose  $\geq 126$  mg/dl or antidiabetic drug use. Body Mass Index, Waist Circumference, Waist-to-Hip Ratio (WHR), Waist-to-Height Ratio (WHtR), Body Adiposity Index, Conicity Index (C-Index), Lipid Accumulation Product (LAP), Cardiometabolic Index and Visceral Adiposity Index were tested. The accuracy performance was analyzed by the Area Under Curve (AUC), with the maximum value of the Youden index for the best cut-off point identifying.

**Results:** Total 8,822 participants (61.25 $\pm$ 13.95 years old) were included. Multiple regression analysis showed all indices were significantly associated with DM ( $p < 0.001$ ). In men, the best prediction performance were C-Index (AUC: 0.681; 95% confidence interval (CI): 0.660-0.701), WHR (AUC: 0.679; 95%CI: 0.658-0.700), WHtR (AUC: 0.658; 95%CI: 0.637-0.679) with the corresponding cut-off point was 1.26, 0.92 and 0.51 respectively. Top indicators and its cut-off point defined in hypertensive women was LAP >37.38, C-Index >1.22, WHR >0.87 and WHtR >0.53, AUC value respectively was 0.654 (95%CI: 0.634-0.674), 0.654 (95%CI: 0.625-0.665), 0.645 (95%CI: 0.633-0.674) and 0.633 (95%CI: 0.614-0.653). LAP was revealed to be the best index in predicting diabetes in Thai hypertensive adults >65 years old (AUC: 0.684, 95% CI: 0.656-0.713, cut-off: 25.52 in men; AUC: 0.654, 95% CI: 0.626-0.682, cut-off: 35.56 in women).

**Conclusions:** The study highly suggests that using simple, inexpensive and invasive methods such as C-Index >1.26, WHR >0.92, WHtR >0.51 for men, and C-Index >1.22, WHR >0.87 and WHtR >0.53 for women are reliably predicting of DM among Thai adults with hypertension. Furthermore, LAP might be used as an alternative index in discriminating diabetes in the hypertensive elderly population with the cut-off point of >25.52 in men and >35.56 in women.

3.

**Do Interactive Exergames Find Their Application in Cardiac Rehabilitation? A Pilot Study**

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**Background:** The limited physical activity and aging of patients with cardiovascular disease (CVD) causes reduction of muscular strength, coordination, and motion, balance. Therefore there is a need for incorporating new rehabilitation forms covering those areas into Cardiac Rehabilitation.

**Aim of the study:** The aim of the study was to assess the effectiveness, safety, and attractiveness of exergames with the Kinect camera and fall protection equipment (activLife) in trainings of CVD patients.

**Methods:** The study group consisted of 46 consecutive patients with various CVD (after myocardial infarction, cardiosurgical procedure, with heart failure) admitted to the Department of Cardiac Rehabilitation. All subjects participated in four-week programme with standardized trainings (endurance training and general conditioning exercises with elements of resistance and balance exercises). Twenty patients (group A) were offered additional trainings (five times per week) with the use of activLife. Before and after rehabilitation all patients underwent tests assessing the strength of lower limbs, 6MWT, and the Up&Go test. Patients also filled out a questionnaire regarding use of activLife.

**Results:** Both groups significantly improved in all tests: strength of lower limbs [number of repetitions/30 sec] - group A: 11.21 $\pm$ .61 vs 13.37 $\pm$ 3.96,  $p < 0.001$ ; control group: 9.96 $\pm$ 3.34 vs 13.12 $\pm$ 3.99,  $p < 0.001$ ; 6MWT [m] - group A: 369.06 $\pm$ 129.1 vs 462.50 $\pm$ 104.88,  $p < 0.03$ ; control group:

366.53 $\pm$ 121.76 vs 457.81 $\pm$ 102.2,  $p < 0.006$ ; Up & Go test [sec] - group A: 7.74 $\pm$  2.75 vs 6.74 $\pm$ 1.8,  $p < 0.006$ ; control group: 8.35 $\pm$ 2.75 vs 7.27 $\pm$ 3.51,  $p < 0.006$ . There was also significant increase in the precision and speed of movements in subsequent trainings. 94.7% of patients evaluated activLife as "very good", 89.5% - "comfortable/very comfortable", 100% - safe, 79.0% - useful in achieving rehabilitation goals and 68.4% assessed it as more attractive than standardized training.

**Conclusions:**

1. Cardiac rehabilitation using exergames is seen by patients as attractive, safe, and useful in achieving their goals.
2. Although the test results has improved for both groups, there is a need for longer observation and increased training time to reliably compare effectiveness of both forms of training.
3. The activLife device is safe and useful for cardiac rehabilitation.

ABSTRACTS

4.

**Cumulative Rheumatic Inflammation Modulates the Bone-Vascular Axis and Risk of Coronary Calcification: A Novel Pathophysiological Paradigm**

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**Background:** Rheumatic diseases are related to both abnormal bone turnover and atherogenesis but a mechanistic link is missing. Osteogenic circulating endothelial progenitor cells (EPC) that carry the osteoblastic marker osteocalcin (OCN) may provide clues to the causal pathway.

**Objective:** To investigate the effect of cumulative rheumatic inflammation (CRI) on risk of coronary calcification through modulation of the bone-vascular axis.

**Methods:** We conducted a retrospective cohort study of patients with rheumatoid arthritis (n=145). A time-adjusted aggregate score reflective of Cumulative Rheumatic Inflammation (CRI) was derived by conglomerating all quarterly biomarker encounters of serum C-reactive protein (CRP) over 60 months immediately preceding CT coronary angiography. Flow cytometry was performed to measure the OCN-positive (OCN+) CD34+KDR+ and OCN+CD34+ circulating EPC. Conventional early circulating EPC CD34+CD133+KDR+ was determined. Coronary calcification was defined as Agatston score >0.

**Results:** 50% patients (n=72/145) had coronary calcification. CRI score was associated with presence of coronary calcification ( $P=0.004$ ), which remained independent after multivariable adjustment (highest versus lowest quartile: OR=5.6 [95%CI 1.1 to 28.9],  $P=0.041$ ). ROC curve analyses revealed divergent behavior of OCN-expressing circulating EPCs (OCN+CD34+: AUC=0.60,  $P=0.034$ ; OCN+CD34+KDR+: AUC=0.59,  $P=0.053$ , favoring detrimental) versus conventional early EPCs [CD34+CD133+KDR+: AUC=0.397,  $P=0.034$ , favoring protective) for coronary calcification, which persisted after multivariable adjustment. (OCN+CD34+KDR+ [ $>75$ th percentile]: OR=7.16 [95%CI 1.83 to 27.92],  $P=0.005$ ; OCN+CD34+ EPC [ $>75$ th percentile]: OR=6.0 [95%CI 1.53 to 23.27],  $P=0.010$ ; CD34+CD133+KDR+ [ $>75$ th percentile]: OR=0.33 [95%CI 0.12 to 1.02],  $P=0.053$ ). Intriguingly, CRI score was associated with increased OCN+CD34+ EPC (highest versus lowest quartile: B= +25.6 [95%CI 0.77 to 50.45] (unit,  $\times 10^3$ /ml peripheral blood),  $P=0.043$ ), but reduced CD34+CD133+KDR+ EPC (B=-16.2 [95%CI -31.54 to -0.89],  $P=0.038$ ).

**Conclusions:** Preceding 60 months of CRI is associated with increased risk of coronary calcification and altered OCN expression in circulating EPC, suggesting inflammation-driven modulation of the bone-vascular axis may be the mediating mechanism.

5.

**The Effect of Early Outpatient Rehabilitation Program on Health-Related Quality of Life Among Heart Transplant and Lung Transplant Recipients**

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**Objective:** The purpose of this study is to investigate the effect of an early postoperative outpatient rehabilitation program to physical capacity and health-related quality of life among patients with bilateral sequential lung transplantation (BLTx) or orthotopic heart transplantation (OHT).

**Method:** The study included 19 BLTx patients (age: 41.5±13.3 years; 8 men, 11 women) and 29 OHT patients (age: 42.4±12.1 years; 19 men, 10 women). The patients participated in a 3-6 months exercise training program after transplantation. The patients were evaluated by the cardiopulmonary exercise testing and short form health survey (SF-36) at baseline and after rehabilitation.

**Results:** Peak oxygen uptake significantly increased in both groups (BLTx, 16.9±3.4 to 19.6±4.9 mL/kg/min,  $p=0.002$ ; OHT, 15.4±3.4 to 20.4±3.7 mL/kg/min,  $p<0.001$ ). Oxygen uptake efficiency slope significantly increased in OHT (1.030±0.403 to 1.439±0.407 L/min per log (L/min),  $p<0.001$ ), but not in BLTx (1.161±0.343 to 1.331±0.388 L/min per log (L/min),  $p=0.094$ ). Oxygen uptake at ventilatory threshold significantly increased in OHT

(10.8±2.7 to 14.0±3.2 mL/kg/min,  $p<0.001$ ) but not in BLTx (13.1±2.4 to 13.2±3.0 mL/kg/min,  $p=0.761$ ). VE/VCO<sub>2</sub> slope significantly decreased in OHT (42.1±11.7 to 36.2±9.7 mL/kg/min,  $p<0.001$ ) but not in BLTx (33.7±6.8 to 34.4±7.5 mL/kg/min,  $p=0.651$ ). Both groups showed improvement of physical component in health-related quality of life. The OHT group showed a significant improvement in physical functioning, bodily pain, vitality, social functioning, mental health, and PCS. The BLTx group showed a significant improvement in physical functioning, physical role, general health, vitality, social functioning, emotional role, mental health, and PCS.

**Conclusions:** Early postoperative exercise training significantly improved physical capacity and health-related quality of life among BLTx and OHT patients. The submaximal exercise parameters improved more obviously in OHT than BLTx patients. Early postoperative outpatient rehabilitation program should be recommended to heart and lung transplantation recipients.

**ABSTRACTS**

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**6.**

**Use of Frailty Screening as Risk Stratification for Advanced Heart Failure Patients in Hong Kong – A Novel Approach for a Chronic Problem**

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**Background:** The use of frailty as a risk stratification tool has been gaining increased attention as an objective assessment of patient vulnerability. Implications of frailty among Chinese patients with advanced HF is not known.

**Methods:** A total of 103 pts [81 men (78.6%) with mean age 49.1±1 years] with advanced HF were recruited between May 2015 to July 2018 for frailty assessment. Patients received optimized medical therapy (OMT) and HF pathway care. Frailty assessment were carried out serially at baseline, during OMT interventions and after heart transplant (HTx) or ventricular assist device (VAD) support respectively. Primary endpoint was defined as HTx, VAD or death. Physical frailty (PF) was defined as 3 or more of the following 5 components (score 1 each): weak hand grip strength, 6-minute walk test <400 m, poor appetite, physical inactivity and exhaustion. Additional cognitive assessment [Montreal Cognitive Assessment (MOCA)-Hong Kong] ( $\leq 22$  scored 1) and depression screening (Hospital Anxiety and Depression Scale; 8 scored 1) were performed. Total frailty (TF) scores equal to PF + MOCA and HADS (ranged 0-7).

**Results:** Mean ejection fraction (LVEF) was 19.8±% at baseline. Forty-eight (47%) were in NYHA class IV and 39 (38%) required continuous intravenous inotropic support. Fifty-one pts (50%) were found to be physically frail (PF $\geq 3$ ) and were significantly associated with primary end-point (p=0.006). Similarly TF score  $\geq 4$  at baseline was associated with combined event of heart transplant

(n=14), VAD (n=30), and death (n=12). [TF $> 4$  59% vs TF $< 4$  24%; p=0.002]. Both PF and TF were most significantly improved after HTx or VAD when compared with baseline. Only depression scores improved significantly after starting OMT and clinical pathway care and continued to improve after HTx or VAD while cognitive function and anxiety scores showed improving trend but did not reach statistical significance.

**Conclusions:** Frailty is highly prevalent amongst Chinese patients with advanced HF. Determination of frailty as an independent marker of outcomes should be considered as part of the evaluation process of patients for advanced HF therapies. Recognizing frailty as a syndrome and using its presence to guide management may ultimately improve patient-centered outcomes.

ABSTRACTS

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ABSTRACT PRESENTATION

1.

**Factors Associated with Persistent Smoking in Patients with Established Cardiovascular diseases (CVD) and Individuals at High Risk for CVD: Post-hoc Analysis of the EUROACTION Plus Varenicline Study**

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**Background:** Intensive smoking cessation intervention in conjunction with a comprehensive preventive cardiology programme increases the rate of a successful quit attempt. However, the interaction of a multitude of other relevant factors surrounding care influences the attainment of abstinence at the end of treatment.

**Objective:** To examine the factors associated with persistent smoking among smokers within the intervention arm of the EUROACTION plus varenicline (EA+) trial.

**Methods:** A dataset consisted of 342 smokers (271 at high CVD risk and 71 with vascular disease) within the intervention arm of the EA+ trial was analysed using a post-hoc multivariate regression analyses. The primary outcome of the main trial was smoking abstinence as defined by a self-reported seven-day point prevalence abstinence (PPA), validated with a breath carbon monoxide (CO) measurement. Persistence of smoking as the outcome of the present study was compared with explanatory variables in a bivariate analysis using stepwise logistic regression to examine the association between them. Variables showing significant association in the analysis were subsequently included into the multivariate analysis.

**Results:** The result of the multiple logistic regression revealed that anxiety is positively associated with an unsuccessful quit attempt at 16-week follow-up, with an odds ratio (OR) of 1.07 [95% confidence interval (CI) 1.01-1.13,  $p=0.01$ ], following a nurse-led, comprehensive, multifactorial preventive cardiology programme with the focus on intensive smoking cessation. In non-quiters, every one-point increase in anxiety score was associated with an increase of 7% chance of continuing to smoke.

**Conclusion:** The findings of this study highlighted the influence of psychosocial factors on smoking abstinence. Intensive smoking cessation emphasised within a preventive cardiology programme improved the likelihood of persistent smokers to stop smoking.

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2.

**Effectiveness of Process Optimizing and Mobile App Monitoring on Door-to-balloon Time in ST-elevation Myocardial Infarction Patients**

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**Objective:** To determine the impact of optimizing the primary percutaneous coronary intervention (pPCI) process and monitor the process by a mobile app for door-to-balloon time among ST-elevation myocardial infarction patients.

**Methods:** A quasi-experimental before-and-after study. Consecutive ST-elevation myocardial infarction patients who visited the hospital emergency department between January 2016 and December 2016 were included. An intervention program was designed that incorporated an expert panel root cause analysis, a patient transfer protocol, a pPCI education scheme, standard preoperative preparation guidelines, and time monitoring via a mobile app.

**Results:** Of the 180 patients examined, 22 were examined prior to the intervention; 55 immediately after the intervention, which was implemented to determine the short-term effect; and 103 at five months after the intervention was initiated. The D2B time was significantly shortened immediately after the intervention was implemented (108.26 [47.23] minutes) than before the intervention (162.56 [100.74] minutes) but was not as short as the D2B time at the end of the follow-up period (97.76 [44.02] minutes) ( $p<0.001$ ). Achievement of D2B time within 90 min was 27.8% before intervention, 43.4% immediately after the intervention, and 48.5% during follow up

( $p=0.26$ ). Before the intervention, two patients died before catheterization, while after the intervention, no patients died ( $p<0.05$ ). A monthly time series analysis demonstrated a sustained improvement following the intervention.

**Conclusion:** The process-optimizing intervention and monitoring by a mobile app significantly shortened the D2B time and reduced mortality. The rate of achieving a D2B time within 90 minutes has improved although not statistically significant.

**ABSTRACTS**

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**3.**

**Clinical Pathway in Heart Failure Effectively Increases the Utilization of Evidence Based Heart Failure Medications Resulting in Better Patient Outcome**

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**Background:** The burden of congestive heart failure (CHF) in the modern society of Hong Kong is increasing annually. A local study in 1997 estimated the overall incidence rate per 1000 men and women was 5.7 and 4.8 respectively. Patients would benefit from a standardized guideline oriented inpatient hospital care. Clinical pathways for heart failure have been developed, but these models have not been evaluated in the local community setting. Here, we sought to assess the effectiveness of implementation of a clinical heart failure pathway by evaluating the use of heart failure medications, length of stay, rate of readmission in patients with congestive heart failure.

**Methods:** Heart failure pathway was implemented in Pok Oi Hospital since December 2015. We retrospectively studied a total of 185 patients (mean age  $66.5 \pm 10.1$ ) with diagnosis of congestive heart failure in a community hospital between January 2015 and December 2016. Patients were divided into two groups, 93 patients who were mainly managed by the general medical team and 92 patients who were recruited into the pathway, all reviewed by the cardiac team with suggested management. We conducted detailed reviews to determine and compare the use of evidence based heart failure medications, risk factors control status, length of stay and rate of readmission.

**Results:** There were significantly more heart failure medications prescribed including angiotensin converting enzyme inhibitor or angiotensin receptor blocker (ACEI / ARB) (59% vs 78%,  $p < 0.01$ ), betablocker (44% vs 68%,  $p < 0.01$ ), aldactone (8% vs 14%,  $p < 0.01$ ), digoxin (7% vs 9%,  $p = 0.03$ ) and warfarin (17% vs 24%,  $p = 0.01$ ) after patients were recruited into the pathway. And lower rate of readmissions was observed after the launch of heart failure pathway with 22% vs 11% in 30-day readmission ( $p = 0.03$ ) and 45% vs 30% in 6-month readmission ( $p = 0.04$ ) for those not enrolled and enrolled respectively.

**Conclusion:** Use of heart failure pathway in the local hospital setting was associated with an increase in use of heart failure medications as well as reduction in heart failure readmission.

**4.**

**Exercise Training Program in Patients with NYHA III Class Systolic Heart Failure – Parallel Comparison to the Effects of Resynchronization Therapy**

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**Background:** The aim of this study was to assess exercise capacity and echocardiographic parameters in patients with systolic heart failure (HFrEF) in NYHA III functional class, after cardiac resynchronization therapy (CRT) or cardioverter-defibrillator (ICD) implantation followed by 6 months of supervised rehabilitation in ICD patients.

**Methods:** The study included 61 patients (53 male, aged 49-77 years) in NYHA III class with HFrEF and impaired left ventricle systolic function (LVEF  $\leq 35\%$ ), divided into two groups: CRT group, > six weeks after CRT-D implantation, and ICD-rehab group: patients after ICD implantation > six weeks, followed by 6 months of supervised aerobic interval training and the conditioning exercises. At baseline and after 6 months in all the patients cardiopulmonary exercise tests (CPX) and standard echocardiographic examinations were performed.

**Results:** The study included 61 patients (49-77 years) with HFrEF. At baseline, the values of CPX parameters were similar in both groups. After completing training almost all CPX parameters in the ICD-rehab group significantly improved, except for anaerobic threshold (AT). In the CRT group significant improvements were found in 2 parameters: peak oxygen uptake ( $VO_2$ ) and exercise tolerance (metabolic equivalents, METs). Significant reductions in left and right ventricle diameters and an increase in LVEF were observed in both groups after 6 months.

**Conclusions:** Significant improvement in exercise tolerance capacity and increase of LVEF were observed in the similar extent both in heart failure patients with CRT and with ICD undergoing rehabilitation program. Regular, controlled exercise trainings provided additional, safe and easy to conduct therapeutic option for heart failure patients with no indications for CRT.

ABSTRACTS

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5.

**High Serum Uric Acid is Associated with Dyslipidemia, Overweight/Obesity and Elevated Arterial Stiffness: A Cross-sectional Study in a Coastal Chinese Population**

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**Background:** Hyperuricemia is more prevalent in populations with high seafood intake. Although the relationships between serum uric acid (SUA) and metabolic disorders had been recognized in patients with various clinical conditions such as hypertension or CKD, the association of SUA and dyslipidemia or overweight/obesity among community-based coastal individuals remains not comprehensively assessed.

**Methods:** In the current cross-sectional study, we evaluated the relationship between SUA and dyslipidemia, overweight/obesity as well as arterial stiffness in a coastal population of China. The study included a questionnaire survey, physical exam and lab test, and was conducted in 7 coastal villages. High SUA was defined as SUA at  $\geq 420 \mu\text{mol/L}$  in men and  $\geq 360 \mu\text{mol/L}$  in women. Elevated arterial stiffness was defined as brachial-ankle pulse wave velocity (baPWV) at  $>1400 \text{ cm/s}$ .

**Results:** Among the 3,343 subjects who completed the study (1,335 men and 2,008 women, mean age  $53.79 \pm 13.18$  years), hyperuricemia was detected in 673 subjects (20.13%). The age-standardized prevalence was 18.85%. Subjects with high SUA had higher levels of blood lipids, blood pressure, BMI ( $p < 0.05$ ) and higher rate of overweight/obesity (49.03% vs. 43.33%), dyslipidemia (63.60% vs. 43.40%), hypertension (47.40% vs. 40.00%), diabetes (16.20% vs. 12.96%), as well as elevated arterial stiffness (50.07% vs. 44.34%). Multivariate linear regression analysis revealed higher SUA was associated with higher BMI, TG, LDL-C, baPWV, and lower HDL-C, eGFR ( $p < 0.05$  for all). Multivariate logistic regression analysis revealed that after adjusting confounding factors, the probability of dyslipidemia, overweight/obesity and elevated arterial stiffness was significantly increased with the SUA quartiles (5.182 times for high TG, 2.418 times for high LDL-C, 1.454 times for low HDL-C, 1.336 times for high BMI, 1.421 times for elevated baPWV, all  $p < 0.01$  for Q4 vs. Q1).

**Conclusion:** High SUA is an independent factor of dyslipidemia, overweight/obesity, or elevated arterial stiffness in this coastal Chinese population.

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6.

**Outcome of Phase II Cardiac Rehabilitation on 6 MWT and Physical Fitness Changes in Patients after Percutaneous Coronary Intervention (PCI)**

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**Objectives:** Cardiac rehabilitation (CR) was recommended to be an effective and safe therapy in management of clinically stable people following PCI. However, limited information is available on the methodology and design of exercise based CR program, especially the result of phase II CR in patients after PCI. The aim of our study was to evaluate the outcome of supervised aerobic and resistance exercise on patients after PCI by assessing the result of 6 MWT and physical fitness test.

**Methods:** We reviewed the treatment records of patients who received PCI at Hong Kong University-Shenzhen Hospital cardiac rehabilitation center in 2016 and 2017. Fifty-five patients were chosen, who had completed supervised 45 minutes aerobic exercise and 15min resistance exercise twice a week for two months.

6 minutes walk test has been shown to provide a clinical useful index of functional capacity and clinical change following heart rehabilitation. Accordingly, initial measurements of 6 minutes walk distance and physical fitness test including skin sebum test, sit and reach test, single leg stand test with eye open and eye close were performed. All measurements were repeated after the treatment program. Changes of 6 minutes walk distances physical fitness parameters were analyzed using pair t-test.

**Results:** 55 participants (52 males and 3 females) aged between 30 and 73 years old (mean  $53.02 \pm 9.61$ ) were included. As expected, a better exercise capacity was proved after two months phase II cardiac rehabilitation. Outcome of 6 minutes walk distances increased from  $536.42 \pm 80.42$  meters to  $593.85 \pm 66.41$  meters ( $P < 0.01$ ). However, no obvious change of skin sebum ( $P > 0.01$ ) was found. Other physical fitness parameters (result of sit and reach test, single leg stand test with eye open and eye close) had a significant improvement for both left and right side from baseline to the end of rehabilitation program ( $P < 0.01$ ).

**Conclusion:** In conclusion, a supervised aerobic and resistance exercise based cardiac rehabilitation program is feasible, as it improves patients' exercise capacity and physical fitness to perform a better life quality following PCI.

ABSTRACTS

7.

**Deletion of Telomere-Rap1 Aggravates Adverse Cardiac Remodeling During Aging**

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**Background:** The heart undergoes multiple functional and structural declining with aging, including impaired fatty acid metabolism, systolic/diastolic dysfunction and compensative myocardial hypertrophy. Repressor activator protein 1 (Rap1), telomere-associated protein, is essential for the maintenance of telomere length and structure integrity. Our preliminary work showed that Rap1<sup>-/-</sup> mice exhibited more pronounced phenotypes of aging, including massive hair loss, earlier hair greying and lower body weight. However, it is still unclear whether deletion of Rap1 aggravates aging-related adverse cardiac remodeling. Thus, the present study was designed to investigate the role of Rap1 in cardiac aging and the underlying mechanism.

**Methods:** Transthoracic echocardiography was performed noninvasively to determine the cardiac structure and function of Rap1<sup>+/+</sup> and Rap1<sup>-/-</sup> mice [36-weeks-old]. Size of cardiomyocytes were detected by WGA (Wheat germ agglutinin) staining. Cardiac senescence and the level of heart lipids were evaluated by  $\beta$ -Galactosidase (SA- $\beta$ -gal) and Oil Red O staining. The ultrastructure of mitochondria was detected by electron microscope with samples from apex cordis of mice. Protein expression of p53, PPAR $\alpha$ , Acetyl-CoA carboxylase (ACC), carnitine palmitoyl transferase I (CPT1) and Acyl-CoA dehydrogenase long chain (ACADL) in the heart were measured by Western blotting.

**Results:** Deletion of Rap1 in mice significantly increased the myocardial performance index (MPI), left ventricular internal dimension end diastole (LVIDD), LV mass and LV mass index, when compared with the age-matched wildtype mice, indicating that Rap1 deficiency led to aging-related cardiac structural changes and dysfunction. Furthermore, deletion of Rap1 increased the cardiomyocytes size, which further reinforced the conclusion that Rap1 deficiency led to dilated cardiac hypertrophy in mice. In addition, there adverse changes were associated with increased cardiac senescence (elevated SA- $\beta$ -gal) in Rap1<sup>-/-</sup> mice. Taken together, these findings suggested that Rap1 deficiency precipitate cardiac aging in mice. The severe cardiac aging in aged Rap1<sup>-/-</sup> mice was paralleled by greater abnormalities in mitochondrial ultrastructure (cristae fragmentation, vacuolization and disrupted external membranes) along with impaired fatty acid oxidation (reduced PPAR $\alpha$ , A CADL, CPT1 level and increased ACC expression), supporting that Rap1 deficiency led to mitochondrial structural injury and dysfunction. Of note, p53, a trigger of cellular senescence and mitochondrial defects, was significantly elevated in the heart of aged Rap1<sup>-/-</sup> mice, indicating that Rap1 deficiency might precipitate cardiac aging and mitochondrial defects via p53.

**Conclusions:** Deletion of Rap1 may impair mitochondrial function including fatty acid oxidation via p53, leading to more severe cardiac dysfunction and compensative structural changes during aging.

8.

**Association of Alendronate and Risk of Cardiovascular Mortality in Patients with Hip Fracture**

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**Background:** The risk of cardiovascular mortality with alendronate use in real-world hip fracture patients is unknown. This study aimed to investigate the risk of cardiovascular mortality with and without use of alendronate in patients with hip fracture.

**Method:** We conducted a retrospective cohort study using a population-wide database managed by the Hong Kong Hospital Authority. Patients newly diagnosed with hip fracture from 2005 through 2013 were followed until November 6, 2016. Alendronate and other anti-osteoporosis medications use during the study period were examined. We matched treated and non-treated patients based on time-dependent propensity score. The risks of 1-, 3-, 5- and 10-year cardiovascular mortality between treatment groups were evaluated using conditional Cox regression stratified by match pairs.

**Results:** Among 34,991 patients with newly diagnosed hip fracture, 4,602 (13.2%) received anti-osteoporosis treatment during follow-up. Physical functioning or survival prospect was not significantly different between treated and non-treated patients. 4,594 treated patients were matched with 13,568 non-treated patients. Results of Cox-regression analysis revealed that alendronate was associated with a significantly lower risk of one-year cardiovascular mortality (HR: 0.33; 95% CI: 0.17-0.65). The strength of the association declined over time but remained significant. Similar results were observed when all nitrogen-containing bisphosphonates were analyzed together. These findings were robust in multiple sensitivity analyses.

**Conclusion:** The use of alendronate was associated with a reduced risk of cardiovascular mortality. Additional studies in other population samples and randomized clinical trials may be warranted to further understand the relationship between use of various anti-osteoporosis medication and risk of cardiovascular events in patients with hip fracture.

**ABSTRACTS**

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**9.**

**KLF2 Suppresses Vascular Calcification through Inhibition of Endothelial BMP/Smad Pathway**

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Vascular calcification is a common vascular complication of diabetes, fibrotic renal diseases and atherosclerosis, and is associated with an increased risk of cardiovascular mortality. The bone morphogenetic proteins (BMPs) have been implicated as mediators of calcification in the vascular wall. However, the regulatory mechanism of BMP/Smad pathway in the progression of vascular calcification is largely unknown. Here, we show that KLF2, a transcription factor induced by athero-protective shear stress, negatively regulates BMP/Smad pathway. Specifically, KLF2 knockdown in human umbilical vein endothelial cells (HUVECs) increases expression levels of BMP2/4/6, total and phosphorylated Smad1 and Smad5, and decreases expression of Smad6 (an inhibitory Smad). By contrast, KLF2 overexpression downregulates expression of BMP2/4/6 and Smad1, and upregulates Smad6 expression. In addition, KLF2 overexpression also induces the expression of BMPER that functions as an endothelial BMP antagonist. Endothelial cells are constantly exposed to mechanical forces generated by blood flow. Different flow patterns induce distinct cellular responses. Disturbed flow (DF) induces vascular inflammation and promotes atherogenesis, while laminar shear stress (LSS) produces anti-inflammatory and athero-protective effects. We found that LSS decreases expression of BMP4 and increases expression of BMPER and Smad6, suggesting an inhibition of BMP/Smad signaling. Moreover, KLF2 silencing using shRNA abolishes the inhibitory effect of LSS on the expression of BMP4, BMPER and Smad6, suggesting that KLF2 is likely to mediate the

suppressive effect of LSS on BMP pathway. On the other hand, DF decreases BMPER and increases BMP4 and p-Smad1/5, suggesting an activation of BMP/Smad signaling. KLF2 overexpression reverses the activation BMP/Smad signaling induced by DF. Taken together, our present study suggests that targeting the KLF2-BMP/Smad signaling cascade may hold promise as a novel drug target against vascular calcification.



## ABSTRACTS

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### Abstracts Presentation (Poster):

#### A04.

##### **Hypertension in School Children of Dhaka City and Associated Risk Factors**

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**Background:** Hypertension has its origin in childhood but goes undetected unless specially looked for. Detection of hypertension in children will increase the awareness and lead to preventive strategies.

**Objective:** The objective of the study was to determine the prevalence of hypertension in school children.

**Method:** This cross-sectional study was conducted among children aged 10 to 17 years in three secondary level schools of Dhaka city. This study included 1146 participants (both boys and girls) by systematic random sampling. Blood pressure was measured and plotted in BP chart to define hypertension and structured questionnaire were used to collect socio demographic information.

**Results:** The prevalence of hypertension in school children was 1.8% (male was 1.68% and female was 1.99%). It was noted that there was a strong correlation between body weight and BMI of the children with hypertension. A significant portion of the respondents had family history of hypertension, diabetes and obesity. There was also a positive relation between hypertension and food habit that include low vegetables and more fast food.

**Conclusion:** It was concluded that hypertension exists among secondary level school children in Dhaka, Bangladesh and it is related with obesity, increased BMI, family history and dietary habit.

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#### A05.

##### **Association Between Cardiopulmonary Health and Balance Confidence in Community-Dwelling Older Adults**

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**Objectives:** This study aimed to explore the association between cardiopulmonary health and balance confidence in community-dwelling older adults.

**Methods:** Thirty-two healthy older adults were recruited from a local community center for the elderly. Basic demographic information was obtained by interviewing the participants and their body weight and height were measured. Resting heart rate and oxygen saturation level in blood were assessed using a fingertip pulse oximeter. Blood pressure was also measured at rest using a blood pressure monitor. Balance confidence was quantified using the Activities-specific Balance Confidence Scale (ABC) (Chinese version). Then, the linear associations between the cardiopulmonary health outcomes (heart rate, blood pressure and oxygen saturation in blood) and the ABC total score were analyzed using Pearson's r.

**Results:** All participants were eligible to participate in the study after screening by 3 physiotherapists (5 males and 27 females; mean age  $\pm$  SD = 69.5 $\pm$ 8.6 years). Their resting systolic blood pressure, diastolic blood pressure, heart rate, and oxygen saturation in blood (mean  $\pm$  SD) were 130.6 $\pm$ 16.9 mmHg, 73.1 $\pm$ 9.7 mmHg, 73.7 $\pm$ 10.3 bpm, and 96.9 $\pm$ 1.5 %, respectively. The mean  $\pm$  SD ABC total score was 77.9 $\pm$ 19.5 %. Pearson's r results revealed that the oxygen saturation in blood was positively associated with the ABC total score ( $r=0.455$ ;  $p=0.010$ ). There were no associations between other cardiopulmonary health outcomes and the ABC total score.

**Conclusion:** Cardiopulmonary health may be associated with balance confidence in community-dwelling older adults. Therefore, it may be essential to incorporate cardiopulmonary exercises into balance training programs for the elderly people to improve their balance confidence.

## ABSTRACTS

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Abstracts Presentation (Poster):

### A06.

#### Coronary Artery Disease after Radiation Therapy for Hodgkin's Lymphoma in a Pregnant Patient: A Case Report

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**Objective:** Radiation-associated cardiovascular diseases are increasingly recognized as adverse effects of Hodgkin's lymphoma (HL) treatment. This case report aims to identify the risk factors for coronary artery disease (CAD) in a symptomatic pregnant patient who had mediastinal irradiation for HL. She later underwent coronary angiogram and percutaneous coronary intervention (PCI).

**Methods:** We evaluated a 26-year-old pregnant patient who had been treated for HL by radiation therapy at the age of 19. The total mediastinal dose was 51 Gray (Gy). Patient was evaluated with serial electrocardiography (ECG) monitoring and Troponin I followed by coronary angiography of the coronary arteries.

**Results:** Patient had CAD. Coronary angiogram showed 2-vessel CAD with significant left main coronary artery involvement, which led to PCI of ostial to proximal left main artery.

**Conclusion:** We report a case of a 26-year-old pregnant patient with CAD who had history of HL treated by radiation therapy. Cardiovascular complications like CAD should be kept in mind as a possible complication after radiation therapy. Physicians must be aware of post-radiation cardiac complications, recognize at-risk patients, and screen such patients for symptoms and signs of cardiac disease.

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### A08.

#### Home-based HEart Failure Self-Management Programme Study (The HOM-HEMP Study): A Randomized Controlled Trial

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**Background:** Patients with chronic heart failure suffer from a wide range of symptoms, including dyspnea, fatigue, activity intolerance and fluid retention. It poses a major challenge to patient's physical, social, and psychological aspects of life. With the rising ageing population and increased prevalence of patients with chronic heart failure over the decades, there is a need to develop chronic heart failure management programmes to enhance the quality of life of these elderly patients.

**Aims:** This study aims to develop and evaluate the effects of a nurse-led, home-based self-management psychosocial education programme, titled HOME-based HEart Failure Self-Management Programme (HOM-HEMP), on self-efficacy, self-care behaviour, health-related quality of life, psychological well-being, social support, and clinical outcomes among patients with chronic heart failure in Singapore.

**Methods:** A single-blinded, stratified, three-arm randomised controlled trial is adopted. The six-week HOM-HEMP consists of a Tool Kit specially designed for heart failure patients and a supplemental smartphone application (App). A total of 213 patients with chronic heart failure from a tertiary public hospital in Singapore will be enrolled into this study through consecutive sampling. They will be randomly allocated to one of the following: control group, experimental group A (HOM-HEMP without App) or experimental group B (HOM-HEMP with App). While the HOM-HEMP will be conducted by a research nurse, data collection will be performed by another research

assistant who is blinded to the participants' group assignment and collects data at baseline, six weeks, three and six months. To evaluate the acceptability, strengths and weaknesses of the HOM-HEMP, a process evaluation will also be performed.

**Discussion:** This study is still undergoing, and we hope study will add on to knowledge generation, evaluating the effectiveness of both the HOM-HEMP and the additional smartphone App in managing patients with chronic heart failure.

## ABSTRACTS

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Abstracts Presentation (Poster):

### A09.

#### **A Systematic Review and Meta-analysis of the Effectiveness of Psychological Interventions on Self-care, Psychological Outcomes, Quality of Life and Physical Function in Patients with Chronic Heart Failure**

Y JIANG,<sup>1</sup> S SHOREY,<sup>1</sup> B SEAH,<sup>1</sup> WX CHAN,<sup>2</sup> WWS TAM,<sup>1</sup> W WANG<sup>1</sup>

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**Objective:** Heart failure is a chronic and disabling syndrome. Efforts aimed at promoting self-care were the cornerstone of heart failure disease management. There has been a growing interest in the role of psychological interventions to enhance the health outcomes for patients with coronary heart disease, including those with heart failure. The objective of current review is to determine the effects of psychological interventions on self-care and psychological and health outcomes in patients with chronic heart failure (CHF).

**Methods:** We conducted a systematic review and meta-analysis on the effectiveness of randomized controlled trials using psychological methods or theory on self-care behaviors, anxiety and depression levels, HRQoL, and physical function. We searched published studies, written in English from January 2006 to December 2016, in the following electronic databases: CINAHL, Cochrane Library, EMBASE, PubMed, PsycINFO, Scopus, and Web of Science.

**Results:** A total of 29 articles, consisting of 25 studies with 3,837 participants, were included in this review. Findings showed that despite heterogeneity between studies, psychological interventions tend to improve self-care in CHF patients without clinical depression and cognitive impairment. Pooled results also revealed that the intervention effect on short-term HRQoL, as measured by the Minnesota Living with Heart Failure Questionnaire (MLHFQ), was in favor of the intervention group (combined MD -7.53, 95% CI -12.83 to -2.23); however, such effect disappeared as the length of time from the intervention increased. The intervention effects on the participants' anxiety level, as measured by HADS, and physical function, as measured by 6MWT, were not statistically significant.

**Conclusion:** The findings from the current review provide evidence of the beneficial effects of psychological interventions on self-care and HRQoL, as measured by MLHFQ, in HF patients without clinical depression and cognitive impairment for a short period of time. However, such effect disappeared as time from the intervention increased.

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### A11.

#### **Effect of Phase I Cardiac Rehabilitation on the Hospital Anxiety and Depression Scale Score (HADS) among Cardiac Surgery Patients**

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**Background:** Depression and anxiety are prevalent co-morbidities in patients who are hospitalized due to heart disease and who have undergone cardiac surgery. These psychosocial aspects can have significant impact on the patient's recovery, quality of life, treatment and prognosis. We aimed to evaluate the effect of an inpatient Phase I cardiac rehabilitation (CR) on the Hospital and Anxiety Depression Scores (HADS) of patients who underwent cardiac surgery.

**Methods:** A prospective cohort study of 100 patients who underwent cardiac surgery at the Philippine Heart Center was done. The HADS score of patients post cardiovascular surgery who were referred to undergo an inpatient Phase I cardiac rehabilitation were compared to a control group who did not receive the Phase I program. The HADS was again determined for both groups for any significant changes prior to discharge.

**Results:** At baseline there was no significant difference in the mean HADS of both groups. There was noted improvement of the HADS score for both groups prior to discharge. Compared to the patients who were not referred there was greater decrease in the mean HADS in patients who were referred for Phase I compared to patients who were not referred (mean HADS difference of 7.70 SD± 3.01 vs 2.53 SD ±1.4, p<0.05 for both groups).

**Conclusion:** Participation in an inpatient Phase I CR program prior to discharge may help in decreasing anxiety and depression levels in patients post cardiac surgery.

## ABSTRACTS

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### Abstracts Presentation (Poster):

#### A12.

##### **Experience of Cardiac Rehabilitation in Private Sector Sri Lanka**

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**Introduction:** Cardiovascular disease (CVD) is a preventable global epidemic which leads to the highest morbidity and mortality. Poor diet, smoking cigarette, alcohol and lack of physical exercise are the potentially modifiable risk factors contributing the majority of CVD and deaths. Cardiac rehabilitation (CR) is demonstrated to be the cost-effective and efficacious in both high- and low-income countries, which could represent an important approach to mitigate the epidemic of CVD by addressing above risk factors through lifestyle modification. Thus, the objective of this study is to assess the short-term effects on behavioural, clinical and health improvements of CR programmes in private sector Sri Lanka.

**Methods:** A retrospective cross-sectional study was conducted for a period of six months in the Center for Diabetes Endocrinology and Cardiac Metabolism (CDEM), Colombo. A total of 39 patients, ages between 30 to 75 years with a history of Ischemic Heart disease (IHD), Post percutaneous coronary intervention (PCI), Post coronary artery bypass grafting (CABG), heart failure with reduced systolic function or patients with high risk factors for CVD were recruited. The pre-and post-test data related to weight reduction and improvement of six minutes' walk were compared using paired t-test and the statistical significance is considered as 0.001. Questionnaires were used to assess psychological status, Quality of life and Medical knowledge on the CVD.

**Conclusion and Recommendation:** The purpose of this study is to share the experience of low-cost approaches to delivering the core components of CR, which could be proposed as the feasible and effective way in reduction of further complications associated with CVD. The findings of this study provide the first experiences reported in Sri Lanka towards the heart-healthy lifestyle and this will help to improve the accessibility and availability of the in- and outpatient CR programmes in other hospitals as well.

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#### A13.

##### **Effects of Two Months of Cardiac Rehabilitation on Self-efficacy and Functional Capacity in Cardiac Patients**

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**Objectives:** According to American Heart Association (AHA) guidelines, 36 sessions of cardiac rehabilitation (CR) over three months can help to further reduce the risk of mortality and myocardial infarction (MI) as compared to those who attended 12 sessions (Kwan and Balady 2012). In National Heart Centre Singapore (NHCS), patients are offered 16 sessions of CR and are highly encouraged to complete within two months. Self-efficacy and functional capacity are important outcomes to be assessed in CR programs. Self-efficacy has shown to independently predict symptom burden, physical limitation, quality of life and overall health (Sarkar et al. 2007) whereas functional capacity has been reported to predict cardiovascular risk and mortality (Mandole et al. 2016). Therefore, the primary aim of this study is to investigate the effects of two months of CR on self-efficacy and functional capacity of cardiac patients in NHCS.

**Methods:** This is a retrospective cohort study conducted in a single CR centre in Singapore. A total of 56 males and 9 females who completed 16 sessions of CR within two months from January 2018 till end of May 2018 were analyzed. The CR program consisted of both aerobic and resistance training prescribed and supervised by physiotherapists. Self-efficacy and functional capacity were measured at the beginning and end of the CR program using Cardiac Self-Efficacy Scale (CSES) and Veteran's Specific Activity Questionnaire (VSAQ) respectively. Data analysis was carried out using SPSS software.

**Results:** Both components of self-efficacy - control symptoms and maintain function significantly improved ( $p < 0.05$ ) after participating in two months of CR. Similarly, significant improvement ( $p < 0.05$ ) in functional capacity was also observed in our study.

**Conclusion:** This retrospective analysis showed that two months of CR was sufficient to significantly improve self-efficacy and functional capacity in our cardiac population.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A14.

##### **Obesity, Cardiovascular Risk, Physical Performance and Dairy Product Intake**

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**Objectives:** Studies suggested that poor physical fitness in overweight and obese individuals (i.e., sarcopenic obesity) might be associated with an additional cardiovascular risk. Here we sought to determine the relationship among obesity index, physical performance and cardiovascular risks and also investigated the contribution of dairy product intake to those factors in overweight subjects.

**Methods:** Physical various tests in addition to morphological evaluations and blood biochemical measurements including glucose metabolism, lipids, and a strong arteriosclerotic marker of high-sensitivity C-reactive protein (CRP) were performed for 124 overweight women (mean age 53±3 years). The levels of dairy product intake were evaluated by food frequency questionnaire. We examined the relationships among the results of the physical tests, cardiovascular risks and body mass index (BMI), and additionally we studied the impact of dairy product intake on aforementioned parameters.

**Results:** A univariate correlation analysis revealed that the anteflexion ( $p<0.05$ ), single-foot standing test with eyes closed ( $p<0.01$ ) and sit-up ( $p<0.01$ ) measures were significantly correlated with CRP. Anteflexion ( $p<0.001$ ) and the single-foot standing test with eyes closed ( $p<0.05$ ) were also significantly related to HDL (high-density lipoprotein). The anteflexion results were significantly correlated with homeostasis model assessment of insulin resistance (HOMA-IR) ( $p<0.01$ ). However, none of the physical showed an independent relationship with the cardiovascular risks

by multivariate analysis after adjustment for BMI. The subjects' BMI values were closely correlated with most of the cardiovascular risks. Moreover, BMI was significantly positively related to absolute values of thigh strength, exercise tolerance and quadriceps thickness ( $p<0.001$ ), and significantly negatively related to the results of the anteflexion, single-foot standing test with eyes closed and sit-up measures ( $p<0.001$ ). On the other hand, dairy product intake showed no relation to any of those parameters.

**Conclusions:** Physical performance did not provide additional prediction information about cardiovascular risk in overweight individuals. BMI was strongly related not only to cardiovascular risks but also physical test measures.

#### A15.

##### **Smokers Could Not Get Similar Benefits to Non-smokers from Exercise Therapy**

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**Objectives:** Smoking is a notorious strong cardiovascular risk, while exercise therapy is noble multifaceted medicine especially for cardiovascular disease. Smoking and exercise are conflicting manners, however, a part of smokers often attempts to exercise for their desire of being healthy. Moreover, smoking might blunt exercise performance acutely and chronically. The purpose of this study is to examine the effects of exercise training on adiposity, cardiovascular risks and physical fitness in obstinate smokers with overweight and multiple cardiovascular risk factors.

**Methods:** A total of 25 smokers (age: 69±5 yrs) and 25 age-matched non-smokers (age: 69±6 yrs) with multiple cardiovascular risk factors were recruited and received an examination, followed by exercise training. The subjects were to exercise 2 to 3 times per week for 6 months at a fitness club. Bicycle exercise with a duration of 20-40 min was employed. At baseline and after 6 months, all subjects underwent outcome measurements.

**Results:** Both groups exercised an average of 2.6 times/week. After 6 months of training, the both groups showed significant improvements in blood pressures (smokers: 143±18 to 137±18\*, non-smokers: 141±14 to 133±17\* mmHg, systolic pressure), body mass index (smokers: 26.4±1.9 to 25.9±1.6\*, non-smokers: 26.3±2.3 to 25.5±2.3\* kg/m<sup>2</sup>, \* $p<0.05$ ), waist circumference (smokers: 90.2±6.5 to 87.5±6.4\*, non-smokers: 90.2±6.6 to 85.2±6.7\* cm,

\* $p<0.05$ ), and peak oxygen uptake (smokers: 21.3±3.8 to 24.0±4.3\*, non-smokers: 22.4±4.1 to 26.0±4.4\* ml/kg/min, \* $p<0.05$ ). Consequently, a significant reduction in high-sensitivity C-reactive protein (hs-CRP) levels were seen in non-smokers (1.08±1.17 to 0.58±0.49 mg/L,  $p<0.05$ ), while no change was seen in smokers (1.10±1.21 to 0.91±1.00 mg/L, ns).

**Conclusions:** Exercise training could reduce conventional cardiovascular risk factors but not hs-CRP, the strongest cardiovascular risk factor in smokers. The evidence might suggest that smokers could not get benefits similarly to non-smokers from exercise training.

## ABSTRACTS

Abstracts Presentation (Poster):

### A16.

#### **The Relationship between Muscle Attenuation and Orthostatic Blood Pressure Variations in Elderly Population**

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**Objectives:** To evaluate the relationship between muscle attenuation status and orthostatic blood pressure variations in elderly population.

**Methods:** A total of 929 subjects >60 years were enrolled between September 2015 and December 2016. All subjects underwent basic data collection, physical examination, laboratory examination; orthostatic blood pressure measurement and muscle attenuation status assessment. The binary logistic regression analysis was used to explore the relationship between muscle strength, muscle function and orthostatic hypotension (OH). The multiple linear regression analysis was performed to explore the relationship between muscle strength, muscle function and orthostatic blood pressure variations.

**Results:** The prevalence of muscle attenuation was 39.9%. The decrease of muscle strength and dysfunction increased with age and pulse pressure (All  $P < 0.01$ ). The muscle strength and function in the OH group were worse than those in the non-OH group ( $P < 0.05$ ). Multiple linear regression analysis showed that the variations of systolic blood pressure (SBP) in 1 minute were negatively correlated with male and female muscle strength, muscle function as well as the strength and function levels of muscles ( $\beta = -0.305, -0.378, -8.172, -3.714$ , all  $P < 0.05$ ); The variations of diastolic blood pressure (DBP) in 1 minute were negatively correlated with male muscle strength, muscle function as well as the strength and function levels of muscles ( $\beta = -0.149, -3.672, -1.180$ , all  $P < 0.05$ ); The SBP coefficient of variation was negatively correlated with the male muscle strength and the strength and function levels of muscles ( $\beta = -0.097, -0.776$ , all  $P < 0.05$ ).

**Conclusions:** The orthostatic blood pressure variations and the risk of OH increased in the subjects with declined muscle strength and muscle dysfunction. Improving muscle attenuation status may reduce the incidence of OH in the elderly population.

### A20.

#### **Can Exercise-only-based Cardiac Rehabilitation Decrease Depression in Women after Myocardial Infarction**

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**Objectives:** Depression is commonly observed comorbidity in patients after myocardial infarction (MI), especially in women and is also a strong predictor of mortality. The aim of our study was to assess the influence of exercise-only-based cardiac rehabilitation without psychological intervention on depression, physical capacity and autonomic balance in post MI women.

**Methods:** 49 women aged  $60.2 \pm 8.1$  after MI underwent an 8-week interval training program (TP) on a cycloergometer 3 times a week. Before and after completing TP, patients underwent: (1) depression intensity assessment with the Beck Depression Inventory (BDI); depressive disorders were diagnosed in patients whose BDI outcome was 10 points or more; (2) a symptom-limited exercise test on cycloergometer (EST) during which were analyzed: maximal workload (Watts), duration (min), double product (DP, mmHg/min), heart rate recovery in the first (HRR1) and second min (HRR2) after EST, which is thought to reflect the reactivation of the parasympathetic nervous system after effort.

**Results:** After the training cycle, the percentage of women with depression significantly decreased from 59.18% to 40.8% ( $p < 0.001$ ). The initial depression intensity was found to be  $12.2 \pm 7.9$  points and decreased significantly after TP to  $8.4 \pm 7.2$  ( $p < 0.001$ ). Physical capacity increased significantly after TP based on EST: max workload  $92.3 \pm 22.7$  vs  $107.1 \pm 24.2$  ( $p < 0.001$ ), duration  $4.2 \pm 1.1$  vs  $5.2 \pm 1.4$  ( $p < 0.001$ ), DP at peak effort  $19118.9 \pm 3129.9$  vs  $21041.5 \pm 4403.1$  ( $p < 0.01$ ). Moreover, HRR1 ( $33.9 \pm 14.8$  vs  $36.2 \pm 23.2$ ) and HRR2 ( $45.3 \pm 14.3$  vs  $48.2 \pm 21.9$ ) also increased, however not significantly.

**Conclusions:** Participating in exercise training program not only improved physical capacity but also beneficially contributed to a decrease in depression in post-MI women.

## ABSTRACTS

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Abstracts Presentation (Poster):

### A21.

#### **The Effects of Enhanced External Counterpulsation Therapy in Patient with Microvascular Angina: A Case Report**

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**Objectives:** To report a case that enhanced external counterpulsation (EECP), one of the cardiac rehabilitation procedures, were used as a non-pharmacological treatment in patient diagnosed with microvascular angina (MA).

**Methods:** Toward this goal a patient who diagnosed with MA were studied before and after 36 1-hr sessions of EECP. Angina episodes, exercise capacity and quality of life (QoL) questionnaires were performed at baseline and after completing EECP treatment.

**Results:** Comparison of results obtained at the beginning of the treatment with data obtained after completion of 36 times' treatments of EECP showed improvements in both exercise test parameters (6 minutes' walk distance, metabolic equivalents, blood pressure control during exertion) and QoL scores. At the same time, angina episodes were reduced obviously after all EECP treatments finished.

**Conclusions:** EECP is a very useful tool of choice in the treatment of patients with MA.

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### A22.

#### **Outpatient Cardiac Rehabilitation Program with Free Shuttle Service for Elderly Patients with Cardiovascular Disease**

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**Objective:** Elderly patients with cardiovascular disease (CVD) may have multiple disabilities and cognitive impairment, and many cannot participate in outpatient cardiac rehabilitation (CR). Outpatient CR is less available in Japan than in Europe and the USA. We investigated whether outpatient CR with free shuttle car service from home to hospital is useful for elderly patients with CVD.

**Methods:** Elderly patients with CVD and difficulty in attending outpatient CR after discharge were included. Difficulty with self-transport, inefficient public transportation, lack of family support, and need for medical support during transit qualified for free shuttle service. We performed weekly outpatient CR using a free shuttle service and instructed patients in self-monitoring using a chronic heart failure notebook. In addition, a certified chronic heart failure nurse performed self-management guidance at every CR session. Physical status and Barthel Index scores were evaluated before and after each CR session. Mortality and rehospitalization rate were examined during the CR program.

**Results:** Ten CVD patients (78±4 years, 4 men) used this CR program between 2016 and 2017. Of these, 7 experienced heart failure and 1 each had histories of acute myocardial infarction, peripheral artery disease, and endovascular aneurysm repair. Three patients lived alone, 5 lived in couples' households, and 2 lived with children. The physical status and activities of daily living showed improvement with free shuttle service, without statistical significance. There were no cardiac deaths during the treatment period of 99±27 days, and the rehospitalization rate for CVD was 20%. In one case, the shuttle car service was provided for a patient with severe heart failure in combination with chronic obstructive pulmonary disease, who required hospitalization for 6 months. This patient was able to continue CR for 4 months and was eventually capable of self-transport, thus, avoiding rehospitalization.

**Conclusion:** Outpatient CR using free shuttle car service may contribute to the maintenance of activities of daily living, as part of a comprehensive disease management program.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A24.

##### **Regular Physical Trainings in Patients with Advanced Heart Failure (NYHA III) After ICD and CRT-D Implantation: The Impact on QoL and Depression Symptoms**

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**Background:** Congestive heart failure (CHF) influences patients' functioning in various areas. Many struggle with depression and impaired quality of life. Therefore there is a need for complex interdisciplinary care.

**Aim:** The aim of the study was to evaluate the impact of regular physical trainings on quality of life (QoL) and depression symptoms in patients with advanced heart failure after ICD and CRT implantation.

**Methods:** Study group consisted of 138 patients (11 F/127 M, 62.3±9.7 years old), with advanced CHF (NYHA III), after ICD (n=77), and CRT-D (n=61) implantation. All subjects underwent Cardiac Rehabilitation programme. Patients were randomly assigned to exercise group (ExG, n=69, 62.4±9.6 years old) with 3-5 exercise sessions per week for 6 months and control group (CG, n=69, 62.1±8.1 years old). Before discharge, after 6, and 18 months patients filled out questionnaires related to depression (Beck Depression Inventory, BDI) and QoL (Nottingham Health Profile, NHP).

**Results:** At the baseline assessment there were no significant differences between groups in depression symptoms (ExG: 11.3±7.4 vs CG: 11.5±7.7). After 6 and 18 months significant improvement was obtained in ExG (9.4±6.1, p<0.03, and 7.9±5.1, p<0.001). In CG no significant differences were observed (11.2±9.3, ns; 10.7±7.7, ns). ExG significantly improved in NHP (sleep: 2.2±1.7 before discharge vs 1.7±1.6 after 6 months, p=0.0002, vs 1.5±1.4 after 18 months, p<0.0001; physical abilities 2.4±1.7, p<0.0001

vs 1.6±1.4, p<0.0001 vs 1.6±1.4 p<0.0001, respectively). Also results of emotional reactions (p<0.0001), and energy level (p<0.01) have improved. In CG level of pain has decreased (p<0.05). Levels of QoL related to social and family life were significantly higher in ExG vs CG (p<0.05).

**Conclusions:** Regular physical trainings significantly reduced level of depression and improved quality of life in patients with advanced CHF and ICD/CRT-D. Cardiac Rehabilitation had significant impact on physical abilities, energy level and self-control of emotional reactions.

#### A26.

##### **Adherence and Functional Outcomes of Elderly Cardiac Rehabilitation Patients: A 5-year Philippine Regional Referral Center Review**

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Chong Hua Hospital, Cebu City, Philippines

**Objectives:** The study aims to (a) determine the clinical and enrolment data of elderlies enrolled in a Philippine regional cardiac rehabilitation (CR) center (referral basis, primary CR indication, co-morbidities) (b) determine adherence of elderlies to prescribed sessions and; (c) determine the functional outcomes of elderlies undergoing CR.

**Methods:** This was an analytical, retrospective study performed at the Chong Hua Heart Institute, a referral center in the Philippines' Central Visayas region. Records for patients enrolled during the dates of interest (Jan 2014 - May 2018) were retrieved. Data variables were summarized as means and proportions/percentages. Mean percentage of complied sessions were compared between sex, age groups and patient treatment groups (*Post Operative, Post PCI/Cath, Medical treatment*) and were analysed via one-way ANOVA.

**Results:** Out of 489 enrollees, a total of 194 patients (39.67%) were 65 years or older during enrolment [(mean age 73.73 years (+6.83)]. We noted 167 patients (86.08%) were enrolled as in-patients, while the remaining 27 patients (14.92%) were referred as out-patients. The most common indication is ischemic heart disease (IHD) with 151 patients (77.83%) referred for this reason. One hundred thirty-six patients (70.1%) were noted to have multi-morbidity with 58 patients (29.9%) having complex multi-morbidity.

Adherence (mean percentage of sessions attended) was high for both phase 1 [86.55% (+23.22)] and phase 2 [81.81% (+30.29)]. No difference was noted between sexes, age groups and treatment groups. Modest functional outcomes were noted post phase 1 [functional capacity of 5.24 (+1.5) mets and HRR of 13.25 (+9.77) bpm] and post phase 2 [functional capacity of 6.5 (+1.03) mets and HRR of 13.87 bpm (+11.84)].

**Conclusion:** This study shows that elderlies account for a sizable percentage of CR enrollees, are referred mostly for IHD and demonstrate a significantly high rate of multi-morbidity and complex multi-morbidity. Adherence rates are significantly higher compared to European and North American literature with no statistically significant differences various subgroups. Post CR assessment shows modest functional outcomes but due to poor compliance with post CR diagnostic testing, this may underestimate the overall impact and efficacy of CR on the population.



## ABSTRACTS

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### Abstracts Presentation (Poster):

#### A27.

##### **Therapeutic Horticultural Activities: An Extended Cardiac Rehabilitation Program**

SH CHIU

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**Introduction:** Horticultural therapy a process of gardening activities used to improve the body, mind and spirit of those people for all ages, backgrounds and abilities. Nowadays, it is being used in hospitals, rehabilitation centres, and a range of community settings. In Hong Kong, it's a new concept of practicing horticultural therapy in recent years.

Cardiac rehabilitation (CR) program Phase I & Phase II has been conducting in the Princess Margaret Hospital (PMH) since 1993. To extend our rehabilitation service to cardiac disease patients, a trial run program "Therapeutic Horticultural Activities" was started.

##### **Objectives:**

1. To provide physical and psychosocial support to CR patients.
2. To develop a leisure pursuit to CR patients.
3. To enhance cohesiveness among CR patient group.
4. To foster partnership among nurses and patients.

**Methodology:** Cardiac patients who have graduated from CR program Phase II in PMH were invited to join this activity. Totally, there were 10 CR patients showed their interested and a leader was voted. Participants were required for self-planned planting activities. Finally, selection of planting species was decided to include vegetables and herbs at this stage. A duty roster and assignment was set up to organize their planting activities including: sowing, watering, fertilization, insecticization and harvesting. A chatting platform through mobile phone was developed to facilitate the communication. A designated page in Facebook was set up for sharing their planting activities photos and feelings to their families or friends.

**Result:** From 1 November 2016 to end of January 2017, there were over 200 attendances in total. Evaluation showed the encouraging result that all of them (100%) highly agreed the horticultural activities lessened their psychological stress, reinforced the communication and support. Relationship and trust among their peer group and nursing professionals was fostered. They showed more confidence on the "Road of Rehabilitation". They were happy and active to share their planting experience and rewards with their families and friends. All of them showed their interest in continuing this activity. They also expressed their wish to be the volunteers in PMH CR group. Horticultural therapy really makes the heart alive green!

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#### A28.

##### **Cardiac Rehabilitation-exercise Training a Cardinal Aspect in Heart Failure**

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**Background:** Cardiac rehabilitation (CR) are recognized as integral to the comprehensive care of patients with chronic heart failure (CHF). In India these programs of cardiac rehabilitation and exercise training have still not been employed as a routine practice, which maybe due to lack of studies. The objective of the study was aimed to assess the effect of cardiac rehabilitation program in patients with HF with reduced EF in Indian population.

**Methods:** A vital of 100 consecutive patients in HF with reduced EF was enrolled into cardiac rehabilitation program in a single center. All data related to patients clinical presentation and demographic characteristics were calculated. The follow up duration was 6 months. Primary and secondary end points improvement of 6MWT, Oxygen saturation on exercise, RPE, BASR, Minnesota questionnaire improvement in QOL, fewer hospital admissions and cardiac mortality.

**Results:** All patients with CHF randomized to supervised exercise training versus control found that after 6 months, the training group had higher quality of life ( $p < 0.05$ ), fewer hospital readmissions ( $p < 0.001$ ), and a lower cardiac mortality ( $p < 0.001$ ) than the control group. The effects of exercise training on prognosis may relate to its effects on autonomic function. Neurohumeral excitation and increased sympathetic nerve activity, both characteristic of CHF, are associated with long-term mortality, and these abnormalities are reduced by exercise training. There was significant improvement noted in all 100 patients of HF with reduced EF who were enrolled in the cardiac rehabilitation program at follow up showed significant statistical improvement in all primary and secondary end points of the study.

**Conclusion:** In Indian subcontinent the inclusion of CR in routine cardiac practice is still lacking. Though this was a single Centre study which low number of subjects and shorter follow up period still significant improvement in various cardiac parameters was evident. This study paves a way for effect of CR in patients with HF with more extensive analysis and longer follow up studies. This study did prove without doubt that Cardiac rehabilitation program is a valuable non-pharmacological intervention for improvement of patients in HF with reduced EF.

**ABSTRACTS**

Abstracts Presentation (Poster):

**A29.**

**The Effect of a 4-week Multidisciplinary Phase II Cardiac Rehabilitation Program for Patients with Coronary Artery Disease**

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**Objectives:** Cardiac rehabilitation (CR) is beneficial in patients with coronary artery disease (CAD) and variations exist between centres in how CR is structured. This study aimed to investigate the effectiveness of this model of CR - shorter period of time, multidisciplinary and small class size - on cardiorespiratory fitness, quality of life (QoL) and attendance.

**Methods:** Patients below 80 years old, recently admitted for CAD and had cardiac catheterization done were recruited, excluding those with severe comorbidities. The 4-week program composed of 8 sessions and each session included at least 45 minutes of aerobic training supervised by physiotherapist and cardiac nurse. There were 5-6 patients in each session.

The program also covered the topics of medication knowledge, nutritional counselling, disease prevention, relaxation skills and community resources by pharmacist, dietitian, cardiac nurse and medical social worker respectively. Education on individual risk factor control was given throughout the 8 sessions. Medical review by cardiologist was arranged in the 4th session and 8th session to check the progress of rehabilitation and to provide additional

medical intervention if needed. A patient support group was set up to promote self-management in the long run.

Primary outcome measures were treadmill graded exercise test (GXT), 6-minute walk test (6 MWT) and SF-36. Paired t-test was used to compare pre-training and post-training results. The study period was from 8 January 2018 to 3 July 2018.

**Results:** 40 patients (age=62.9±9.15; 33 males and 7 females) completed the course. The attendance of the program is 86.68%. Significant improvements (all p values <0.005) were observed in all domains of SF-36 especially the physical functioning, role physical and general health domains. There were also significant improvements in cardiorespiratory fitness after CR as reflected in GXT and 6 MWT. The means of 6MWT and GXT are as follows:

	Pre-training (Mean±SD)	Post-training (Mean±SD)		Mean difference (Mean±SD)	95% confidence interval
6MWT (m)	433.7±68.0	487.7±92.8	p=4.64x10 <sup>-9</sup>	54±45.6	39.4 - 68.5
GXT (MET)	7.2±2.6	9.2±2.7	p=6.98x10 <sup>-12</sup>	1.9±1.2	1.5 - 2.3
N=40					

**Conclusion:** The results showed that this multidisciplinary Cardiac Rehabilitation Program significantly improved patients' cardiorespiratory fitness and subjective health related QoL.

**A31.**

**Do Patients with Implantable Cardioverter Defibrillator Who Have Never Experienced any ICD Shock Feel Better Than Those Who Have?**

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Patients with implantable cardioverter defibrillators (ICD) are exposed to psychophysical disorders.

**Study aim:** To compare levels of fear, stress and depression as well as physical activity levels in ICD patients who have or have not experienced ICD shock.

**Study group and methods:** The study included 94 patients aged 25-91 (mean age 64 years) after ICD implantation. The study participants were divided into two groups: S – patients who had experienced at least 1 ICD shock (50 persons), and NS – patients who had never experienced any ICD shocks (44 persons). The groups did not differ in terms of demographic and clinical characteristics. Physical activity levels were assessed with IPAQ, quality of life was evaluated using NHP, depression levels were assessed with the use of Beck Depression Inventory, while PSS-10 scale and the analogue scale were employed to evaluate stress and fear, respectively.

**Results:** Patients from group S were afraid of experiencing ICD shocks significantly more often than their counterparts from group NS (74% vs. 40.9% p=0.0012). Their levels of fear were also significantly higher compared to group NS (6 vs. 0 p=0.004). Study participants from group S limited their physical activity considerably more often due to their fear of ICD shocks (65.2% vs. 42.5% p=0.0284). No differences were found in depression and stress levels in the examined groups. It was noted that patients from group

NS manifested significantly higher levels of moderate physical activity (p=0.0007) and all-week physical activity (p=0.0326). As far as physical abilities are concerned, patients from group NS displayed fewer limitations than their peers from group S (p=0.0323).

**Conclusions:**

1. Experience of ICD shocks causes fear of future shocks and increases fear levels considerably.
2. Previously experienced ICD shocks do not exert any influence on the levels of stress and depression.
3. ICD shock results in limiting all-week physical activity.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A32.

##### **Analysis of the Effects of Implementing Balance Exercises in Cardiac Rehabilitation in Elderly Patients-Pilot Study**

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**Introduction:** In Poland population ageing can be noted. In senior citizens, another goal of rehabilitation (not linked with a disease) is to improve balance levels and to reduce the risk of falls.

**Aim:** The study sought to analyse the effects of exercises aimed at improving postural stability and gait on balance in elderly patients after myocardial infarction (MI) who participated in post-hospital cardiac rehabilitation.

**Material and methods:** The study included 32 patients aged 75-87 after MI. The patients were divided into 3 groups: C-control group (16 pts) not subjected to any rehabilitation procedures, CE-the group subjected to endurance training (9 pts), CB-the group that underwent endurance training and balance exercises (7 pts). Training sessions took place twice a week over a period of 3 months. Balance was assessed using the following tests: Romberg's, Babinski-Weill, Unterberger, Barany's and Timed Up&Go. In each group, the tests were carried out four times: on entering the examination procedure as well as after 3, 6 and 12 months.

**Results:** In the C group balance test results in examinations 1 and 2 did not differ significantly. Between examinations 1 and 3, results deteriorated in the Barany's test ( $p=0.0455$ ). Compared to examination 1, scores obtained in the Babinski-Weill test worsened significantly in examination 4 ( $p=0.0143$ ). In the CE group balance test results did not differ significantly across all the examinations. The CB group exhibited significantly better results in examination 2 than in examination 1 in the Babinski-Weill test ( $p=0.0210$ ) and the Timed Up and Go test ( $p=0.0465$ ). Results obtained in examinations 3 and 4 did not differ compared to examination 1.

**Conclusions:** (1) Balance exercises led to an improvement in stability and gait velocity in the examined group. (2) In order to produce a constant improvement in balance levels and a reduction in the risk of falls, it is necessary to perform exercises on a regular basis. (3) Taking up physical activity in the form of endurance training enables patients aged 75+ to keep constant balance levels. (4) Avoiding physical activity may lead to a deterioration in balance levels in elderly persons.

#### A33.

##### **Short-term Results on Changes in Echo Intensity and Muscle Thickness of Rectus Femoris After the Introduction of Cardiac Rehabilitation**

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**Objectives:** Muscle ultrasound is a feasible and reproducible method that is widely used as a non-invasive imaging technique for the examination of both muscle quality (echo intensity, EI) and quantity (muscle thickness, MT). In contrast, the short-term effects due to the introduction of cardiac rehabilitation (CR) on EI and MT of skeletal muscle are still in question. The purpose of this study is to investigate this issue in patients with heart disease.

**Methods:** Fifty-one patients with heart disease (men 33, mean age 76 years) were enrolled in this study. Both aerobic exercise and low-intensity resistance training as CR were performed for approximately one month. Weight bearing index (WBI), muscle mass (BIA method), six-minute walk distance (6 MWD), walking speed, short physical performance battery (SPPB), barthel index (BI) as well as EI and MT of rectus femoris (RF) using ultrasound were evaluated before and after the introduction of CR. All patients were divided into the sarcopenia group (SP,  $n=20$ ) and the non-sarcopenia group (non-SP,  $n=31$ ) according to the AWGS criteria.

**Results:** In all patients, both EI and MT of RF revealed significant relationship with many indices such as body weight, muscle volume, WBI, SPPB and BI, but not with 6MWD. SP demonstrated significant decrease of muscle volume, WBI, walking speed, BI and SPPB before CR. These indices were significantly improved after the introduction of CR for one month in both groups. MT of SP also increased after CR. However, MT of non-SP and EI of both groups did not show significant change after the introduction of CR.

**Conclusion:** EI and MT of RF are thought to be useful non-invasive indices when evaluating physical performance in patients with heart disease. However, one month CR did not reach beneficial effects on changes in EI and MT of RF despite significant improvements of most indices of physical performance. Further investigation such as nutritional intervention or altered exercise program, i.e. introduction of interval training or changes of exercise loading etc., should be addressed as a subject of future investigation.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A34.

##### **Functional Genetics of Non-Coding Risk Variant in Vascular Dysfunction**

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Cardiovascular disease is the number one cause of mortality worldwide. Genome wide association studies (GWAS) identify non-coding variants in the susceptibility locus 6p24 for coronary artery disease. However, the difficulty of elucidating genetic aetiology of non-coding variants has often impeded clinical application of GWAS findings. Our goal is to interrogate the influence of such risk variants on vascular endothelial health. Firstly, we derived induced pluripotent stem cells (iPSCs) from coronary artery disease patients (with risk genotypes) and normal individuals (with non-risk genotypes). CRISPR/Cas9-based gene editing was employed to introduce the risk alleles in the normal iPSCs. Then, to elucidate how chromatin landscape is perturbed by the risk genotype, we performed chromatin conformation capture assay. Our finding revealed that some non-coding variants could be distal regulators of key genes implicated in atherosclerosis through long range chromatin interactions. In establishing the genotype-to-phenotype link between risk locus 6p24 and endothelial health, we were able to model functional differences in the iPSC-endothelial cells carrying risk versus non-risk genotypes. Taken together, our work provides the molecular basis of non-coding risk variants, holding promise for improving disease management guided by personal genetic risk profile. This would have broad relevance for investigating the functional genetics of other non-coding variants.

#### A36.

##### **The Exploration of Planned Extubation of Cardiovascular Surgery Patients in a Southern Taiwan Hospital**

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**Objectives:** The aim of this study was focused on the exploration of planned extubation for the cardiovascular surgery patients.

**Methods:** This retrospective observational study was in a medical center in southern Taiwan. All patients admitted to the intensive care unit (ICU) were enrolled between 01 January 2016 and 31 December 2016. Those who were received operation and planned extubation included in this study. Successful extubation was defined as no re-intubation over 72 hours after extubation. Statistical analyses were conducted using the SPSS software package (version 18.0). The results are expressed as mean standard deviation (SD) for continuous variables and frequency (%) for categorical variables. The data was analyzed using the chi-square test and Student's *t*-test. For all tests, a *p* value of less than 0.05 was considered statistically significant.

#### A35.

##### **The Role of Neuromuscular Electrical Stimulation in Regulation of serum IL-6 and IL-15 in Chronic Heart Failure Patient**

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**Background:** Majority of chronic heart failure patient became intolerance of physical training that could limit activity. NMES application could increase muscle mass, oxidative enzyme, endothelial function, VO<sub>2</sub> peak and quality of life on chronic heart failure patient. It was hypothesized that NMES assisted muscle contraction on chronic heart failure patient will increase the activity of myokine (IL-6 and IL-15), that in turn will promote exercise tolerance in this patient.

**Objective:** To reveal the effect of NMES added to standard cardiac rehabilitation protocol for inpatient chronic heart failure patient.

**Methods:** It was pretest- posttest control group design study on 30 chronic heart failure patients in cardiology ward that fulfilled inclusion criteria were randomized in two groups; control (standard cardiac rehabilitation protocol) and intervention (standard cardiac rehabilitation protocol and NMES) groups. The intervention was done every day for seven days. Measurement of serum IL-6 and IL-15 were done before and after study, analyzed by sandwich immunoassay with antibody monoclonal.

**Result:** There was no significant change in sIL-6 concentration in both control (*p*=0.65) and intervention (*p*=0.16) groups. There was significant change in sIL-15 on intervention group (*p*=0.004) but was not in control group (*p*=0.13).

**Conclusion:** There was effect of NMES addition on cardiac rehabilitation standard protocol for inpatient chronic heart failure patient on sIL-15 concentration, but no change on sIL-6 concentration.

**Results:** No eligible patients required exclusion from this study. A total of 206 patients were enrolled during the study period with a mean age of 62.3±13.6 years (range, 24 to 92) who was assigned into successful extubation group within 72 hours and failed extubation group within 72 hours, and then the successful extubation ratio was 96.1%. The hospital survival rate was 95.6% of these patients, (9 over 197 cases). Compared with the survival groups, the death group was apparently higher APACHE II (17.8 vs. 11.3, *p*=0.019) and lower rate of the 72 hours successfully planned extubation (66.7% vs. 97.5%, *p*<0.0001). Lower rate of the transferred to respiratory care center (RCC) (3.6% vs. 22.2%, *p*=0.007) were found in the hospital death patients. Moreover, prolonged ICU (12.7 vs. 3.6 days) and hospital stays (39.7 vs. 16.8 days) with higher costs of medical care (105.7 vs. 43.7) (thousands in New Taiwan Dollars) in the hospital death patients were also found in this study.

**Conclusion:** The higher APACHE II level revealed an important predictive factor of hospital deaths for CVS patients. The hospital death patients exhibited a prolonged ICU and hospital stays with higher costs of medical care.

## ABSTRACTS

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Abstracts Presentation (Poster):

### A37.

#### **Patient Outcome and Satisfaction of the Tung Wah Hospital Cardiac Rehabilitation Program**

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Tung Wah Hospital, Hong Kong

**Objectives:** To identify patient outcome and satisfaction after completion of the Tung Wah Hospital Cardiac Rehabilitation Program.

**Methods:** 228 patients have completed the Cardiac Rehabilitation Program in 2016 and 2017. Data was taken during Phase 1, 2, 3 & 4 of the cardiac rehabilitation program by treadmill test, blood test and self-reported data.

**Results:** Patients have better exercise capacity as they can walk from 429 to 471 meters in the six-minute walk test when compared to the baseline. There is significant improvement in exercise capacity of patients as reflected by an increase from 6.1 to 8.6 METS in stress test. The improving trend did not diminish in Phase 4. Patients have lowered total cholesterol (from 4.39 to 3.4 mmol/L) and LDL level (from 2.64 to 1.70 mmol/L). Patients with AMI have better blood glucose control in terms of a decrease in fasting blood sugar (from 6.93 to 6.09 mmol/L) and HbA1c level (from 7.07% to 6.17%). On enrollment, 33% of our patients are smokers. At the end of Phase 2, 74% of the smokers ceased smoking while 20% of the smokers reduced smoking by more than 50% and only 6% of them continue to smoke. The smoking cessation rate remains around 70% at the end of Phase 4. In 2 years' time, 11 patients received early intervention which include PCI, CABG and ICD implantation due to early detection by symptom, positive treadmill and positive perfusion scan result. Over 90% of patients rated 7 or above out of 10 marks for their self-confidence to achieve healthier lifestyle. Over 70% of patients are very satisfied with our service and they give us full marks.

**Conclusion:** On completion of the cardiac rehabilitation, patients have better exercise capacity. Risk factors of cardiac disease which include hyperlipidemia, diabetes mellulitis and smoking were under better control. Patients received early intervention due to early detection in the program. Patients were very satisfied with the service as a whole.

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### A40.

#### **Drop Foot Post Mitral Valve Replacement and Total correction of Tetralogy of Fallot (Two Case Report)**

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**Objective:** Peripheral nerve lesion after heart surgery was report on Brachial Plexus, Phrenic Nerve, Laryngeal Recurrent Nerve Facial Nerve, Lumbosacral root and spinal cord. Incidence of Peroneal Communis Nerve Lesion after heart surgery not much reported (0, 19%). Diagnostic procedure of peripheral nerve lesion included clinical sign and symptom; electrophysiology studies and MRI. Rehabilitation management of peripheral nerve lesion included management of pain and nerve stimulation also walking aid beside cardiac rehabilitation due to cardiac problem.

**Methods:** Reporting two case of peripheral nerve lesion after heart surgery. First case is female, 37 years old suffered from drop foot two days after mitral valve replacement with mechanic valve. She got pain management, electrical nerve stimulation and therapeutic exercise beside cardiac rehabilitation program. Second case is female, 9 years old, after total correction of Tetralogy of Fallot, got drop foot at days two. She also got pain management, electrical nerve stimulation and therapeutic exercise beside cardiac rehabilitation.

**Results:** First case result was the drop foot getting better after she entered phase two of cardiac rehabilitation and the second case, the drop foot was relieved at phase two cardiac rehabilitation and back to normal condition after one year after surgery.

**Conclusion:** There was report of two case of drop foot after heart surgery and after got pain and rehabilitation management beside cardiac rehabilitation, the drop foot was relieved.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A41.

##### Phase I Cardiac Rehabilitation in Atrial Myxoma Patients: Case Series

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**Objective:** Myxomas are a rare case and the most common primary heart tumors. Based on data of autopsy series in United States, the prevalence of primary cardiac tumors is approximately 0.02%. The most common symptoms are associated with obstruction due to the size and location of the tumor. Other symptoms are associated with embolization. Phase I cardiac rehabilitation is an important program to restore the optimal condition of the patients and improve quality of life.

**Methods:** The authors reported three patients with atrial myxomas. Rehabilitation program for each patient were conducted based on patient's condition. Two patients were male and one patient was female. First patient was male, 56 years old with chief complain dyspnoea. Second patient was male, 42 years old, beside dyspnoea he also had history of lung tuberculosis. And the third patient was female 65 years old with chief complain dyspnoea and palpitation. Rehabilitation programs before surgery consists of patient education, breathing exercise, coughing exercise for secret removal after extubating. Rehabilitation programs after surgery were breathing exercise, chest physical therapy and early mobilization. Monitoring for clinical signs and symptoms before, during, and after exercise.

**Result:** There were function improvement for chest expansion, count test and incentive spirometry during hospitalization. At the end of phase I cardiac rehabilitation program, all patients can achieve independent ambulation without cardiac symptom. All patients still need outpatient rehabilitation programs to increase endurance for achieving better functional activity and quality of life.

**Conclusion:** Phase I cardiac rehabilitation is a comprehensive management and an important part to optimized patient with atrial myxoma

#### A42.

##### Effect of Nordic Walking at Different Walking Speeds and Slope

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**Objective:** The purpose of this study was to characterize responses in oxygen uptake ( $VO_2$ ), minute ventilation (VE), heart rate (HR), systolic blood pressure (SBP), surface electromyography (sEMG) of upper and lower limb and back muscle during incremental Nordic walking (NW) and regular walking (W) at different walking speeds and treadmill grade.

**Methods:** Fifty healthy young men (aged  $23.7 \pm 3.0$  years) were participated in this study. The sequence of two walking conditions (NW and W) was randomized. The subjects walked on a treadmill at incremental walking speed and grade: stage 1, 3 km/hr, 0%; stage 2, 4 km/hr, 0%; stage 3, 5 km/hr, 0%; stage 4, 5 km/hr, 1%; stage 5, 5 km/hr, 3%; stage 6, 5 km/hr, 5%; stage 7, 5 km/hr, 7%. The sEMG signals of the deltoid (DEL), biceps brachii (BB), triceps brachii (TB), vastus lateralis (VL), gastrocnemius (GCM), tibialis anterior (TA), and L3 paraspinal muscles (L3) in their right body were recorded. Two-way analysis of variance ANOVA was used to analyze walking test stage and walking with or without Nordic poles.

**Results:** The  $VO_2$ , VE, HR, and SBP were significantly higher during NW than during W with %change 14.4, 15.5, 8.3, and 7.4, respectively. NW resulted in increased upper limb muscle activity including DEL, BB, and TB ( $P < 0.05$ ). In the lower limb, sEMG activity of VL was decreased in NW than W ( $P < 0.05$ ), and the activities of GCM, TA, and L3 were not significantly different. Increasing walking speed and treadmill grade resulted in increased  $VO_2$ , VE, HR, and SBP. The activity of TA muscle increased with increasing walking speed. The activity of GCM muscle increased with increasing treadmill grade. The activities of DEL, BB, TB, VL and L3 were not significantly changed with walking test stage.

**Conclusion:** Nordic walking showed higher work intensity than regular walking. Nordic walking involved more muscles of upper body and attenuated muscle activity in the vastus lateralis. The activities of TA and GCM were not changed by the use of poles but changed by walking speed or treadmill grade.

## ABSTRACTS

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### Abstracts Presentation (Poster):

#### A43.

##### **Cardiac Rehabilitation and Psychological Counselling for Patients with Anxiety and Depression after Cardiac Surgery**

A NAZIR,<sup>1,2</sup> MA MOELIONO<sup>1,2</sup>

<sup>1</sup>Faculty of Medicine Padjadjaran University; <sup>2</sup>Dr. Hasan Sadikin General Hospital, Bandung, Indonesia

**Objectives:** To evaluate the effect of adding psychological counselling to cardiac rehabilitation program on anxiety and depression in patients after cardiac surgery.

**Methods:** Three patients underwent cardiac surgery with thoracotomy procedure. All three had complaints of pain, fatigue, sleep disorder, and disturbance of daily activities due to fear of activity. One patient also abstained from sexual activity due to fear of activity. All three patients were given regular phase II cardiac rehabilitation program, consisting of aerobic at low to moderate intensity, and flexibility exercises. To this program was added relaxation exercise 3 times per week, and psychological counselling for patients and their families every 2 weeks. Main goal of psychological counselling was to motivate the patients to increase their independence and to dismiss their fear. Pain was assessed by Numerical Rating Scale (NRS). Fatigue was assessed by modified Borg Scale. Six-minute walking distance (6-MWD) was measured to evaluate level of functional capacity. Fear of activity was assessed by modified Fear-Avoidance Beliefs Questionnaire (m-FABQ), and Instrumental Activity Daily Living (IADL) was measured by Lawton and Brody's Questionnaire. Anxiety and depression were assessed by Depression, Anxiety and Stress Scale (DASS). Evaluation was done at the end of second and sixth week.

**Results:** After 2 weeks, NRS decreased (mean 4.67 to 2.33), fatigue score decreased (mean 15.33 to 13.67), sleep quantity increased (mean 296.67 minutes to 330 minutes), IADL score decreased (mean 20.33 to 17.33), and 6-MWD increased (mean 238 meters to 315.33 meters). There was no change in m-FABQ and DASS scores. After 6 weeks, there were no complaints of pain and fatigue in all patients. There was improvement of 6-MWD (mean 315.33 meters to 397.33 meters), sleep quantity (mean 330 minutes to 390.33 minutes), m-FABQ score (mean 17.33 to 13.33 for physical activity, and mean 34.67 to 25.67 for work), and DASS score (mean 9 to 7.33 for anxiety, and mean 15 to 11 for depression).

**Conclusion:** Addition of psychological counselling to regular phase II cardiac rehabilitation program resulted in a reduction of anxiety and depression in patient after cardiac surgery.

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#### A44.

##### **Cardiac Rehabilitation of Transposition of Great Artery (Case Report)**

A ANDRIATI, M ZULFIA

Physical Medicine and Rehabilitation Department of Universitas Airlangga Dr Soetomo General Hospital, Surabaya, Indonesia

**Objective:** Survival of transposition of Great artery post Ballon arterial Sistolomy (BAS) is very limited reported and rehabilitation after surgery needed tailor made for every patient.

**Method:** The case report of baby boy, 30 days old with BAS procedure due to Transposition of great arteries, which survive and could prevent from respiratory complication after surgery.

**Result:** The patient could survive and the condition was better than before surgery.

**Conclusion:** Rehabilitation phase I which followed surgery (preparation before surgery and program after surgery) could prevent respiratory complication after surgery.

**ABSTRACTS**

Abstracts Presentation (Poster):

**A45.**

**Utilizing Specific Activity Scale as Outcome Measure in Cardiac Rehabilitation Program**

WS CHAN,<sup>1</sup> TC LUI,<sup>1</sup> SF YAU,<sup>1</sup> CK WONG,<sup>1</sup> TK KWOK,<sup>1</sup> HF TSE<sup>2</sup>  
<sup>1</sup>Tung Wah Hospital; <sup>2</sup>Queen Mary Hospital, Hong Kong

**Objective:** To investigate Specific Activity Scale (SAS) serving as an outcome measure for Cardiac Rehabilitation Program.

**Method:** SAS is an activity-based scale developed by Lee Goldman in 1981. This scale classifies cardiac patients into four functional classes. Class 1 indicates the highest functional level and Class 4 being the lowest. Each class represents different range in metabolic equivalents (METs) of daily activities. Conducting a 10-minute interview in the actual performance of selected daily living tasks, the functional capacity of cardiac patient can be evaluated. SAS is administrated before the entry (Phase I) and exit (Phase II) of the program. The duration is 8 weeks, 16 sessions in total.

**Result:** From January 2016 to December 2017, 224 cardiac day patients are recruited. The average age is 60.34 years old. One hundred and eighty-seven (83.48%) are male and 37(16.52%) are female. The results are tabulated as follows:

**Table 1.**

Specific Activity Scale	No. of participant in Phase I	No. of participant in Phase II
Class 1	16 (7.14%)	56 (25%)
Class 2	167 (74.55%)	157 (70.09%)
Class 3	40 (17.86%)	11 (4.91%)
Class 4	1 (0.45%)	0 (0%)

**A46.**

**Cardiac Rehabilitation Program for End-stage Heart Failure Patients with Left Ventricular Assist Devices in Hong Kong**

TY FU,<sup>1</sup> KY Y FAN,<sup>2</sup> KL WONG,<sup>2</sup> R FUNG,<sup>2</sup> YC FOK,<sup>2</sup> KY CHENG,<sup>2</sup> J LI,<sup>1</sup> D CHAN,<sup>1</sup> YT WONG,<sup>2</sup> MY LEE,<sup>2</sup> SL LEE,<sup>3</sup> CKL HO,<sup>3</sup> TWK AU<sup>3</sup>

<sup>1</sup>Physiotherapy Department, Grantham Hospital; <sup>2</sup>Cardiac Rehabilitation Center, Cardiac Medical Unit, Grantham Hospital; <sup>3</sup>Cardiothoracic Surgical Department, Queen Mary Hospital, Hong Kong

**Background:** Implantation of modern durable left ventricular assist device (LVAD) in advanced heart failure (HF) patients is associated with increased survival and improved quality of life. Exercise-based cardiac rehabilitation (EBCR) has been demonstrated to improve exercise capacity in HF patients but data on effect of EBCR in advanced HF patients with LVAD are limited.

**Objectives:** To evaluate the effect of EBCR program on the functional capacity of advanced heart failure patients with LVAD.

**Methods:** Out of the current 64 LVAD recipients in Hong Kong, 43 patients who have had LVAD implanted and survived 1 year were screened. The EBCRP consisted of cardiorespiratory and strength training exercise once a week for a total of 24 sessions (6 months). The functional rehabilitation outcome was evaluated by 6 minute walk test (6MWT) at baseline, before LVAD implantation, pre-EBCR and by end of EBCR (6 months). The muscle strength was evaluated by an isokinetic knee extension strength test defined by 10 repetitive maximum (RM) torque of quadriceps strength before starting EBCR and at 6 months upon termination of EBCR.

**Table 2.**

Specific Activity Scale	No. of participant in Phase I	Average METs in Phase I	Average METs in Phase II	Percentage change in METs
Class 1	16 (7.14%)	9.49	11.36	+19.71%
Class 2	167 (74.55%)	6.09	8.68	+42.53%
Class 3	40 (17.86%)	4.37	6.60	+51.03%
Class 4	1 (0.45%)	2.60	6.30	+142.31%

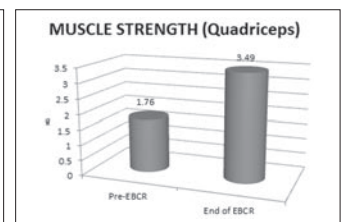
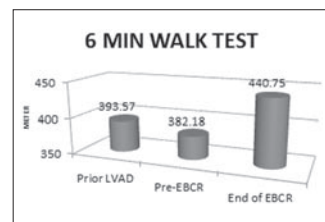
**Table 3.**

METS (Stress Test)	Phase I	Phase II	Percentage change
Mean of METS	6.01	8.49	+41.27%

**Conclusion:** Participants demonstrate upshift in functional class shown as an increase percentage of Class 1 after Phase II (Table 1). Concurrent improvement is shown in METs in each functional class (Table 2) and in overall participants (Table 3). In conclusion, Specific Activity Scale can serve as an outcome measure for cardiac rehabilitation.

**Results:** A total of 33 LVAD patients were recruited into our EBCR program. The mean age was 48.7±13.6 years, in which 27 (82%) of them were male. Average duration from LVAD surgery to commencement of EBCR was 5.3 months. Baseline 6MWT could not be performed in 21 patients due to extreme poor functional class (NYHA class IV) with prolonged hospitalizations requiring inotropes and circulatory support. For the other 12 patients, there were no significant differences in 6 MWT at baseline and post LVAD before starting EBCP. Overall 6MWT significantly improved by end of EBCR (pre-EBCR mean 382.2, ±95.2 m vs post -EBCR mean 440.8±88.2 m p=0.001). There was significant improvement in quadriceps strength by the end of EBCRP program. (pre- CRP 1.8±2.5 kg vs post CRP 3.5±3.5 kg p<0.001).

**Conclusions:** LVAD patients show high level of impairment of functional capacity despite after LVAD implantation with improved circulatory output. EBCR program allowed greater improvement in exercise capacity evolution and peripheral physiology such as muscle strengthening.





## ABSTRACTS

### Abstracts Presentation (Poster):

#### A47.

##### **The Effects of Cardiac Rehabilitation on Heart Rate Recovery in Patients who underwent Coronary Artery Bypass Grafting and Percutaneous Coronary Intervention**

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<sup>1</sup>Chong Hua Hospital, Cebu City; <sup>2</sup>The Medical City, Pasig City, Philippines

**Background:** Dysfunction of the autonomic nervous system appears to be implicated in the pathophysiology of coronary artery disease (CAD) and it was shown that it can be modified by exercise training. Heart rate recovery is a strong predictor of mortality in CAD patients and independent of exercise capacity, left ventricular function, angiographic severity of CAD and changes in heart rate during exercise.

##### **Objectives:**

1. To determine the demographic profile of coronary artery disease patients enrolled in cardiac rehabilitation such as age, sex, risk factors and medications.
2. To determine the resting heart rate, peak heart rate and heart rate recovery during pre and post cardiac rehabilitation treadmill stress test.

**Methods:** A retrospective, cross sectional chart review study design conducted at The Medical City, NCR, Philippines for a period of three years. The patients were categorized as those who received CABG and those who underwent PCI. The demographic profile of the patient was taken. Heart rate response (HRR) was defined as the decrease in the heart rate from end of peak exercise to the first minute of the recovery and cool down period (peak heart rate subtracted by 1 minute post exercise heart rate).

**Results:** There was a significant difference in the mean baseline resting systolic blood pressure (115.00 vs 108.46,  $p=0.039$ ) between two groups. CABG group has a lower baseline peak HR (121.68 vs 137.42,  $p=0.001$ ), 1-minute baseline (111.29 vs 121.96,  $p=0.008$ ). HRR (10.03 vs 15.46,  $p=0.006$  in comparison with PCI group. There was no significant difference in patient's cardiovascular parameters in the post cardiac rehabilitation across the two groups. After six weeks of cardiac rehabilitation, both groups showed significant improvement in peak heart rate 121.68 to 130.71 ( $p=0.004$ ) and 137.42 to 143.42 ( $p=0.018$ ) respectively. However only the CABG group showed an improvement in HRR from 10.03 to 15.29 ( $p=0.001$ ).

**Conclusion:** In The Medical City, patients who had acute coronary syndrome, underwent coronary artery bypass grafting showed that cardiac rehabilitation significantly improved the heart rate response of the patient. The peak heart rate was also significantly improved in both CABG and PCI group.

#### A49.

##### **The Efficacy of Institute Jantung Negara's (IJN) cardiac Rehabilitation Phase II (CRP II) Program on Quality of Life (QoL) in Adult**

MY HISHAM, A AHMAD

National Heart Institute KL, Kuala Lumpur, Malaysia

**Objective:** In IJN, the Cardiac Rehabilitation Program phase II (CRP II) takes place in the outpatient setting. In general, IJN CRP II consists of a set of closely supervised exercises prescribed by the physiotherapist or exercise physiologist.

**Methods:** This research is based on observational and non-experimental prospective time series at base line and 8 weeks. The sessions were conducted twice a week and patients need to complete 8 sessions equivalent to 4 weeks in order to complete the program. The survey used in this study is Short Form 36 Health survey (SF-36). Total respondents in this study are 12 participants. Data were compared between pre and post using paired T test and correlation test.

**Results:** The result shows the surveyed patients were satisfied with their self-physical and energy level which carry a value of  $p>0.05$ . Total number of questions that significant were 23. Respondents were dissatisfied with their material health and social state which carry a value of  $p>0.05$  (13 questions not significant). The most significant question  $P<0.002$  which is pair 30 which show the effectiveness on psychological and emotional. Thirty-one over 36 questions are significant. 86% overall therefore it carries more than 50%. Overall improvement compared to baseline and this shows that this study is significant poor in basic health component and highly supported in physical and emotional component.

**Conclusion:** This study showed that QOL is significantly improved with IJN's CRP II program. As a conclusion this program does promote better quality of life.

## ABSTRACTS

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Abstracts Presentation (Poster):

### A50.

#### **Six Minutes Walking Test Distance Improvement after 8 Sessions Structured Cardiac Rehab Program Phase II IJN. Is It a Useful Indicator?**

A AHMAD, JWP YEE

National Heart Institute KL, Kuala Lumpur, Malaysia

**Objective:** To ascertain whether or not baseline six minute walking test can predict improvement in fitness level through changes in six minute walking test distance after 8 session of CRPII.

**Background:** A study was conducted to evaluate 8 sessions of structured exercise program with 6 minutes walking test distance pre and post. This study is important to ascertain the improvement of fitness level post Phase II cardiac rehabilitation program and to see what type of patients (from a fitness point of view) benefited most from participation in this program.

**Methods:** Data from pre- assessment includes; Physical assessment, current cardiac status, lifestyle assessment, agreed goals and 6- minute walking test (6-MWT). The 6-MWT was used in the program for both pre and post Phase II CRP. During the program, the Maximum Heart Rate method was set a maximum of  $\leq 80\%$ . The results of the 6- MWT were converted to estimate MET's for analysis. Patients completed exercise program for 8 sessions (2x per week in the hospital & home exercise daily) Post cardiac rehabilitation program phase II, re test 6 minutes walking test. Sample = 36 patients (31 males & 5 females) who completed Phase II of the cardiac rehabilitation program. All patients were randomized selected from CRP database.

**Results:** 6 Minutes Walking Distance pre & post program and Rate Perceived exertion Scale (RPE) Average age was  $57.89 \pm 9.88$  years. Pre assessment 6-MWT =  $424.38 \pm 75.52$  meter & mean RPE was 13. Post assessment 6-MWT =  $483.89 \pm 64.11$  meter & mean RPE was 10. All patients for this study are still classified as sedentary (MET's  $\geq 10$  ACSM 2001). Patients age group 46-60 years old showed greater improvement in the 6-MWT distance (13, 36%) followed by patients Age group = 60 years old (7, 19%) and 30-45 years old age group (3, 8%). Post CRP II, 23 (63.9%) patients showed a significant improvement after completing this program.

**Conclusion:** Distance from 6 minutes walking test increased significantly as a consequence of 8 sessions Phase II cardiac rehabilitation program with greater changes occurring in all age group of patients.

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### A51.

#### **Outpatients Cardiac Rehabilitation Programs: Analyzed Population Factors is Associated with Non-Enrollment in IJN Kuala Lumpur, Malaysia**

A AHMAD

National Heart Institute KL, Kuala Lumpur, Malaysia

**Objective:** Cardiac rehabilitation (CR) is very effective for secondary prevention of cardiovascular disorders. The objective of this study was to analyze population factors associated with non-enrollment of cardiac patients in these programs.

**Introduction:** In IJN Cardiac Rehabilitation is still underutilized despite well documented benefits for patients with CHD.

**Methods:** Retrospective study of 466 patients referred to the cardiac rehabilitation program (CRP) from January 2015 to May 2018. We assessed the relationship between population characteristics of these patients and no enrollment by logistic regression analysis.

**Results:** There were 37370 hospital admissions for Cardiology and Cardiothoracic intervention during the study period. Out of the 36410 patients who were alive at discharge, 466 (1.27%) (421 men and 45 women) were referred for Cardiac Rehabilitation. 35,944 of patients 98.7% were not referred. The referral rate was lower among women than among men ( $P < 0.001$ ). The characteristics associated with a lower rate of enrollment in the program were age group  $> 40$  group (437, 93.77%) 18-40 years old (29, 6.22%), living further than 50km from IJN KL (11, 2.36%) and, in women, having a history of cardiovascular disease (recurrent myocardial infarction) (15, 33%) not associated with enrollment.

**Conclusions:** The rate of referral for CR in our setting is still low, but can still be improved. We identified younger age, travel distance to IJN KL, and in women, a history of a previous myocardial infarction as barriers to enrollment in CRP.

## ABSTRACTS

Abstracts Presentation (Poster):

### A52.

#### **Functional Capacity of Heart Transplant Recipients Participating Exercise-based Cardiac Rehabilitation Program Compared to the Normal Persons – A 5-year Retrospective Study in Hong Kong** TY FU,<sup>1</sup> KY Y FAN,<sup>2</sup> KL WONG,<sup>2</sup> R FUNG,<sup>2</sup> YC FOK,<sup>2</sup> KY CHENG,<sup>2</sup> J LI,<sup>1</sup> D CHAN,<sup>1</sup> YT WONG,<sup>2</sup> MY LEE,<sup>2</sup> SL LAM,<sup>3</sup> CKL HO,<sup>3</sup> TWK AU<sup>3</sup>

<sup>1</sup>Physiotherapy Department, Grantham Hospital; <sup>2</sup>Cardiac Rehabilitation Center, Cardiac Medical Unit, Grantham Hospital; <sup>3</sup>Cardiothoracic Surgical Department, Queen Mary Hospital, Hong Kong

**Background:** Heart transplantation is viewed as the gold standard treatment for selected patients with end-stage heart disease. The exercise capacity was showed improvement at approximately two months post heart transplantation, however, the exercise function remains 30 to 40 percent below normal. The data of functional capacity of Exercise-based cardiac rehabilitation (EBCR) in Hong Kong is limited.

**Objectives:** To evaluate the functional capacity in cardiac transplant recipient participating EBCR in Hong Kong and comparison to the normal persons.

**Methods:** All the heart transplant patients would be recruited into the EBCR in the Grantham Hospital in Hong Kong within 90 days post transplantation. The EBCR consists of one session per week, 24 weeks program exercise training. Each session was about 1 hour and 30 minutes which consisted of warm up, mild to moderate intensity of cardio-respiratory and light weight resistance training and cool down.

This is a retrospective review of all patients requiring heart transplant from 2013 to 2017 (5 years) who participated in the EBCR. The exercise capacities were measured by submaximal stress test with treadmill in terms of MET (Metabolic Equivalents). The exercise capacities of the subjects after EBCR were compared to the normal persons.

**Results:** 31 subjects completed the EBCR. The overall survival rate at 1 year was 95.3%. The age of the subjects ranged from 21 to 64 with a mean of 50.4±10.3 years. Seventeen subjects were male (55%). The mean VO<sub>2</sub>max of the male subjects before and after the EBCR were 4.9±1.6 MET and 7.3±2.3 MET respectively (p=0.00).

Comparison of MET of the subjects with age-gender match means of normal persons. The overall exercise functions of the subjects were 94.4±33 %.

**Conclusion:** The functional capacity of the heart transplant recipients participating EBCR were shown significantly improved. The functional capacity of the heart transplant recipients could close to the normal persons after EBCR.

### A53.

#### **Improvement of Risk Factors Control and Patient Knowledge after Phase 1 Cardiac Rehabilitation Program**

MS YEUNG, YH CHAN, CW WONG, YH CHENG, CS LAM, TM CHENG, YTE LAW, SC CHAN, LS CHAU, CM MAK  
Pok Oi Hospital, Hong Kong

**Introduction:** Coronary artery disease (CAD) is one of the leading causes of mortality worldwide. Cardiac rehabilitation program (CRP) is constantly underutilized despite its well established benefits. A multi-disciplinary CRP Phase 1 of joint collaboration of Department of Anesthesia and Intensive Care, Department of Medicine and Geriatrics and Department of Physiotherapy, was implemented in Nov 2013 in CCU of Pok Oi Hospital.

**Objectives:**

1. Ensure evidence-based medication prescription
2. Risk factors control
3. Improve patient's knowledge on CAD
4. Provide early mobilization

**Methodology:** From November 2013 to March 2018, we recruited 427 CAD patients admitted to CCU after stabilization. Risk factors were identified by attending cardiologist on admission. Nurses then offered education program about CAD and risk factor control with relevant pamphlets. Patient's knowledge was assessed using a standardized pre- and post-questionnaire. Nurse would clarify misconception as shown on the post-questionnaire.

Selected patients underwent revascularization were referred to physiotherapist for early mobilization. Nurses would ensure evidence-based medication was properly prescribed. Blood test including fasting lipid, fasting glucose and HbA1c was evaluated during recruitment and follow-up at specialist out-patient clinic. Nurses would inform cardiology team physician if risk factor control was not optimal.

**Results:** 427 patients were recruited. Mean age was 60.5±11. Majority of patients (72.3%) were suffering from acute coronary syndrome (ACS). Majority of CAD patients (95.8%) had percutaneous coronary intervention (PCI) performed. Mean follow-up was 64 days. All blood results were improved significantly. Mean fasting glucose improved from 7.06 to 6.13 (p<0.001), total cholesterol improved from 4.34 to 3.51 (p<0.001), LDL were improved from 2.58 to 1.75 (p<0.001), HDL was raised from 1.09 to 1.15 (p<0.001), triglyceride improved from 1.58 to 1.41 (p<0.001) and HbA1c improved from 6.81 to 6.55 (p<0.001). Mean knowledge score of CAD improved after education program (12.16 to 13.9, Max 15; p<0.001). Prescription percentage of evidence-based medication including ACEI (from 53.9% to 72.6%; p<0.001), beta-blocker (from 51% to 64.6%; p<0.001) and statin (from 98.1% to 98.4%; p<0.001) was also significantly improved.

**Conclusion:** The multi-disciplinary in-patient CRP was effective in reducing risk factors, prescription percentage of evidence-based medication and enhanced patient's knowledge.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A55.

##### **Pilot Study: The Effects of the Brief Phase II Cardiac Rehabilitation Program on Health-related Quality of Life for Patients with Coronary Heart Disease**

YN TSOI, NY CHAN, H MAN, HY TANG, WC CHENG, WY LAW, WS CHAN, YW IP, WK WONG, HW CHOY

Cardiac Rehabilitation Team, M&G Department, Princess Margaret Hospital, Hong Kong

**Objectives:** Phase II Cardiac Rehabilitation Program (CRPII) in Princess Margaret Hospital (PMH) is a five-session multidisciplinary program. Education on disease management involving topics on diet, exercise, healthy lifestyle, medication and psychosocial wellbeing is provided by different professions followed by exercise supervised by physiotherapist. The program is designed to enhance secondary prevention and adoption of healthy lifestyle for patients after coronary events. Previous studies have mixed results for cardiac rehabilitation programs on quality of life (QOL) benefits but the findings could be related to the vast diversity of program structure and components. This study aims to examine the impact of the brief CRPII on QOL in patients with coronary heart disease (CHD).

**Methods:** Patients with CHD who had experienced recent coronary events were recruited from May to July 2018. Standardized and validated questionnaire, the Chinese version of Short Form 36 Health Status Survey (SF-36), was administered by the occupational therapists at the first session and the last session of the CRPII for evaluating the health related QOL scores of the participants. Paired t-test was used to compare the differences of the physical and psychological health domains.

**Results:** 12 participants (10 males and 2 females) with mean age of 62.8 years old (SD=8.16) were recruited into the study. All patients had undergone percutaneous coronary intervention. For SF-36, there was significant increase in physical functioning ( $p=0.012$ ) and the role-physical ( $p=0.039$ ) health domain scores. An improving trend was showed in other factors though not statistically significant. For instance, there was an increase in mean scores noted in bodily pain from 81 to 91, general health from 63 to 73, social functioning from 76 to 81 and role-emotional from 64 to 81 respectively. The vitality and the mental health scores remained similar before and after the study.

**Conclusion:** The preliminary results from the study suggest that the brief CRPII in PMH has potential to improve the health related QOL of patients with CHD. These results have given more insights on the design of program structure for service development in cardiac rehabilitation programs in our hospital.

#### A56.

##### **The Aerobic Capacity and Ventilatory Efficiency During Exercise of Bokken-taiso Exercise, Newly Developed Method for Aged Hypertensive Patients: A Pilot Study**

S ISHIIHARA,<sup>1</sup> N ENDOH,<sup>2</sup> J IWASAKA<sup>3</sup>

<sup>1</sup>Urbanity Wakamizu; <sup>2</sup>Keiwakai Clinic; <sup>3</sup>Kansai Medical University, Osaka, Japan

**Background:** The exercise therapy is one of the important therapies. However, difficulties do exist in the enrollment to or maintenance of the conventional exercise therapy for many of patients.

**Aim:** We evaluated the aerobic capacity and ventilatory efficiency of Bokken-taiso exercise (BTX), newly developed method based on Japanese traditional Kenjutsu (the training of samurai warriors in feudal Japan).

**Methods:** A male in his forties with Kendo (traditional Japanese style of fencing) experience participated in this study. Anaerobic threshold (AT) was calculated by cardiopulmonary exercise test (CPX) with cycle ergometer. Ventilatory gas analyses were performed during following four menus of BTX. Menu 1: Kirikaeshi (diagonal striking with forward and backward movements) Menu 2: Hirakiashi-kesagiri (diagonal striking with diagonal footwork) Menu 3: Fumikae-kirikaeshi (alternative movement of attacking and defense). Menu 4: Fumidome-kirikaeshi (alternative movement of defense and attacking)

**Results:** Load of menu 1 and menu 2 did not exceed AT. However, load of menu 3 and menu 4 exceeded AT.

**Conclusion:** There are multiple menus in BTX as persistent exercise menus at home. This study revealed the difference of character in these menus. Therefore, it was suggested that it is necessary to prescribe BTX in combination for each diseases or cases.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A58.

##### **Examination of the Effect on the Psychological Aspect of Bokken-taiso Exercise as Exercise Therapy in Elder Dementia Patients**

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<sup>1</sup>Kansai Medical University; <sup>2</sup>Keiwakai Clinic; <sup>3</sup>Urbanity Wakamizu, Osaka, Japan

**Background:** Recently, the effectiveness of exercise therapy has been shown for depressive mood in dementia patients.

**Aim:** We evaluated the effect on the psychological aspect of Bokken-taiso exercise (BTX), newly developed method based on Japanese traditional Kenjutsu (the training of samurai warriors in feudal Japan) for elder patients with dementia.

**Methods:** 20 elder patients with dementia were enrolled to this study.

Thirty minutes BTX program was provided to patients.

Wong-Baker six graded of facial scale of visual analogue scale, heart rate and blood pressure were examined before and after BTX.

**Results:** Significant reduction was found in systolic blood pressure.

- No significant changes were found in diastolic pressure and heart rate.
- No adverse event was found during and after the exercise.
- The results of the questionnaire were generally favorable.
- No significant difference was found in the score of the facial scale before and after BTX, except one case of worsening (grade 0 to grade 1).
- All patients scaled over grade 2 before BTX were scaled 0 or 1 grade after BTX.

**Conclusion:** In this study, BTX may be safe and also have psychological effective for elder dementia patients.

#### A59.

##### **The Validity and Agreement of Oxygen Uptake Efficiency Slope in Cardiac Surgery Patients**

LY KUO,<sup>1,2</sup> SL SHEN,<sup>2</sup> HY HUANG,<sup>2</sup> BY CHEN,<sup>2</sup> HY TSAI,<sup>2</sup> YS LIN<sup>1</sup>

<sup>1</sup>Department of Physical Therapy and Assistive Technology, Yang Ming University; <sup>2</sup>Heart Center, Cheng Hsin General Hospital, Taipei, Taiwan

**Objects:** The ventilatory efficiency derives from cardiopulmonary exercise test (CPET) has been proposed as a measure of the cardiorespiratory functional reserve and exercise capacity. We doubt that this index is not influenced by the exercise intensity and duration achieved in test for the frail cardiac patients. We aimed to investigate the validity and agreement of oxygen uptake efficiency slope (OUES) in evaluation of adult post-cardiac surgery patient.

**Methods:** We chose 136 subjects patients who underwent CABG and finished cardiopulmonary exercise test. The OUES was calculated from data for the first 50%, 75%, 90%, and 100% of exercise duration. We compared the correlation and agreement between 50%, 75%, 90% and 100% OUES by Bland-Altman (BA) analysis.

**Results:** OUES in entire exercise duration vs. 50%, 75% and 90% duration are  $1.39 \pm 0.40$  vs  $1.34 \pm 0.40$ ,  $1.40 \pm 0.41$  and  $1.40 \pm 0.40$ . Except OUES 50%, OUES 75% and 90% were non-significantly different from OUES entire. The correlation coefficient between OUES 50% ( $r=0.839$ ), OUES 75% ( $r=0.939$ ) or OUES 90% ( $r=0.973$ ) had a strong correlation with OUES entire. The OUES from more than first 75% exercise duration was more accurate with entire exercise test. Agreement between the OUES values for the first 75%, 90% and 100% of the exercise duration was excellent.

**Conclusions:** Our results suggest that submaximal OUES is an effort-independent variable to adult cardiac patients. At least 75% duration test is clinically useful to quantify the ventilatory efficiency and exercise capacity.

#### A60.

##### **The Outcomes of Patients with Congestive Cardiac Failure Who Required Inpatient Rehabilitation**

T CHAN

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**Introduction:** Rehabilitation of the patients with Congestive Cardiac Failure (CCF) involves the same multi or interdisciplinary approach but also endeavors to obtain the maximal cardiac function with minimal risk to the individual patient so that he or she can return to his or her previous role and daily livings. Increasingly, patients with CCF require inpatient rehabilitation. Those patients can experience high levels of dyspnea with exertion, chronic fatigue and high levels of depression and anxiety which may affect their rehabilitation outcomes and that it gives rise to this study.

**Methods:** This was a 4-year-retrospective study examining medical records of patients with CCF who were admitted to The Prince Charles Hospital (TPCH) Rehabilitation Unit from 1st January 2104 to 31st December 2017. It was to examine their outcomes by looking at their Length of Stay (LOS), their Functional Independent Measure (FIM) and the rate of complications occurred, discharge destination and mortality rate. Echocardiogram results will be obtained to look at Left Ventricular Ejection Fraction (LVEF) and Right Ventricular Systolic Pressure (RVSP) results and to assess the severity of patients' heart failure.

**Results:** 17 consecutive patients were found to have a primary diagnosis of CCF admitted to the rehabilitation unit during the 4-year-period. The average age was 78. M: F ratio was 8:9. The average LVEF and RVSP were 48.6% and 44.6% respectively. The average LOS was 27 days. The average discharge FIM score was 89.59 and the average FIM change was 7.58. The complication rate during their inpatient rehabilitation stay was 47%. Mortality rate was 11%. The number of patients required supported living (Nursing Home) on discharge was 4 (17%).

**Conclusion:** There was a significant longer length of stay in those patients with CCF compared to other similar cohorts. Despite their cardiac function was relatively reserved, they demonstrated poorer functional gains in their FIM score, and lower functional achievements on discharge. The mortality and morbidity rate during the inpatient rehabilitation were relatively high, so was the rate of discharge destination to a residential aged care facility. More studies would be required to investigate further their long term outcomes in the community.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### A61.

##### **Short-term Outcomes and Effects on Rehospitalization of Cardiac Rehabilitation to the Patients with Heart Failure and Cardiac Infarction**

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**Objectives:** To investigate characteristics and outcomes of the patients with heart failure (HF) and with myocardial infarction (MI), underwent cardiac rehabilitation in our hospital.

**Methods:** Consecutive 67 patients who started a comprehensive cardiac rehabilitation program in our hospital from January 2014 to May 2017 were retrospectively enrolled (observation period: 775.2±382.6 days). We examined 41 patients with HF and with MI separated by gender, and investigated about cardiac events (CE) of them. We defined CE as cardiac death and rehospitalization in order to cardiovascular diseases.

**Results:** In this study, the risk of CE was significantly higher in patients with diabetes mellitus (DM) (p=0.033), cardiac device (p=0.007), and implantable cardioverter defibrillation (p=0.006), and HDL cholesterol (p=0.012) was significantly lower in patients with CE than without CE. In male patients, the risk of CE was significantly higher in patients with DM (p=0.005), and HDL cholesterol (p=0.017) and grip strength (p=0.019) were significantly lower in patients with CE than without CE.

**Conclusion:** In comprehensive cardiac rehabilitation program to patients with HF and with MI, it is likely that intervention to improve low serum levels of HDL cholesterol and low muscle strength contributes to prevent cardiac events especially for male patients.

#### A62.

##### **Association of Body Mass and Body Composition with Exercise Intolerance in Heart Failure Patients with Cardiac Resynchronization Therapy**

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**Background:** There is an inverse relation between body mass and mortality in large populations of patients with heart failure (HF). Fat-free mass (FFM) is increasingly recognized as a systemic marker of HF and is an important target for physiologic and pharmacologic interventions to improve functional status. However, there are limited data about association of body composition and exercise capacity, the hallmark of HF, in patients with implanted cardiac devices like cardiac resynchronization therapy defibrillator (CRT-D).

**Aim:** The aim of this study was therefore to evaluate the correlation between exercise capacity against body mass and FFM measured by dual energy X-ray absorptiometry (DEXA) in patients with CRT-D.

**Methods:** Body composition and exercise tolerance were determined in 6 stable HF patients after CRT-D (four male, mean age 58.3±15.6 y.o.) Body composition was measured with DEXA. Skeletal muscle mass index (SMI) was calculated as appendicular skeletal muscle mass/height<sup>2</sup> from DEXA data. They also underwent a cardiopulmonary exercise test to measure peak oxygen uptake (peak VO<sub>2</sub>).

**Results:** There were positive correlations between peak VO<sub>2</sub>/weight with body weight, FFM and SMI. However, no significant correlation was found between peak VO<sub>2</sub>/weight with body fat mass.

**Conclusions:** To maintain FFM and SMI might be one of the important factors to prevent exercise capacity reduction.

#### A63.

##### **The Evaluation of Effects of Exercise Therapy on Quality-of-Life among Elder People with Lifestyle Related Disease**

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**Background:** Exercise therapy has been now widely used for prevention of cardiovascular disease or dementia among elder people in Japan. However, the effects of exercise to the QOL of daily life in elderly is not clear.

**Aim:** In this study, we evaluated whether exercise therapy is actually effective to maintain the quality of life (QOL) of the elderly.

**Methods:** One hundred and sixty-seven female patients with lifestyle related disease underwent exercise therapy (duration: 6.0 +/- 0.4 months) were enrolled in this study. Subjects were divided into three groups by their age; 50s (n=46), 60s (n=93) and 70s (n=28). We evaluated their QOL using SF36 before and after exercise therapy. Body composition, exercise capacity and physical functions were also examined.

**Results:** In 50s group, the scores of general health (GH) and of vitality (VT) from SF 36 were significantly increased (p<0.05, respectively) after exercise therapy. In 60s group, all factors of SF 36 were significantly improved (p<0.05, respectively). However, score of social function (SF) of SF36 was significantly decreased in 70s group (p<0.05).

Significant reduction of percentage body fat, improvement of body flexibility, balance and power of handgrip were found in 50s group after exercise therapy. Significant reduction of body weight and percent body fat and improvement of flexibility were seen in 60s. However, no significant change was found in body composition, exercise capacity and physical functions in 70s group.

**Conclusions:** In this study, the effect of exercise therapy on QOL measured with SF36 was different according to their age in elder patient. Unfortunately, current exercise therapy may not-sufficiently contribute to improvement of QOL of elderly people aged over 70 years old. However, the limitation for SF36 for evaluating the QOL of elderly people was also reported, more appropriate questionnaire should be arranged in such elderly people.

**ABSTRACTS**

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Abstracts Presentation (Poster):

**A64.**

**Hemodynamic Characteristics during Exercise in Cardiovascular Patients with Renal Dysfunction**

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Japan

**Background:** There has been increasing interest on the so-called cardiorenal syndrome (CRS), defined as a complex pathophysiological disorder of the heart and kidneys. Previous reports had showed that exercise therapy as cardiac rehabilitation also had short-term renal protective effects and increase of physical fitness in CRS patients. However, we previously reported that we could not show long-term renal protective effects and increase of physical fitness with ordinary exercise therapy in patients with CRS.

**Aim:** We evaluated the correlations hemodynamic characteristics during exercise in cardiovascular patients with renal dysfunction.

**Method:** Seventeen subjects were CRS patients. We divided consecutive patients with cardiovascular disease and chronic kidney disease, estimated glomerular filtration rate (eGFR) <60 ml/min/1.73 m<sup>2</sup>, into CRS group (n=6) and Cont. group (n=11) by the median of their eGFR. Their hemodynamic characteristics were examined during cardiopulmonary exercise test.

**Results:** There were no significant difference between CRS and Cont. groups in peak VO<sub>2</sub> (17.5±4.0 vs. 19.3±5.1 ml/kg/min) and systolic blood pressure (SBP, 196.5±19.9 vs. 190.0±20.9 mmHg) upon maximum exercise. However no significant difference was found in VO<sub>2</sub> during warming-up between two groups (8.2±1.6 vs. 7.4±1.5 ml/kg/min), SBP during warming-up of CRS group was significantly higher than of Cont. group (169.0±19.2 vs. 143±24.7 mmHg, p<0.05).

**Conclusions:** Arterial blood pressure is regulated with both cardiac output and peripheral vascular resistance (PVR). In our results, significant elevation of SBP in CRS group during warming-up did not accompanied with significant increase of VO<sub>2</sub>. Therefore, this phenomenon, the elevation of SBP without increase of VO<sub>2</sub>, might be caused only by the increase of PVR. Previous studies have shown the correlation on endothelial dysfunction and exaggerated exercise blood pressure response in CKD patients. From these results, we estimated that endothelial dysfunction might play the important role for increasing of PVR in CRS patients during mild exercise.

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