

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



Proceedings of  
6th Asian Preventive Cardiology  
and  
Cardiac Rehabilitation Conference  
cum  
10th Certificate Course in Cardiac Rehabilitation  
3-6 November 2016  
Hong Kong

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

## **Proceedings of 6th Asian Preventive Cardiology and Cardiac Rehabilitation Conference cum 10th Certificate Course in Cardiac Rehabilitation**

3-6 November 2016  
Hong Kong Convention and Exhibition Centre  
Hong Kong

### **Cardiovascular Risk and Management: Orthodox and Controversies**

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1. Jardiance<sup>®</sup> Hong Kong prescribing information. 2. Merker L, et al. Poster 1079-P. Presented at the 74th Scientific Session of American Diabetes Association, 13-17 June 2014, San Francisco, CA, USA. 3. Roden M, et al. Lancet Diabetes Endocrinol. 2013;1208-219. 4. Häring HU, et al. Diabetes Care. 2014;37:1650-1659. 5. Häring HU, et al. Diabetes Care. 2013;36:3396-3404. 6. Rosenstock J, et al. Diabetes Obes Metab. 2015;17:936-948. 7. Zinman B, et al. N Engl J Med. 2015;373:2117-2128.

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# 6th Asian Preventive Cardiology and Cardiac Rehabilitation Conference cum 10th Certificate Course in Cardiac Rehabilitation



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## Preface

It is our great pleasure to welcome you to this biennial scientific conference, the 6th Asian Preventive Cardiology and Cardiac Rehabilitation Conference (APCCRC) cum 10th Certificate Course in Cardiac Rehabilitation. With the concerted effort of the Hong Kong College of Cardiology and 23 supporting organizations including the government, 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 "Cardiovascular Risk and Management: Orthodox and Controversies". We shall present to you a comprehensive scientific programme covering different areas of preventive and rehabilitative medicine in cardiology with special emphasis on recent advancement. On the other hand, we shall bring back to you the popular 2-day certificate course in cardiac rehabilitation which certainly will facilitate the establishment or optimization of cardiac rehabilitation programmes in the participants' centres.

The conference will begin with the Hong Kong Heart Foundation Lecture delivered by a renowned keynote speaker, Prof. Laurence Sperling from Emory University School of Medicine, USA. He will talk on "Preventive Cardiology & the Future of Cardiovascular Medicine: Opportunities for Improvement". This year, we have attracted over 50 high quality abstract submissions by local and overseas colleagues from over 10 regions and countries. They will compete for the Dr. Chu-Pak Lau Best Paper Award in Preventive Cardiology and Dr. Suet-Ting Lau Best Paper Award in Cardiac Rehabilitation.

To enhance heart health education in the public, we will once again hold the Jump Rope for Heart Public Conference conducted in Cantonese for the local public to improve their knowledge and skills in self-management.

We are confident that our programme will be both practical and on the cutting edge for all attendees. Your continuous support is a huge vote of confidence for us to keep hosting this conference.



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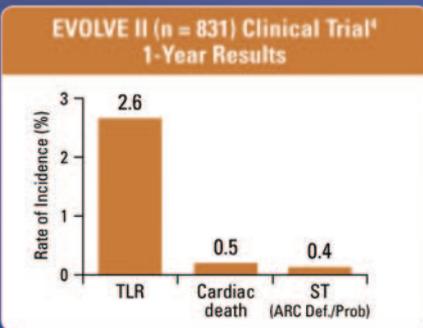
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*J. M. de la Torre*

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3. Eppihimer M, PhD. Impact of Polymer Type and Location on Stent Thrombogenicity and Endothelial Cell Coverage. EuroPCR 2013.
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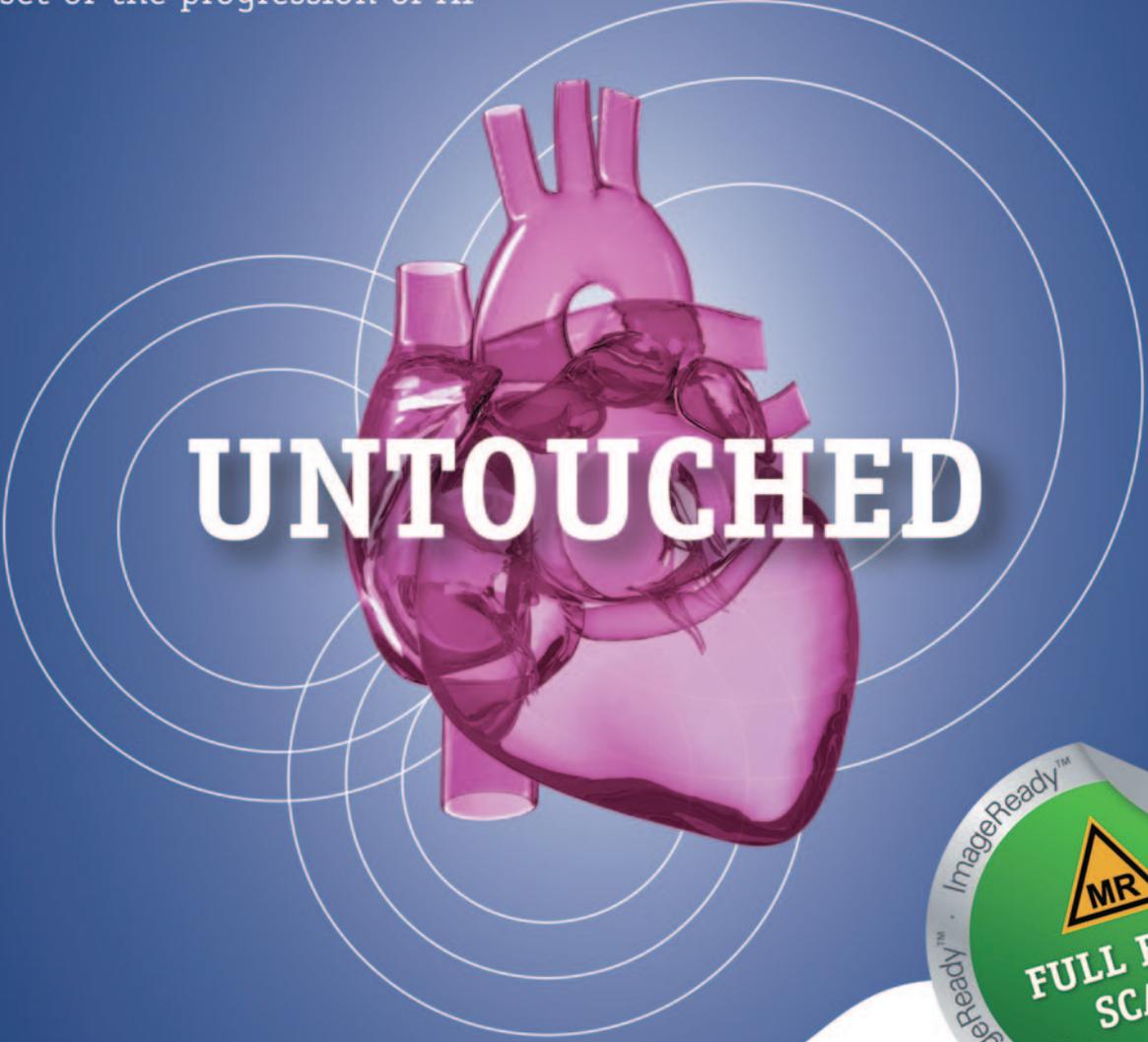
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Impaired

- Combining alogliptin and pioglitazone to target 6 core defects of type 2 diabetes.<sup>1</sup>
- Superior durability of glycemic control vs. an SU<sup>2</sup> in both its components.<sup>2,3</sup>
- Cardiovascular safety data in high CV risk type 2 diabetes patients in both its components.<sup>4,5</sup>

<sup>1</sup> SU: Sulphonylurea

**Composition:** Per 25 mg/15 mg FC tab: alogliptin 25 mg, pioglitazone 15 mg. Per 25 mg/30 mg FC tab: alogliptin 25 mg, pioglitazone 30 mg. **Indications:** Improve glycemic control in adult patients (≥18 yr) w/ T2DM: As adjunct to diet & exercise in patients inadequately controlled on pioglitazone or in patients already being treated w/ alogliptin & pioglitazone, & for whom metformin is inappropriate. In combination w/ metformin when diet & exercise plus dual therapy w/ pioglitazone & metformin do not provide adequate glycemic control. **Dosage:** 25 mg/15 mg or 25 mg/30 mg once daily. Max of 25 mg/45 mg daily. **Administration:** Swallow whole. **Contraindications:** Hypersensitivity, NYHA Class I-IV cardiac status; severe hepatic impairment (Child-Pugh score >9); active bladder cancer or a history of bladder cancer; uninvestigated macroscopic hematuria, unstable &/or type 1 DM. **Pregnancy & lactation:** Ped patient <18 yr. **Special Precautions:** Wt gain, fractures, CHF, acute coronary syndrome, edema, hypoglycemia, bladder cancer, change in Hb values, hepatic impairment, increased liver enzymes, hepatocellular injury, pancreatitis, hypersensitivity reactions, decreased visual acuity, moderate renal impairment or ESRD requiring dialysis, premenopausal anovulatory patient w/ insulin resistance. **Geriatric patients (>65 yr).** **Adverse Reactions:** Influenza, nasopharyngitis, headache, bronchitis, Upper resp tract infection, UTI; cough, rash, HTN. **Drug Interaction:** Gemfibrozil, Rifampicin. For further information, consult full prescribing information.



Takeda Pharmaceuticals (Hong Kong) Limited  
23/F & 24/F East Exchange Tower,  
38 Leighton Road, Causeway Bay, Hong Kong  
Tel: 2133 9800 Fax: 2856 2728

1. Tripitt C, et al. *Vasc Health Risk Manag.* 2010; 6:671-690 2. Harefeld M, et al. *Curr Med Res Opin* 2006; 22(6):1211-1215 3. Del Prato S, et al. *Diabetes Obes Metab.* 2014 Aug 8 4. White WB, et al. *N Engl J Med* 2013;369: 1327-1335 5. Dormandy JA, et al. *Lancet.* 2005; 366(9493): 1279-1289

HK/CSU/2016-0004

## PROGRAMME

### (A) 10th Certificate Course in Cardiac Rehabilitation

**THURSDAY, 3 NOVEMBER 2016**

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

0800-1600	REGISTRATION	
0900-1030	WORKSHOP I – Advance in Evidence <i>Chairperson: Dr. Iris KWAN</i>	
	1. How to Improve Compliance of Patients with Cardiac Rehabilitation?	Dr. Lan GUO
	2. Physical Activity, Really Does It Matter?	Prof. Jong-Young LEE
	3. Orthodoxy and Orthopraxy: How to Bridge the Gap in Cardiac Rehabilitation?	Dr. Cliff WONG
1030-1100	TEA BREAK	
1100-1230	WORKSHOP II – Exercises <i>Chairperson: Dr. Eddie CHOW</i>	
	1. Exercise is Medicine: From Theory to Practice	Dr. Visal KANTARATANAKUL
	2. Exercise in Various Heart Conditions	Dr. Peter TING
1230-1400	LUNCH BREAK	
1400-1530	WORKSHOP III – Diet and Cardiovascular Health <i>Chairperson: Ms. Andrea CHAN</i>	Ms. Andrea CHAN
1530-1600	TEA BREAK	
1600-1730	WORKSHOP IV – Psychological Approach for Cardiac Patients <i>Chairperson: Dr. Suet-Ting LAU</i>	Ms. Loretta CHAN

**FRIDAY, 4 NOVEMBER 2016**

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

0800-1600	REGISTRATION	
0900-1030	WORKSHOP V – Advance in Evidence II <i>Chairperson: Dr. Kai-Chi LEUNG</i>	
	1. Smoking and CVD – What Role for the Cardiologist?	Dr. Sandeep GUPTA
	2. Diets and Cardiovascular Disease: An Evidence-based Assessment	Prof. Laurence SPERLING
	3. Cardiopulmonary Exercise (CPET) Based Exercise Prescription during Cardiac Rehabilitation Program	Prof. Ssu-Yuan CHEN
1030-1100	TEA BREAK	
1100-1230	WORKSHOP VI – Work and Driving Rehabilitation <i>Chairperson: Dr. Eddie CHOW</i>	Dr. Andy CHENG Dr. Angus CHU
1230-1400	LUNCH BREAK	
1400-1530	WORKSHOP VII – Self Management <i>Chairperson: Ms. Kit-Han LIU</i>	Ms. Mandy CHOY Ms. Fanny WONG
1530-1600	TEA BREAK	
1600-1730	WORKSHOP VIII – Practical Session <i>Chairperson: Mr. Eyckle WONG</i>	Cardio-Pulmonary Special Group of Hong Kong Physiotherapy Association



## **(B) 6th Asian Preventive Cardiology and Cardiac Rehabilitation Conference**

**SATURDAY, 5 NOVEMBER 2016**

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

0800 REGISTRATION

0900-1030 ABSTRACT PRESENTATION

*Chairpersons: Dr. Adrian CHEONG*

*Dr. Chi-Chung CHOY*

*Dr. Nim-Pong KWONG*

*Dr. Shu-Keung KWONG*

1. Effect of Exercise Training on Heart Failure Patients with Cardiac Resynchronization Therapy Dr. Soha BOULOS NAKHLA
2. Needs for Exercise-based Cardiac Rehabilitation after Myocardial Infarction in Korea: Data from Korea National Health Insurance Corporation Prof. Won-Seok KIM
3. Relationship between Skeletal Muscle Mass and Exercise Intolerance in Participants of Chronic Phase Cardiac Rehabilitation Program for Chronic Heart Failure Dr. Sonoko HIRAYAMA
4. Early Rehabilitation Mode in Transcatheter Aortic Valve Implantation of Perioperative Implementation and Effects on Patient Life Ability Mrs. Xiu-Ying YAN
5. Exercise-based Cardiac Rehabilitation Program is Extremely Effective and Safe in Elderly Patients with Treated Coronary Artery Disease Ms. JNG
6. Cardiac Rehabilitation after Acute Myocardial Infarction in South Korea Dr. Sunki LEE
7. Follistatin-like 1 Protects Cardiomyoblasts from Injury Induced by Endotoxin Shock Dr. Weiqian CHEN
8. High-intensity Interval Training in Cardiac Rehabilitation for Coronary Artery Disease Mr. Edward TAM
9. Design and Rationale of the Application for Self-improvement (AnSim) Trial: A Smart Phone Based Message Intervention for Secondary Prevention in Patients with Coronary Artery Disease Dr. Ji-Bak KIM

1030-1100 TEA BREAK / EXHIBITION / POSTER VIEWING

1100-1230 ABSTRACT PRESENTATION – BEST PAPER AWARDS

*Chairperson: Prof. Leonard LI*

*Judges: Dr. Ngai-Yin CHAN*

*Prof. Bernard CHEUNG*

*Dr. Suet-Ting LAU*

*Prof. Laurence SPERLING*

1. Six-minute Walking Test Predict Cardiovascular Mortality among Patients Following Cardiac Surgery Mr. Chehsuan LIN
2. Patients with Coronary Artery Bypass Surgery (CABG) Derived More Significant Functional Capacity Improvement with Exercise-based Cardiac Rehabilitation than Percutaneous Coronary Interventions (PCI) – Time to Expand Enrollment for Cardiac Rehabilitation Program Ms. JNG
3. Effectiveness of a New Psychological Group Intervention in Cardiac Rehabilitation in Reducing Cardiac Anxiety and Enhancing Quality of Life Mr. Isaac KWOK
4. Cardiovascular Disease: Prognostic Value of MRI Risk Factors on Outcome in Peripheral Arterial Disease: 6-year Follow-up Dr. Harrie van den BOSCH
5. Randomized Controlled Trial on Amount of Physical Exercise of a Home-based e-health Educational Intervention for Middle-aged Adults with Coronary Heart Disease Dr. Doris LEUNG
6. Effects of Tai Chi Exercise for Community-dwelling Chinese Adults with Metabolic Syndrome: A Feasibility Study Dr. Janet SIT

1230-1400	LUNCH BREAK	
1400-1445	OPENING CEREMONY	
1445-1530	SYMPOSIUM 1 – Hong Kong Heart Foundation Symposium <i>Chairpersons: Dr. Shu-Kin LI</i> <i>Dr. Tak-Fu TSE</i>	
	Preventive Cardiology and the Future of Cardiovascular Medicine: Opportunities for Improvement	Prof. Laurence SPERLING
1530-1600	TEA BREAK / EXHIBITION / POSTER VIEWING	
1600-1805	SYMPOSIUM 2 – Novel Approaches and Treatments for Cardiovascular Diseases <i>Chairpersons: Dr. Chun-Ho CHENG</i> <i>Dr. Liang CHOW</i> <i>Dr. Katherine FAN</i> <i>Dr. Suet-Ting LAU</i> <i>Dr. Yuk-Kong LAU</i>	
	1. What is New in Managing Patients with Heart Failure	Prof. David SIU
	2. EMPA-REG OUTCOME – Changing the Paradigm of Type 2 Diabetes Treatment?	Prof. Kathryn TAN
	3. Antiplatelet Therapy – For Whom and For How Long	Prof. Tomas JERNBERG
	4. Treatment of Blood Cholesterol: New Approaches/New Agents	Prof. Laurence SPERLING
	5. Stroke Prevention in Non-valvular AF: Novel Drugs or Novel Devices?	Dr. Jo Jo HAI

## SUNDAY, 6 NOVEMBER 2016

Venue: S421, Hong Kong Convention and Exhibition Centre

0800	REGISTRATION	
0900-1100	SYMPOSIUM 3 – Cardiac Rehabilitation: Special Patients and Special Approaches in Asia <i>Chairpersons: Dr. Boron CHENG</i> <i>Dr. Eddie CHOW</i> <i>Dr. Raymond FUNG</i> <i>Dr. Kau-Chung HO</i> <i>Prof. Seok-Min KANG</i> <i>Dr. Kai-Chi LEUNG</i>	
	1. Cardiac Rehabilitation for Intensive Care Patients	Ms. Yafei WANG
	2. Cardiac Rehabilitation in Patients with Chronic Kidney Diseases	Dr. Yoichi GOTO
	3. Metabolic Syndrome: Role of Cardiac Rehabilitation	Dr. Visal KANTARATANAKUL
	4. How to Set Exercise Prescription for Patients with Heart Failure?	Dr. Lan GUO
	5. Effect of Outpatient Cardiac Rehabilitation Program on Parameters of Submaximal Cardiopulmonary Exercise Testing	Prof. Ssu-Yuan CHEN
	6. Cardiac Rehabilitation in Hospital Greenspace: Does It Make any Difference?	Dr. Mohamed Yatim SAARI
1100-1130	TEA BREAK / EXHIBITION / POSTER VIEWING	
1130-1245	SYMPOSIUM 4 – e-Health - The Future in Prevention and Rehabilitation <i>Chairpersons: Dr. Raymond CHAN</i> <i>Prof. Eung-Ju KIM</i> <i>Dr. Godwin LEUNG</i>	
	1. Mobile Technology in Promoting Community-based Cardiac Rehabilitation	Dr. Peter TING
	2. Use of e-Health to Support Exercise Maintenance in Cardiac Patients	Prof. Sek-Ying CHAIR
	3. Self-monitoring for AF: Are We There Yet?	Dr. Ngai-Yin CHAN

1245-1400	LUNCH SYMPOSIUM (Sponsored by AstraZeneca) <b>Chairpersons: Dr. Kam-Tim CHAN</b> <b>Dr. Cho-Yiu WONG</b>	
	Cardiovascular Risk Modification & Advance DM Management & Application of Novel SGLT2-inhibitors	Dr. Raymond CHAN
1400-1605	SYMPOSIUM 5 – Towards a Further Reduction in Cardiovascular Risk <b>Chairpersons: Dr. Kwok-Keung CHAN</b> <b>Dr. Wai-Kwong CHAN</b> <b>Dr. Patrick KO</b> <b>Dr. Iris KWAN</b> <b>Dr. Albert LEUNG</b>	
	1. The Art of Cardiovascular Risk Assessment 2. Pre-Marathon Screening in Hong Kong 3. Specific Reversal Agent for New Oral Anticoagulants: Why, Which and How? 4. Update on the Management of Chronic Stable Angina 5. Can Alcohol Reduce Cardiovascular Risk?	Prof. Laurence SPERLING Prof. Hung-Fat TSE Prof. Thorsten STEINER Prof. Peter COLLINS Prof. Chu-Pak LAU
1605-1635	TEA BREAK / EXHIBITION / POSTER VIEWING	
1635-1750	SYMPOSIUM 6 – Cardiovascular Imaging: Can We See into the Future? <b>Chairpersons: Dr. Kin-Lam TSUI</b> <b>Dr. Carmen CHAN</b>	
	1. Prediction of Ischemic Stroke from Coronary Plaques 2. "A Women's Heart is a Deep Ocean of Secrets," But Now You Know There are Tools Called CT/MRI... 3. Role of CMR in Heart Failure with Preserved Ejection Fraction	Dr. Ping CHAI Dr. Stephen CHEUNG Dr. Hiu-Lam CHAN



### (C) 跳繩強心公眾研討會暨工作坊

日期: 2016年11月6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	劉雪婷醫生
0900-1045	S426-S427	研討講座 破解膽固醇迷思	蔡致中醫生 (瑪嘉烈醫院心臟科專科醫生)
		「性」在有心人	鄒兆麟醫生 (屯門醫院康復科顧問醫生)
1100-1300	S428	工作坊 A – 自然好味	詹佩鳳女士 (註冊營養師(美國))
	S426-S427	工作坊 B – 「運」走大肚腩	黃潔怡女士 (香港復康會社區復康網絡 註冊物理治療師)

**ABSTRACTS**

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**WORKSHOP I – ADVANCE IN EVIDENCE**

**1.**

**How to Improve Compliance of Patients with Cardiac Rehabilitation?**

L.GUO

Division of Cardiac Rehabilitation, Guangdong Cardiovascular Institute, Guangdong General Hospital, China

Cardiac rehabilitation (CR), including drug therapy, exercise, risk factor management and behavior intervention, can significantly reduce cardiac symptoms, improve functional capacity, enhance psychological well-being and decrease the risk of further cardiac events. However, the participation rate of CR is very low, especially in hospital-based CR programs. Barriers to adherence to a CR program can be classified as three categories: patient factors, service factors and professional factors. Patient factors include time conflicts, lack of motivation, reluctance to change lifestyle, depression, transportation and lack of support from the family. Service factors contain difficulties with accessibility of programs and little insurance coverage. Professional factors, such as fewer referral from cardiologists, fewer well-trained CR staff and a heavy workload of doctors also have great impact on the participant rate. Many alternatives, including education, CR manual, counseling programs, group training and home-based CR programs, can offer different choices and encourage participation. Education should be set as the first step of CR program and carried out throughout the entire process. The courses include brief introduction of disease, drug therapy, and risk factor management and the benefits and potential risks of exercise. Patients, family members, care givers and healthcare professionals are candidates of those courses. Counseling programs can serve to those patients who have any questions during the CR program or those who don't have knowledge of CR but want to attend. It helps patients have better understanding of CR and

increase the compliance. People, who are living in groups, are more likely to do work in a group. When patients get together to take part in group training, they will discuss about benefits of CR program, and increase the motivation of CR participation. Therefore, group training is considered as a good way to increase patients' compliance. Home-based CR programs overcome the drawbacks of center-based CR programs. With the application of remote devices, portable tools and internet, home-based CR programs become safer and more popular. In order to increase the referral from cardiologists, it is necessary to teach cardiologists about the associated knowledge of CR, such as its benefit, mechanisms, indications, contents and so on. Referral by a cardiologist has been shown to improve uptake. Community and long-term follow up is also essential. CR team should tell patients to continue the CR program after discharge, and connect them to the community or social service. In conclusion, patients with cardiovascular disease can benefit from CR, but the compliance of patients with CR is very low. There are several reasons for the low participant rate and high dropout rate. Alternatives to improve compliance of patients with CR include education, CR manual, counseling programs, group training, and home-based CR programs.

## ABSTRACTS

### 2.

#### Physical Activity, Really Does It Matter?

JY LEE

Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, Korea

Physical activity is any body movement that works your muscles and requires more energy than resting. Walking, running, dancing, swimming, yoga, and gardening are a few examples of physical activity. Exercise is a type of physical activity that's planned and structured. Lifting weights, taking an aerobics class, and playing on a sports team are examples of exercise. As well as traditional risk factors such as hypertension, diabetes and smoking, physical inactivity is a major health problem worldwide, particularly in developed countries. The medical literature clearly demonstrates beneficial effects of physical activity on several health outcomes, including cardiovascular disease and all-cause mortality. Although there are risks associated with exercise in some patients, the benefits outweigh the risks in most patients. According to the 2008 Physical Activity Guidelines, you need to do two types of physical activity each week to improve your health-aerobic and muscle-strengthening. Generally, 2 hours and 30 minutes (150 minutes) of moderate-intensity aerobic activity (i.e., brisk walking) every week and muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms, or 1 hour and 15 minutes (75 minutes) of vigorous-intensity aerobic activity (i.e., jogging or running) every week and muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).

#### Benefits of regular physical activity (exercise)

Exercise favorably impacts multiple systems and health outcomes.

**Table 1.** Benefits of regular physical activity

Reduces the risk of dying prematurely
Reduces the risk of dying from heart disease
Reduces the risk of stroke
Reduces the risk of developing diabetes
Reduces the risk of developing high blood pressure
Helps reduce blood pressure in people who already have high blood pressure
Reduces the risk of developing cancer (colon, breast, uterus, stomach etc.)
Reduces feelings of depression and anxiety
Helps control weight
Helps build and maintain healthy bones, muscles and joints
Helps older adults become stronger and better able to move about without falling
Promotes psychological well-being

#### Measurement of physical activity

Direct measurement or estimation of physical activity could not be easy. There are several alternative approaches to measuring physical activity such as triaxial accelerometers, pedometers, questionnaires that estimate physical activity, and physical activity scores. Of these, the triaxial accelerometers can provide useful information. Pedometers, which provide a single dimensional measurement of activity, are useful in providing feedback to patients and may help increase walking activity, and these are becoming more useful as wrist-watch technologies are advancing. In contrast, questionnaires that estimate physical activity and physical activity scores are relatively unreliable. Even though this drawback, questionnaire is now most popular activity for academic field.

#### Evidences

In our hospital, we performed several clinical investigations. I will show shortly, about those.

### #1.

#### Association of Physical Activity and Inflammation with All-Cause, Cardiovascular-Related, and Cancer-Related Mortality: A Prospective Cohort Study

**Objective:** To investigate the association between physical activity (PA) and risk of mortality in a large middle-aged cohort stratified by inflammatory status.

**Patients and Methods:** A total of 336,560 subjects (mean age, 39.7 years; 58% male) who underwent comprehensive health screenings were enrolled in this prospective cohort study. They were grouped according to self-reported PA level using questionnaire: no regular PA with a sedentary lifestyle; regular but insufficient PA (below the guidelines); sufficient PA (concordant with the guidelines); and health-enhancing PA. Inflammation was assessed via high-sensitivity C-reactive protein (hsCRP) level. Study endpoints were all-cause, cardiovascular-related, and cancer-related mortality.

**Results:** During the 1,976,882 person-years of follow-up (follow-up duration, median 6.17 years), 2,062 deaths occurred. Compared with a sedentary lifestyle, the hazard ratios (HRs) (95% confidence intervals [CI]) on the multivariable Cox proportional hazards regression analyses for all-cause mortality by PA level were 0.95 (0.84-1.07), 0.85 (0.72-0.99), and 0.75 (0.60-0.93) (P for trend =0.003), while those for cardiovascular-related and cancer-related mortality were 0.95, 0.80, and 0.55 (P for trend =0.05); and 0.82, 0.83, and 0.78 (P for trend =0.01), respectively. Compared with subjects with low hsCRP (<1 mg/L) and any regular PA, those with high hsCRP (≥1.0 mg/L) and no regular PA showed a significantly higher risk of mortality [1.59 (1.38-1.84)].

**Conclusion:** Higher PA level was associated with a dose-dependent reduced risk of cardiovascular-related, cancer-related, and all-cause mortality. Especially, subjects with high hsCRP and no regular PA were exposed to the higher risk of mortality.

### #2.

#### Impact of change in exercise dose on risk of newly developed hypertension and diabetes mellitus in Korean men

**Objective:** Regular exercise is recommended for prevention and treatment of hypertension and diabetes mellitus (DM). The objective of this study is to investigate the impact of change in exercise dose on newly developing hypertension and DM in middle-aged Korean men.

**Design and Method:** The study population consisted of individuals who participated in a comprehensive health screening program at Kangbuk Samsung Hospital, Seoul, Korea from 2002 to 2014 (N=233,676) Among them, excluded history of diabetes, hypertension, cardiovascular disease and cancer, finally 174,314 subjects were enrolled in this analysis (mean fu: 5.22 years; median 4.23, IQR 2.12 to 7.89 years) We assessed the weekly frequency of moderate to vigorous exercise which was assessed using the validated Korean version of the International Physical Activity Questionnaire Short Form (IPAQ-SF) and risk of new hypertension or DM.

**Results:** During follow-up duration, total new 5,544 DM and new 21,276 hypertension were developed. There was no significant association between baseline frequency of regular exercise and incidence of new hypertension and DM during follow-up (P for trend = 0.05 and 0.10, respectively). But, for analysis of change of exercise dose, we classified to three groups according to change of exercise dose: decrease (A), no change (B) and increase (C) per week, respectively. Compared with subjects in A group, those in C group showed significantly lower (7%) reduction of risk of new hypertension (multivariate hazard ratio (HR), 0.93; 95% confidence interval (CI), 0.87 to 0.99; P=0.024) and 17% reduction of new DM (HR, 0.83; 95% CI, 0.74 to 0.92; P=0.001)).

**Conclusions:** Increase in exercise frequency was significantly associated with lower risk of newly developing hypertension and DM in relatively healthy middle-aged Korean men.

**ABSTRACTS**

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#3.

**Effect of exercise on the development of new fatty liver and the resolution of existing fatty liver**

**Background & Aims:** Guidelines about recommendations for amounts of exercise/physical activity are variable in non-alcoholic fatty liver disease. Our aim was to determine the amount of exercise that was associated with two outcomes: a) development of incident liver fat and b) resolution of baseline liver fat, at five-year follow-up.

**Methods:** In an occupational health screening program, weekly frequency of exercise was assessed using the validated Korean version of the International Physical Activity Questionnaire Short Form (IPAQ-SF). Liver fat was identified by ultrasonography (3.5 MHz probe) at baseline and at five-year follow-up. Fully adjusted Cox proportional hazards models were used to estimate hazard ratios (HRs and 95% confidence intervals [CI]) for incident fatty liver and resolution of fatty liver at follow-up.

**Results:** 233,676 men and women were studied between 2002 and 2014. 126,811 individuals were identified without fatty liver, and of these subjects, 29,014 subjects developed incident fatty liver during follow-up. At baseline, there were 42,536 individuals with liver fat and of these individuals, fatty liver resolved in 14,514, during follow-up. After full adjustment, compared to no exercise, exercise was associated with benefit for both outcomes; for exercise  $\geq 5$  times per week for incident fatty liver: HR 0.86 (95% CI 0.80, 0.92),  $p < 0.001$ , and for resolution of fatty liver HR 1.40 (95% CI 1.25, 1.55),  $p < 0.001$ .

**Conclusions:** Moderate to vigorous exercise is beneficial in decreasing risk of development of new fatty liver or improving resolution of existing fatty liver during 5 years of follow-up.

**Lay Summary:** The amount of exercise/physical activity to benefit fatty liver disease in non-alcoholic fatty liver disease is not known. In a large

study of free-living people, our aim was to determine the amount of exercise that was linked with a decrease in new fatty liver and also improvement of existing fatty liver over 5 years of follow-up. Compared to no exercise, exercise  $\geq 5$  times per week (lasting at least 10 min on each occasion) was linked to a highly significantly benefit for both a decrease in new fatty liver and also improvement of existing fatty liver.

**Final Summaries**

Regular physical activity, which of amount is recommended by guideline at least, really does matter. For primary and secondary prevention including cardiac rehabilitation program, all efforts must be given for enhancing physical activity.

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**3.**

**Orthodoxy and Orthopraxy: How to Bridge the Gap in Cardiac Rehabilitation?**

C WONG

Khoo Teck Puat Hospital, Singapore

In this discussion, orthodoxy means the generally accepted theory and orthopraxy implies the correct practice. Most lay people know about the benefit and recommendation of physical activity but how many people do exercise regularly? After acute coronary syndrome, patients know the importance of physical activity and also they determine to start the motives. However, one has the knowledge but their actions vanish, what are the barriers to exercise? Firstly, we discuss about the risk factors leading to refusal of cardiac rehabilitation. Then we look at the current recommendations. Finally, we discuss about the trend in the future of cardiac rehabilitation.

**ABSTRACTS**

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**WORKSHOP II – EXERCISES**

**4.**

**Exercise is Medicine: From Theory to Practice**

V KANTARATANAKUL

Samitivej Rehabilitation Center, BDMS Group; Cardiac Rehabilitation Unit, Ramathibodi Hospital, Mahidol University; Expert Panel on Exercise and Physical Activity, Department of Health, Ministry of Public Health, Thailand

Exercise is widely accepted in various benefits. By increasing muscle mass and strength and fostering cardiovascular endurance, exercise improves functional status for normal daily life and sports which leads to protection against development of disease and injury. A prescription for exercise should specify intensity (level of exertion), volume (amount of activity in a session), frequency (number of exercise sessions), and progressive overload (either the amount of increase in one or more of these elements per workout or the actual load). The balance of these elements depends on individual tolerance and physiologic principles (ie, as intensity increases, volume and frequency may need to decrease, whereas as volume increases, intensity may need to decrease). Intensity, volume, and frequency can be increased concurrently, but increases are limited because human tolerance to strain is finite. Exercise is Medicine® (EIM) is a global health initiative managed by the American College of Sports Medicine (ACSM) that is focused on encouraging primary care physicians and other health care providers to include physical activity when designing treatment plans for patients, to take the EIM Pledge to assess and record PA as a vital sign during patient visits and to conclude each visit with an exercise "prescription" and/or referral to a certified health fitness professional or allied health professional for further counseling and support. Within two years of its launch in 2007, begin a multinational collaboration to make EIM a global effort. Thus began the EIM Global Health Initiative and the establishment of the EIM Global Center at ACSM's National Headquarters in Indianapolis, IN. Currently, there are 7 Regional Centers and 43 National Centers across the globe.

The vision of EIM is to:

- Have healthcare providers assess every patient's level of physical activity at every clinic visit

- Determine whether or not the patient is meeting the U.S. National Physical Activity Guidelines
- Provide patients with brief counseling to help him/her meet the guidelines and/or refer the patient to either healthcare or community-based resources for further physical activity (PA) counseling.

The EIM Solution is the practical application of integrating physical activity into healthcare provider services and linking patients to evidence-based community programs. The integration of the EIM Solution is achieved through the following steps:

- Embedding a physical activity vital sign (PAVS) into electronic medical records (EMRs)
- Developing a national network of evidence-based PA programs and resources
- Providing a clinical decision support system linking clinical and community, so that HCPs can offer behavioral PA counseling and refer patients to fulfill their PA "prescription" in the community

In Thailand, we also have expanded and launched this initiative to healthcare providers via several routes including website: <http://www.exercisemedicine.or.th>

Then come to the practical question, how we can manage this as exercise prescription?

These are our steps of approach:

- Set the OPD for exercise prescription "DPAC: Diet & Physical Activities Clinic"
- Set "train the trainee program for exercise prescription" to nurse or physical therapy
- Initiate the network from "primary medical care to secondary & tertiary care hospital"
- Design the documents for prescription, monitoring and outcome measuring
- Supervision and monitoring process by committee that appointed by Ministry of Public Health

**5.**

**Exercise in Various Heart Conditions**

P TING

The Harley Street Heart and Cancer Centre, Gleneagles Hospital, Singapore

Regular exercise has numerous health benefits, but participation by patients with known heart disease poses a number of clinical and ethical questions, most notably what is the most appropriate physical activity and sports in which patients may safely engage. This talk aims to provide useful background information and references for doctors who wish to prescribe exercise to adult patients suffering from various types of heart disease, including ischemic heart disease (IHD), chronic heart failure (CHF), arrhythmias, valvular heart diseases (VHD) and post-surgery or device implantation. The information includes pre-participation assessment, understanding the risks involved, determining who needs additional testing, general recommendations and special precautions or restrictions.

**ABSTRACTS**

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**WORKSHOP III – DIET AND CARDIOVASCULAR HEALTH**

**6.**

**Diet and Cardiovascular Health**

A CHAN

Hospital Authority, Hong Kong

Epidemiological evidence has shown that dietary approach is effective in improving biochemical markers related to cardiovascular diseases. In this session, we will have a review on conventional evidence-based cardiac diet, followed by discussion on the most current recommended nutrition strategies for decreasing risk of cardiovascular diseases, identifying evidence for specific nutrients and foods that have cardiovascular protective effects. In addition, we will critically assess claims about cardio-protective effects of various kinds of dietary fats and address the common pitfalls of dietary habit of various cultures. A practical approach will be used in suggesting everyday food choices and meal ideas for day-to-day application.

**ABSTRACTS**

**WORKSHOP V – ADVANCE IN EVIDENCE II**

**7.**

**Smoking and CVD – What Role for the Cardiologist?**

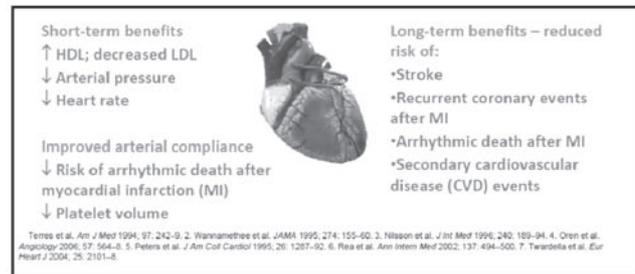
S GUPTA

Department of Cardiology, Whipps Cross/BartsHealth NHS Trust, London, UK

Tobacco continues to be a major global health hazard and cigarette smoking is one of the biggest public health threats. There are an estimated 1.1 billion cigarette smokers in the world. Cigarette smoking significantly contributes to cardiovascular disease (CVD) mortality and morbidity. It has been estimated that 10% of worldwide CVD deaths are directly attributed to smoking. Nicotine and carbon monoxide appear to play major roles in the cardiovascular effects of smoking. Both components adversely alter the myocardial oxygen supply/demand ratio and have been shown to produce endothelial injury, leading to the development of atherosclerotic plaque. Cigarette smoking impacts all phases of atherosclerosis. It increases inflammatory reaction, oxidation of low-density lipoprotein cholesterol and thrombosis. Both active and passive smoking contributes to cardiovascular events. Whether there is a distinct direct dose-dependent correlation between smoking exposure and the cardiovascular events remains debatable. Of all the established modifiable risk factors for CVD, smoking has arguably the greatest impact on the likelihood of developing an acute coronary event. There may still be gaps in our knowledge on the effects of smoking on CVD but we know that smoking cessation interventions can reverse the damage that has already occurred and hence preventing fatal cardiovascular outcomes.

**Cardiovascular benefits of smoking cessation**

Cardiologists play a key role in smoking cessation. For a smoker, the diagnosis of CHD makes the health risks of smoking suddenly personally important. Providing information like "quitting smoking puts you on a lower risk of any further CVD event" has the potential to be highly motivating. A smoke-free policy at home or cars can be advised by the Cardiologists regardless of their



smoking history. Smoking cessation has been identified as a key intervention in CVD prevention in guidelines of American Heart Association (2011) and European Society of Cardiology (2012). The 2012 European Guideline on CVD prevention in clinical practice has included 10 'strategic steps' to guide physicians who seek to help their patients alter any behavioral cardiovascular risk factor. The hazard of tobacco/cigarette smoking are well acknowledged. Quitting smoking at any stage has shown to reduce the excess risk rapidly and reliably even after the clinical development of CVD. Combination of pharmacotherapy and behavioral support enhances the outcome of smoking cessation. Clearly, smoking cessation should be the standard of care for primary and secondary prevention of CVD. In spite of the strong body of evidence, smoking is often the forgotten cardiac risk factor and often not prioritized by Cardiologists. This needs to change as smoking is a chronic condition and it deserves equal attention. Identifying smoking status, advising cessation, and referring to resources to assist smokers in making a quit attempt should be standard practice and quality measures. Cardiologists can clearly play a vital role in highlighting the benefits of smoking cessation to patients, and also in preventing the public at large from taking up the habit. The topic needs to be upgraded.

**8.**

**Diets and Cardiovascular Disease: An Evidence-based Assessment**

L SPERLING

Emory University School of Medicine, Atlanta, USA

Despite American Heart Association dietary guidelines recommending a low saturated fat diet there has been a rapid rise in obesity and diabetes both in the United States and globally. Given increasing interest in better understanding dietary approaches to promote cardiovascular health clinicians must have a better understanding of the evidence related to diets and cardiovascular disease. Importantly, a sustainable healthy dietary pattern is essential for cardiovascular prevention. There is limited long-term data regarding low carbohydrate and very low fat diets with both approaches presenting challenges related to maintenance and adherence. There is substantial evidence to support dietary patterns focused on abundance of fruits, vegetables, whole grains, and high quality fats and proteins including Mediterranean and DASH-type approaches. In addition, there is evidence to support the importance of food quality, quantity, and developing a sustainable plan for life.

**ABSTRACTS**

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**9.**

**Cardiopulmonary Exercise (CPET) Based Exercise Prescription during Cardiac Rehabilitation Program**

SY CHEN

Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital, and National Taiwan University, College of Medicine, Taipei, Taiwan

The administration of a graded exercise test to patients entering outpatient cardiac rehabilitation programs has been recommended since the 1970s. Graded exercise testing is a key component of the initial patient assessment, and is a tool for exercise training evaluation, risk stratification, and individualized exercise prescription. The cardiopulmonary exercise testing (CPET), by noninvasive assessment of inspired O<sub>2</sub> and expired CO<sub>2</sub> during graded exercise test, is uniquely able to evaluate the contribution of respiratory, cardiovascular, and peripheral tissue function in support of maximal exercise. The CPET is usually performed in a laboratory setting, with trained personnel, using specific metabolic cart and monitoring equipment. Currently, CPET is the gold standard test to assess the exercise intensity and cardiorespiratory fitness. The CPET permits the evaluation of both submaximal and peak exercise responses, providing the health professionals with relevant information on clinical decision making and exercise prescription. The intensity of aerobic exercise training is a key issue in cardiac rehabilitation. Exercise intensity is directly linked to both the amount of improvement in exercise capacity and the risk of adverse events during exercise. Findings of CPET provide critical information on exercise intensity for aerobic training, such as ventilatory threshold (first ventilatory threshold), respiratory compensation point (second ventilatory threshold), and peak oxygen uptake. The ventilatory threshold marks the limit between

the light to moderate- and the moderate to high-intensity effort domains; this is reached at around 50-60% of peak oxygen uptake or 60-70% of peak heart rate. The possibility of identifying the respiratory compensation point depends to a large extent on the gain of the chemoceptive response to metabolic acidosis, which can vary among subjects/patients, thereby making the respiratory compensation point identification potentially difficult. When identifiable, the respiratory compensation point is usually attained at around 70-80% peak oxygen uptake and 80-90% peak HR, and it has been proposed to be related to the so-called 'critical power' that is, the upper intensity limit for prolonged aerobic exercise. According to the joint position statement of the European Association for Cardiovascular Prevention and Rehabilitation, American Association of Cardiovascular and Pulmonary Rehabilitation and Canadian Association of Cardiac Rehabilitation is published and provides evidence-based indications for a shift from a 'range-based' to a 'threshold-based' aerobic exercise intensity prescription. The CPET, when available, is proposed as the gold standard for a physiologically comprehensive exercise intensity assessment and prescription. This would maximize the benefits obtainable from aerobic exercise training in cardiac rehabilitation.

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**WORKSHOP VI – WORK AND DRIVING REHABILITATION**

**10.**

**To Drive or Not to Drive**

A CHU

Tuen Mun Hospital, Hong Kong

Driving is an important aspect of life for some people. Some drive because of personal preference as a substitute to public transportation especially for those living in the rural area but some drive because of the vocational need. For the later, it may be the only skill they can earn for a living because of their physical and educational background. However not many or even among the medical professional are aware of how various chronic medical conditions might affect the eligibility to drive e.g. ischaemic heart disease, stroke, sleep apnoea to name a few. The main reason is that the conditions that need to be declared under the First Schedule of Road Traffic (Driving License) Regulations in Hong Kong are not defined objective enough in medical term. In order to provide more clear instructions to help physicians giving appropriate driving advice, Rehabaid Society has published guidelines on fitness to drive private cars and commercial vehicles. For patients suffered from cardiac disease, recommendations shall be made according to the disease status, the medications being taken and the type of vehicle licenses under evaluation. Additionally, good exercise capacity (able to achieve stage III Bruce protocol without anti-anginal medication for 48 hours) is required for commercial driving. This is because of the longer time spent behind the wheels, the much higher probability of causing devastating accident shall the truck or passenger carrying vehicle loss control due to drivers' sudden cardiac incapacitation and the occasional needs to carry out laborious work as part of their job requirement e.g. loading and unloading goods or changing

tyre. This functional level is roughly equal to/ above the generally accepted 1% risk of sudden cardiac incapacitation per annum. Although best evidence was used to calculate the risks of driving, it should be noted that the evidence itself does not support or deny driving license restrictions for cardiac patients. It is the legal process that matters. The major difference between the local system with that in UK is that the treating doctors in UK are only required to report the facts while the final decision on fitness to drive is made by the Medical Branch of the DVLA. While it is true in HK that the Transport Department makes the final decision, they do so on the advice of the doctor making the assessment, who states their opinion of the individual's fitness to drive. This is not always straight forward as the fulfilling of all the criteria lay down in the guideline does not always empower a physician to make fitness determination in a much broader terms described under item 2 in the First Schedule i.e. liability to sudden attacks of disabling giddiness or fainting due to hypertension or **ANY OTHER CAUSE**. On the other hand, in less controversial situation e.g. drivers of marginal fitness NOT driving dangerous good vehicles, large passenger vehicles or large commercial vehicles, strengthening their physical capacity through rehabilitation and supervised training can facilitate early return to driving and reduce the driving risk.

**ABSTRACTS**

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**WORKSHOP VII – SELF MANAGEMENT**

**11.**

**Practicing Self-management in Cardiac Rehabilitation**

M CHOY, F WONG

Community Rehabilitation Network, The Hong Kong Society for Rehabilitation, Hong Kong

Heart disease is now the third leading cause of death among chronic illnesses in Hong Kong. The population of cardiac patients has been growing, together with the trend of a younger age. Active participation in the rehabilitation process has proven beneficial to cardiac patients in achieving better management of the disease. Cardiac patients joining the rehabilitation training are encouraged to change their diet and exercise habits to attain a healthy life style. The aim of this workshop is to introduce knowledge and skills needed in the promotion and education of self-management strategies to cardiac patients.

Contents of the workshop

1. Introduction of health theories related to self-management and behavioural change
2. Support from health care professionals to facilitate self-management in cardiac rehabilitation
3. Practical skills in materializing self-management behaviours in cardiac rehabilitation process
4. Tips for sustaining a healthy life style after rehabilitation training

Workshop approach and format

It composes of presentation, interactive discussion, demonstration and practice.

By the end of the workshop, the participants will be able to:

1. Understand the principles and strategies in self-management concept
  2. Acquire skills for introduction of self-management concept in the educational / rehabilitation programs
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**ABSTRACTS**

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**SYMPOSIUM 1 – HONG KONG HEART FOUNDATION SYMPOSIUM**

**1.**

**Preventive Cardiology and the Future of Cardiovascular Medicine: Opportunities for Improvement**

L SPERLING

Emory University School of Medicine, Atlanta, USA

The treatment of cardiovascular disease continues to develop rapidly with associated increases in healthcare costs. Coincident with escalating costs of care there is greater emphasis on quality, value, and alternative payment models. In addition, the epidemiology of cardiovascular risk is changing globally (especially in low and middle income countries) with non-communicable disease such as atherosclerotic cardiovascular disease and diabetes responsible for an ever increasing burden of premature mortality. Importantly, the future of cardiovascular medicine will have to increasingly be focused on cardiovascular population health, disease prevention, and health promotion. In this regard there are numerous opportunities for improvement including utilization of cardiac rehabilitation, comprehensive risk reduction, and adherence to guideline-recommended therapies. Additional opportunities include improving identification of familial hypercholesterolemia, treatment of atherosclerosis, partnerships, registries, and the use of complementary approaches to cardiovascular prevention.

**ABSTRACTS**

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**SYMPOSIUM 2 – NOVEL APPROACHES AND TREATMENTS FOR CARDIOVASCULAR DISEASES**

**2.**

**What is New in Managing Patients with Heart Failure?**

D SIU

The University of Hong Kong, Hong Kong

Heart failure (HF) is recognized as an emerging epidemic that affects an estimated 26 million people worldwide. The prevalence and incidence of HF in Western countries are 1-2% of the adult population and 5-10 per 1000 population per year, respectively. Recently, we have showed that the rate of new HF hospitalization among Chinese living in Hong Kong was 0.59 per 1000 population per year, which is substantially lower than the Caucasian series. In the past 3 decades, the advance in pharmacological and device therapies has improved the outcomes of patients with HF. However, the prognosis of Hong Kong Chinese HF patients remains poor: the 1-year mortality is as high as 19.5%. Not until 2015, the US Food and Drug Administration have not approved any new agents for the treatment of chronic heart failure in more than a decade. The excitement of newly approved pharmacological agents: ivabradine and sacubitril/valsartan or LCZ696 promises great hope for HF that carries a prognosis worse than many forms of cancer. This talk will summarize newer drugs currently being used in the treatment of heart failure.

**3.**

**EMPA-REG OUTCOME – Changing the Paradigm of Type 2 Diabetes Treatment**

K TAN

Department of Medicine, The University of Hong Kong, Hong Kong

Cardiovascular mortality is the main cause of death in patients with type 2 diabetes mellitus and reduction of plasma glucose concentration seems to have relatively little effect on cardiovascular disease risk. Tight glycemic control improves microvascular complications but its effects on macrovascular complications remain uncertain. A number of cardiovascular outcome studies have been performed in patients with type 2 diabetes and cardiovascular disease, and trials with insulin glargine and glucose-lowering drugs (saxagliptin, alogliptin, sitagliptin, lixisenatide) have demonstrated safety of these newer glucose-lowering agents but did not show superiority in the cardiovascular outcomes compared with placebo. In contrast, the recent EMPA-REG OUTCOME study demonstrated that in type 2 diabetic patients with high cardiovascular risk, empagliflozin significantly reduced the primary major adverse cardiac event end point (cardiovascular death, nonfatal myocardial infarction, nonfatal stroke) by 14%. This beneficial effect was driven by a 38% relative risk reduction in cardiovascular mortality, and empagliflozin also caused a 35% risk reduction in hospitalization for heart failure. Interestingly, the reduction of these clinically relevant end points was already apparent after a few months, and the underlying mechanism(s) for these beneficial outcomes are so far unclear. The modest improvements in glycemic, lipid, or blood pressure control were unlikely to be the cause. Furthermore, analysis of pre-specified secondary microvascular outcomes showed that renal endpoints including end stage renal disease were also significantly reduced and the use of empagliflozin was associated with slower progression of kidney disease compared to placebo. In light of the EMPA-REG OUTCOME results, it has been recommended that the use of a sodium glucose cotransporter 2 inhibitor with proven cardiovascular benefit can be prioritized in type 2 diabetic patients with prevalent atherosclerotic cardiovascular disease who have not achieved glycemic target.

**4.**

**Treatment of Blood Cholesterol: New Approaches/New Agents**

L SPERLING

Emory University School of Medicine, Atlanta, USA

Appropriate intensity statins are recommended by the ACC / AHA Blood Cholesterol Guidelines as first-line therapy for 4 statin benefit groups including clinical ASCVD, LDL-C >190 mg/dl, diabetes, and individuals with a 10 year pooled cohort risk estimate > 7.5%. Despite established benefits of statin therapy, however, there appears to be substantial underutilization of well validated guideline-directed therapies and a significant lack of medication adherence. The primary focus of care should be on the concept of net clinical benefit and the importance of a meaningful patient-clinician risk discussion. Although non-statin therapies are not recommended for routine prevention of ASCVD new approaches and novel treatment options are emerging such as disease modulating therapies and PCSK9 inhibitors. Additional safety, efficacy, and clinical outcomes data is needed. Importantly, a greater emphasis on identification and treatment of individuals (as well as families) with familial hypercholesterolemia are needed given a prevalence as high as 1:250.

**5.**

**Stroke Prevention in Non-Valvular AF: Novel Drugs or Novel Devices?**

JJ HAI

Department of Medicine, The University of Hong Kong, Hong Kong

Non-valvular atrial fibrillation (AF) is associated with a 5- to 7- fold increase in the risk of stroke. The use of warfarin was associated with a 67% reduction in relative risk of ischemic stroke. Nevertheless, its narrow therapeutic range and high risk of interaction with food and drugs precluded its widespread use. Novel oral anticoagulants (NOAC) have revolutionized thromboprophylaxis of patients with non-valvular AF. Studies have shown that NOAC were at least as efficient as warfarin to prevent stroke and yet associated with reduced risk of intracranial hemorrhage. Nevertheless, patients on NOAC were still at risk of clinically significant bleeding, especially those who have underlying risk factors. Left atrial appendage occlusion (LAAO) is a reasonable alternative to oral anticoagulation. Studies have shown that LAAO was non-inferior to warfarin in stroke prevention. Nevertheless, it was associated with periprocedural complications and data comparing its efficacy and safety with NOAC was limited. In this presentation we will have a discussion on the use of NOAC versus LAAO in specific case scenarios.

ABSTRACTS

SYMPOSIUM 3 – CARDIAC REHABILITATION: SPECIAL PATIENTS AND SPECIAL APPROACHES IN ASIA

6.

**Cardiac Rehabilitation for Intensive Care Patients**

Y WANG

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Critically ill patients are usually featured with instability, airway compromise, multi-organ dysfunction or low survival rate in the past. Along with the advancement of intensive care medicine, patients' survival rate has increased and people pay more attention to the long-term outcomes than before. Rehabilitation for those critically ill patients becomes popular over the world and attracts lots of interests of medical staffs. The general problems of intensive care patients include respiratory insufficiency, impaired cardiovascular function, musculoskeletal dysfunction, restricted mobility, recumbency and emotional problems. Additionally, some medications also have an adverse effect on the activity ability, such as the sedative drugs, corticosteroids, hyperglycemia, and so on. All of the above factors can contribute to impaired oxygen transport, or even affect the gas exchange, thus reduce the cardiopulmonary fitness. The BACPR defined cardiac rehabilitation (CR) as: "The coordinated sum of activities required to influence favourably the underlying cause of CVD, as well as to provide the best possible physical, mental and social conditions, so that the individuals may, by their own efforts, preserve or resume optimal functioning in their community and through improved health behavior, slow or reverse progression of disease". It is a program involving medication, exercise therapy, risk factor management and behavior modification. The ultimate goals of rehabilitation for intensive care patients include two parts, the first one is returning the patient to his or her pre-morbid functional level or a higher level if possible, the second one is reducing complications, morbidity, premature mortality, length of ICU and

overall hospital stay. The immediate goals of rehabilitation are to maximizing oxygen transport, cardiovascular and pulmonary function, musculoskeletal and neurological function. Exercise therapy is one of the most essential elements of CR. For those intensive care individuals, previous studies have shown that early mobilization is safe and efficient. Given the complex reason of impaired oxygen transport, staffs need to identify the specific problems at first, and then design a proper treatment protocol aiming to optimize oxygen delivery in the patient who is critically ill. Early mobilization for patients with critical illness can be divided into two circumstances, non-cooperation group and cooperation group. Exercise strategies for non-cooperation patients include body positioning, passive stretching, range of motion exercise, continuous passive movement, bedside cycle ergometer and neuromuscular electrical stimulation. For cooperation patients, it includes body positioning, turning, transferring, standing, stepping, walking, aerobic training and muscle strengthening training. Before mobilizing critically ill patients, a comprehensive assessment, including evaluation of cardiovascular function, pulmonary function, risk factors and other contraindications, is essential, and a step-by-step exercise training protocol is necessary. Furthermore, education and psychosocial support for those patients are also important, which should be contained in the daily treatment. In conclusion, intensive care patients have some specific problems, and a comprehensive cardiac rehabilitation program can benefit them after balancing the risk and benefit.

7.

**Cardiac Rehabilitation in Patients with Chronic Kidney Disease**

Y GOTO

National Cerebral and Cardiovascular Center, Suita, Japan

**Background:** In patients with chronic kidney disease (CKD), Exercise training has not been generally recommended because of paucity of clinical evidence and a general fear that exercise training might deteriorate renal function in CKD patients. However, in the practical setting of cardiac rehabilitation (CR), the prevalence of cardiac patients complicated with CKD is increasing as a result of increases in elderly and/or diabetic patients, leading to a demanding necessity of evidence of safety and efficacy of exercise training in cardiac patients with CKD.

**Study 1:** Clinical features and the effect of CR in CKD patients. A total of 3233 consecutive cardiac patients who entered our 3-month CR program was retrospectively studied. They were categorized into 3 groups, Non-CKD (eGFR $\geq$ 60, n=2045), Mild CKD (MCKD, 30 $\leq$ eGFR $<$ 60, n=1087), and Severe CKD groups (SCKD, eGFR $<$ 30, n=121). Compared with Non-CKD patients, both MCKD and SCKD patients were older, and showed higher prevalence of hypertension, diabetes, prior myocardial infarction, heart failure, device implantation, and orthopedic comorbidities, and lower left ventricular ejection fraction and peak oxygen uptake (PVO<sub>2</sub>) at baseline, indicating that these patients are at very high risk. After completion of the 3-month CR, all three groups exhibited significant increases in PVO<sub>2</sub>, and both MCKD and SCKD groups showed significant improvements in eGFR. However, SCKD group experienced a lower rate of program completion and a higher rate of dropout due to medical reasons. The two major medical reasons for dropout were worsening heart failure and orthopedic problems, although no direct adverse events were observed during the CR exercise sessions.

**Study 2:** Effect of CR on renal function in post-myocardial infarction patients with CKD. We studied 528 acute myocardial infarction (AMI) patients with (n=180) and without CKD (n=348) who participated in the 3-month CR program. In patients with CKD, eGFR significantly improved after CR along with improvements in PVO<sub>2</sub> and BNP. When these CKD patients were divided into non-active (n=70) and active CR participants (n=110), eGFR significantly improved after CR in active participants but not in non-active participants.

**Conclusion:** CR with exercise training is safe and effective in improving exercise capacity and renal function in cardiac patients complicated with CKD. Issues to be solved are: improving adherence to CR, preventing heart failure and orthopedic problems, and developing optimal modalities of exercise training in these high risk patients.

**ABSTRACTS**

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**8.**

**How to Set Exercise Prescription for Patients with Heart Failure?**

LGUO

Division of Cardiac Rehabilitation, Guangdong Cardiovascular Institute, Guangdong General Hospital, China

The characterized symptom of chronic heart failure (CHF) is exercise intolerance, early fatigue and dyspnea at exertion. Underlying mechanisms include impaired cardiac output responses to exercise, abnormal redistribution of blood flow, reduced mitochondrial volume and density, impaired vasodilatory capacity, and heightened systemic vascular resistance. Reduced exercise capacity has a negative impact on daily activities, quality of life and prognosis. Thus, it is essential to improve the exercise capacity for those patients. Numerous studies have shown that patients with heart failure can benefit from exercise rehabilitation. Regular exercise improves muscle function, increases patients' ability to take in and use oxygen, enhances the work efficiency, reduces fatigue, increases the maximal oxygen consumption and improves prognosis; it is also good for improving patients' psychosocial conditions. Although serious events during exercise are extremely low in all patients, the risk for sudden death, arrhythmic events is a greater concern in patients with CHF. Before initiating an exercise program for patients with heart failure, a comprehensive clinical evaluation, including treatment of underlying causes of CHF, optimal pharmacologic therapy, risk stratification and exercise testing is necessary. Absolute and relative contraindications of exercise should be specially considered. A scientific exercise prescription should be individualized and progressively changed, including four basic elements (frequency, intensity, time and type, FITT). Aerobic exercise, resistance exercise, and respiratory muscle training are the most commonly used exercise mode among heart failure patients. Guidelines suggested that

aerobic exercise should be performed 3 to 5 times per week, with an adequate warm-up period, 20 to 60 minutes exercise at targeted intensity, and a sufficient cool down period. The recommended target intensity is 50-70% of peak  $\text{VO}_2$ , or rating perceived exertion (Borg 6-20 scale) approximately 12-14, or heart rate reserve 60-80% of maximum. Walking is the most popular exercise. Resistance training as a complement of aerobic exercise, patients can also benefit from it. Isometric exercise and valsalva maneuver are forbidden. Short duration exercise with a sufficient rest interval is recommended. Patients can perform resistance exercise with small free weights (1, 2, or 5 lb), elastic bands or weight machines, 2 or 3 days per week, 20 to 30 minutes per session, 10 to 15 repetitions of every movement, doing in a rhythmical manner at a moderate to slow controlled speed. Recommended intensity is 50% to 70% 1RM for lifts involving the hips and lower body; 40% to 70% 1RM for lifts involving the upper body. Studies have demonstrated the benefit of respiratory muscle training among heart failure patients, especially the inspiratory muscle training. The recommend exercise duration is 15 to 30 minutes, at 15% to 60% of maximal inspiratory mouth pressure, performed daily. In conclusion, exercise rehabilitation is beneficial to patients with heart failure; aerobic exercise, resistance exercise and respiratory muscle training are the most commonly utilized exercise forms. Aiming to enhance the safety and efficiency of exercise, a scientific and individualized exercise prescription is essential.

**9.**

**Effect of Outpatient Cardiac Rehabilitation Program on Parameters of Submaximal Cardiopulmonary Exercise Testing**

SY CHEN

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Oxygen consumption at peak exercise ( $\text{VO}_{2\text{peak}}$ ) obtained from cardiopulmonary exercise test (CPET) provides valuable information while assessing cardiorespiratory fitness. However,  $\text{VO}_{2\text{peak}}$  might be underestimated and might be a less reliable parameter because of reduced patient motivation, selected exercise protocol, and knowledge and skills of the examiner. Therefore, submaximal exercise parameters have been introduced to overcome many of these limitations. The relationship between minute ventilation and carbon dioxide production ( $V_E/\text{VCO}_2$  slope) reflects the increase in ventilation in response to  $\text{CO}_2$  production, and thus shows increased ventilatory drive. It has been applied most commonly in patients with heart failure. Studies have shown that the  $V_E/\text{VCO}_2$  slope exhibits a high prognostic value for cardiac-related events in patients with heart failure, and the risk of mortality is believed to increase when the  $V_E/\text{VCO}_2$  slope is higher. Oxygen uptake efficiency slope (OUES) is derived from the logarithmic relation between oxygen uptake and minute ventilation during incremental exercise. This slope represents how effectively the oxygen is extracted by the lungs and used in the periphery. OUES has been clinically applied in patients with heart failure, COPD, CAD, and pediatric patients with heart disease (e.g. Fontan patients). Oxygen uptake efficiency (OUE), the response during exercise of  $\text{VO}_2$  to  $V_E$ , when plotted against time, reaches its highest and briefly stable values near the anaerobic threshold, before

declining due to hyperventilation stimulated by the excess  $[\text{H}^+]$  of metabolic acidosis. This plateau value is defined as OUEP. It has been applied in patients with heart failure and pulmonary hypertension. It has less variability and higher predictability than OUES for subjects regardless of the age, gender, or height; also less difference between treadmill and cycle ergometer. The effect of outpatient cardiac rehabilitation program on submaximal cardiopulmonary exercise testing parameters has not been fully elucidated. According to our preliminary data, an exercise-based outpatient cardiac rehabilitation program may improve  $\text{VO}_{2\text{peak}}$  as well as submaximal CPET parameters among patients with coronary heart disease and heart transplantation recipients.

**ABSTRACTS**

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**10.**

**Cardiac Rehabilitation in Hospital Greenspace: Does It Make any Difference?**

MY SAARI

Department of Rehabilitation, Serdang Hospital, Malaysia

Rehabilitation after coronary events, such as myocardial infarction, requires a specific approach to increase physical activity taking into account low cardiorespiratory fitness, impaired coronary flow reserve and cardiac autonomic nervous system response. The appropriate level of physical strain on the heart may improve these unfavourable changes. There is some evidence that green environments are associated with better self-reported health, lower blood pressure, lower psychophysiological stress, and lower mortality risks. However, the benefits of physical activity in green environments of CAD patients in terms of functional capacity are uncertain. Study shows that walking in a park has a greater positive effect on coronary artery disease (CAD) patients' hemodynamic parameters than walking in an urban environment. The city park group exhibited statistically significantly greater reductions in HR and DBP and increases in exercise duration and HR recovery. Most of cardiac rehabilitation programs for the cardiac survivors in Malaysia is utilizing the equipment provided in the rehabilitation departments' buildings and less usage of the green outdoor environments (GOEs) found within the hospitals' compound. The present knowledge of nature and human- health relation in Malaysia is still rather new and limited despite sufficient evidences indicated that natural environment plays an important role in supporting people's health and well-being. A pilot study conducted in Serdang Hospital to look into the beneficial of exercise in green outdoor environment versus

indoor activity towards cardiac survivors. It showed that there is significantly different in the reading of heart rate (bpm) of the cardiac survivors after the outdoor exercise held while there is no significant difference of heart rate (bpm) from the cardiac survivors after having the indoor activities. Moreover, for the cardiac survivors' systolic blood pressure (mmHg) and diastolic blood pressure (mmHg), they showed no significant differences after receiving both rehabilitation treatment sessions. Therefore, these study suggesting that rehabilitation through walking in green environments after coronary events should be encouraged.

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**SYMPOSIUM 4 – E-HEALTH - THE FUTURE IN PREVENTION AND REHABILITATION**

**11.**

**Mobile Technology in Promoting Community-based Cardiac Rehabilitation**

PTING

The Harley Street Heart and Cancer Centre, Gleneagles Hospital, Singapore

Cardiac rehabilitation (CR) is highly recommended for patients recovering after a heart attack or heart surgery. These programs are traditionally delivered from a hospital outpatient center. Despite demonstrated benefits and guideline recommendations, CR utilization has been poor. To overcome some of the barriers to the traditional delivery of CR, different telehealth platforms and approaches have been developed in recent years to deliver CR services remotely. These solutions have been shown to overcome some of the barriers in CR participation and show potential as alternative or complementary options for individuals that find traditional center-based CR programs difficult to commit to. We look at some of the different forms of tele-rehabilitation and the existing evidence on its effectiveness, and review some of the early experiences, challenges and obstacles in order to improve the chance of successful implementation.

**12.**

**Use of e-Health to Support Exercise Maintenance in Cardiac Patients**

SY CHAIR

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

Cardiovascular disease (CVD) is the leading cause of death in the world. Cardiac rehabilitation (CR) is an evidence-based, multidisciplinary program designed to optimize a cardiac patient's physical, psychological, and social functioning; exercise training has been identified as the central element of CR. Despite the known benefits of exercise, referral, enrolment, and completion rates of exercise-based CR remain suboptimal over the past decades. With the trend of having more number of younger population affected by CVD, the traditional strategic for health maintenance may need to be revisited. Younger patients are normally having higher education, more likely to use e-devices, and more readily to accept innovative ideas. Therefore, e-health becomes a popular approach in health maintenance. Increasingly, e-health is attracting attention and offering several potential advantages in behavioral change interventions. Existing evidence supports the feasibility and acceptability of using e-health in exercise maintenance among patients with CVD. In this presentation, several strategic e-health movements will be shared. Understanding the nursing roles in e-health service as well as factors that promote successful implementation of e-health program will facilitate nursing practice in this area. In addition, future efforts to address challenges posed by e-health are also discussed.

**ABSTRACTS**

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**13.**

**Self-monitoring for AF: Are We There Yet ?**

NY CHAN

Princess Margaret Hospital, Hong Kong

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia which is associated with an increased risk of stroke, heart failure and cardiovascular mortality. Oral anticoagulation therapy can effectively reduce the risk of ischemic stroke caused by AF by 64-70%. However, a quarter of patients have silent or asymptomatic AF, which can still cause this complication. This underscores the importance of early recognition of AF, especially in asymptomatic patients. Currently, only opportunistic screening for AF is recommended. Whether systematic screening or self-monitoring for AF can reduce the burden of ischemic stroke remains controversial. In a recent study on community screening for AF with a smartphone electrocardiogram, it has been shown that 101 (0.8%) among 13122 participants screened had newly diagnosed AF. Independent predictors for newly diagnosed AF include age, body weight, history of stroke and valvular heart disease. Female sex predicted a lower risk for newly diagnosed AF. The area-under-curves for age and weight were 0.768 and 0.548 respectively. When a cut-off age threshold of 60 or above was used, there was a 98% sensitivity and 29.2% specificity in detecting newly diagnosed AF. The data on self-monitoring for AF is scarce. With the increasing availability of different smartphone-related devices for detection of AF, self-monitoring for AF becomes technically feasible. In a recent telephone survey on 810 Hong Kong citizens, 49% of those aged <65 and 40% of those aged 65 or above were willing to use smartphone-related devices to self-monitor for the presence of AF. Whether self-monitoring for AF can reduce the burden of stroke in the community remains to be studied.

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**LUNCH SYMPOSIUM (Sponsored by AstraZeneca)**

**14.**

**Cardiovascular Risk Modification & Advance DM Management  
& Application of novel SGLT2-inhibitors**

R CHAN

Queen Mary Hospital, Hong Kong

In patients with type 2 diabetes mellitus (T2DM), cardiovascular disease (CVD) remains the principal cause of morbidity and mortality. The strict control of hyperglycaemia seems beneficial for reducing microvascular complication; However the effect on CVD risk is less clear. In addition, the intensive glucose control may be associated with an increased risk of severe hypoglycemia, which might counterbalance the potential benefit of intensive glucose lowering treatment. Thus, a novel strategy to reduce CVD risk in T2DM patients is needed. Sodium-glucose cotransporter 2 (SGLT2) inhibitor is the novel way to control excess glucose for T2DM patients. SGLT2i lowers blood glucose levels in T2DM patients by reducing renal glucose reabsorption and increasing urinary glucose excretion. The mechanism of action of SGLT2i influences a number of CVD risk factors, including HbA1C reduction, as well as the additional benefits of weight loss and blood pressure reduction. Overall, SGLT2 inhibitor plays an important role to address multiple CV risk factors simultaneously, bringing large benefits to T2DM patients.

**ABSTRACTS**

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**SYMPOSIUM 5 – TOWARDS A FURTHER REDUCTION IN CARDIOVASCULAR RISK**

**15.**

**The Art of Cardiovascular Risk Assessment**

L SPERLING

Emory University School of Medicine, Atlanta, USA

In 1961 with just two words, Dr. William Kannel helped to change our understanding of the underlying causes of heart disease-risk factors. Preventive cardiology efforts begin with the assessment of ASCVD risk using a population-based risk estimator. It is beneficial to convey the concepts of absolute, relative, and lifetime risk to individuals with the goal of developing a comprehensive evidence-based strategy for prevention. In patient care consideration should be given to well-validated scientific evidence, patient preference, and clinical judgement. Above and beyond initial risk assessment there are biomarkers and noninvasive testing that should be used appropriately to further reclassify risk. When assessing cardiovascular risk both traditional risk factors and non-traditional risk factors should be considered. Moreover, there are potential clinical markers of risk that should be greater recognized.

**16.**

**Specific Reversal Agent of New Oral Anticoagulants: Why, Which and How?**

T STEINER

Department of Neurology, Klinikum Frankfurt Höchst, Germany

Preventing stroke is the primary goal of anticoagulant treatment in patients with atrial fibrillation (AF). Non-vitamin K antagonist oral anticoagulants (NOACs) are increasingly used for this purpose. NOACs have demonstrated both efficacy and safety in randomized clinical trials which have also been confirmed by real world evidence. While NOACs are beneficial to AF patients, their usage might increase the complication for AF patients when emergency situations arise. There are established measures to manage NOAC-treated patients in emergency situations, the benefits of current treatment options are still unclear and there are certainly still unmet needs. Recently the first reversal agent is available for the rapid reversal of dabigatran offering an alternative approach to effectively manage AF patients in cases of emergency. This lecture discusses:

- Real world evidence of NOACs
- Current strategies for management of NOACs-treated patient in emergency situations with both non-specific and specific reversal agents
- Case sharing on using specific reversal agent

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**17.**

**Update on the Management of Chronic Stable Angina**

P COLLINS

Clinical Cardiology, Royal Brompton Hospital and Imperial College London, United Kingdom

Chronic stable angina pectoris affects over 2 million people in the UK and in most European countries 20,000 - 40,000 individuals/million suffer from angina. China is the most populous country in the world and has been experiencing a progressive increase in cardiovascular disease (CVD); with recent studies showing that 30% of the population in China has  $\geq 3$  risk factors for CVD. It is estimated in the "Report on Cardiovascular Disease in China, 2011" that there are about 230 million patients with CVD. Despite many recent therapeutic advances, a growing number of patients experience persistent angina in spite of intervention and optimal medical treatment. Current estimates suggest as many as ten percent of all patients diagnosed with CHD (23 million Chinese) will develop angina which is difficult to control, highlighting an ever increasing population of patients. Despite optimal revascularisation up to 30% of patients return within one year with persistent angina due to coronary micro-vascular dysfunction. The aim of the clinical management of patients with angina should be to relieve symptoms, as well as improving quality of life and long-term outcomes. In the setting of chronic stable angina, medical therapy represents the main stay of treatment. Optimal antianginal therapy should always include medication for secondary cardiovascular protection including aspirin, statins and angiotensin-converting enzyme inhibition. Risk factors that increase cardiovascular events should also be optimally managed such as cigarette smoking, hypertension, diabetes, obesity and lack of exercise. Traditional agents for the chronic management of stable angina include beta-blockers, calcium-channel blockers and long

acting nitrates. These agents either reduce myocardial oxygen demand or increase myocardial oxygen supply through haemodynamic effects. In a significant proportion of patients up-titration of these agents may be difficult because of dose-limiting adverse effects, e.g. hypotension and bradycardia. Furthermore, despite attempts to 'optimise' medical treatment a significant proportion of patients with stable angina remain symptomatic. Most antianginal drugs have vasoactive properties and mechanisms of action. However Ranolazine, is a novel antianginal piperazine derivative with a completely different and haemodynamically independent anti-ischaemic mechanism of action, which involves inhibition of the late sodium current into ischaemic myocardial cardiac cells. The efficacy of Ranolazine has been proven in several large randomized controlled trials in a variety of patient groups. Importantly and specifically Ranolazine has been shown to reduce angina frequency by 24% in patients already treated with a combination of a beta-blocker and calcium channel blocker. There are also particular challenges in the management of angina in diabetics, the elderly (over 70 years) and those with micro-vascular dysfunction despite optimal revascularization or with normal coronary arteries. Cases will be presented to illustrate the difficulties and complexities encountered in managing some of these patient groups with chronic stable angina and discuss options available to optimise management. Recent NICE/ESC and AHA chronic stable angina guidelines will also be briefly discussed.

**ABSTRACTS**

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**18.**

**Can Alcohol Reduce Cardiovascular Risk?**

CPLAU

Department of Medicine, The University of Hong Kong, Hong Kong

Alcohol is associated with several cardiovascular diseases: alcoholic cardiomyopathy (ACM), systemic hypertension (HT), arrhythmias, stroke and importantly coronary artery disease (CAD). In epidemiology studies, there appears to be a threshold beyond which alcohol causes harm. This level is variable in different individuals, sexes and the types of disease. Acute ACM occurs due to direct toxic effect of alcohol, often after binge drinking, the "holiday heart" syndrome. Cardiac arrhythmias, including atrial fibrillation and ventricular tachycardia may occur. Chronic ACM is characterised by a form of dilated cardiomyopathy, normally after heavy alcoholic drinking for prolonged period (>120 g/D for 20 years). Abstinence may improve. Prolonged alcohol consumption is associated with HT for all ethnic groups. Men are more susceptible. The mechanisms include: increase in sympathetic activity, RAS stimulation and endothelial dysfunction. Heavy alcohol drinking is the most reversible cause of HT. The attributable risk is 5-7%, thus affecting millions of people worldwide. Meta-analysis suggests a reduction of CAD risk in men (<25 g/D) and women (<10/D), and an increase risk with higher amount. This J-shaped relationship is different for reports from different countries, pattern of drinking and alcohol type. Mechanisms include: Increase HDL-cholesterol, anti-thrombosis and decrease insulin resistance, and genetic predisposition. However, associations are confounded by absence of controls, other co-risk factors, under reporting and social differences. In conclusion, heavy alcoholic consumption and binge drinking are harmful. The benefit of alcohol on CAD, if any, should be taken in the light that alcohol is addictive and is a major cause of cirrhosis and traffic accident. Alcohol is also addictive and can lead to alcohol dependence.

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**SYMPOSIUM 6 – CARDIOVASCULAR IMAGING: CAN WE SEE INTO THE FUTURE?**

**19.**

**Prediction of Ischaemic Stroke from Coronary Plaques**

P CHAI

National University Heart Centre, Singapore

Atherosclerosis causes 20% to 40% of ischaemic strokes (IS) in different populations. Being a systemic disease, it is not surprising that atherosclerotic disease often occurs simultaneously in the coronary and cerebrovascular arterial beds. Studies have shown that coronary plaques were present in up to 70% of patients with fatal IS. On the other hand, IS not uncommonly complicates myocardial infarction (MI). In the Valsartan in Acute Myocardial Infarction (VALIANT) trial, for instance, IS occurred in 2.4% of the patients with MI and heart failure with reduced ejection fraction after a median follow up period of 24.7 months. Recently, it has been shown that coronary plaques, detected non-invasively with computed tomography (CT), are associated with stroke risk. In the prospective Rotterdam Coronary Calcification Study, subjects with coronary calcium score (CCS) of between 101 and 500, and those with CCS of more than 500, were 2 and 3 times more likely to have experienced a stroke, respectively, compared with subjects in the lowest CCS category of 0 to 100. In a recent publication of the Heinz Nixdorf Recall study, in which individuals without prior stroke or coronary heart disease underwent CCS with electron beam CT and followed up for a median of 94.9 months, CCS was found to be an independent predictor of stroke. In addition, CCS was able to discriminate stroke risk in participants belonging to the low (<10%) and intermediate (10%-20%) Framingham risk score categories. In the Multi-Ethnic Study of Atherosclerosis, CCS was a better

predictor of stroke/transient ischaemic attack than intima-media thickness alone and nearly as good as carotid plaque presence determined on carotid ultrasound. To date, however, there is no validated calculator incorporating CCS for predicting future stroke risk. Clinicians therefore utilise currently available calculators to predict future atherosclerotic cardiovascular disease risk in order to guide prescription of appropriate preventive measures.

**ABSTRACTS**

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**20.**

**"A Woman's Heart is a Deep Ocean of Secrets," But Now You Know There are Tools Called CT/MRI...**

SCW CHEUNG

Department of Radiology, Queen Mary Hospital, Hong Kong

Women are usually under-represented in many trials of coronary artery disease (CAD). The prevalence of CAD is lower in women compared with men and this occurred about a decade later in women also. However women can also present with atypical symptoms and commonly employed investigations like exercise stress test is less accurate in women also. Studies have shown that cardiac event rate is higher than expected in women with symptom but no obstructive CAD on angiogram and occur even in some asymptomatic women. The AHA guideline for noninvasive testing in evaluation of women with suspected IHD still recommends exercise stress test as the first line investigation for those with no resting ECG abnormality and are able to exercise. For the others initial imaging should be a stress imaging test (including echo, nuclear perfusion and MRI) or coronary CTA depending on risk profile. Adenosine stress MR perfusion has been shown to have higher sensitivity than MPI SPECT in the CE-MARC study. It is even truer for women. Breast attenuation is not a problem in MRI which is a common source of artefact in SPECT. There is significant correlation between a positive test and future cardiac events in 5-year follow-up and this is true for both women and men. Coronary CTA also has similar accuracy in the two sexes. The CONFIRM study has shown significant correlation between all-cause mortality in a 3-year follow up and severity of CAD detected by coronary CTA. While it is expected that patients with 3-vessel or left main disease

would do worse compared with those with 1/2-vessel disease or non-obstructive disease, the relative increase in mortality is greater in women. Cardiac MR and coronary CTA are well tolerated examinations with excellent safety profile. Their diagnostic accuracy is high in patients with appropriate risk profile. There is accumulating evidence that the imaging results have prognostic implication and can be particularly useful in women who may have atypical symptoms or uncertain results from other investigations.

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**21.**

**Role of CMR in Heart Failure with Preserved Ejection Fraction**

HL CHAN

Department of Medicine, Pamela Youde Nethersole Eastern Hospital, Hong Kong

The prevalence of heart failure with preserved ejection fraction (HFpEF) accounts up to 50% of all heart failure patients and is a growing healthcare burden worldwide. The diagnosis of HFpEF relies upon the presence of symptoms or/and signs of heart failure, preserved left ventricular systolic function, and evidence of diastolic dysfunction. Echocardiography is the modality of choice in the evaluation of diastolic function. A number of CMR techniques have been used to evaluate diastolic function in addition to its accurate assessment of left and right ventricular function. With the ability in myocardial tissue characterization, it can also help determine the underlying etiology of HFpEF.

**ABSTRACTS**

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**PUBLIC CONFERENCE**

**1.**

**Controversy on US New Guideline for Cholesterol Intake**

CC CHOY

Princess Margaret Hospital, Hong Kong

Dyslipidaemia management has long been an important component of coronary artery disease risk management. Dyslipidaemia management involves both diet control and medication use. General public understanding of dyslipidaemia diet and medication management originates from recommendations by professional bodies. There had been recent updates about these recommendations that might create confusion for the general public. This lecture seeks to clear up the confusion by providing current knowledge and explaining mechanisms about lipid metabolism and atherosclerotic artery disease.

**2.**

**Sexuality and Cardiac Rehabilitation**

ESL CHOW

Hong Kong Association of Sex Educators, Researchers and Therapists (HKASERT); Hong Kong Society of Rehabilitation (HKSR); and Department of Medicine and Geriatrics, Tuen Mun Hospital, Hong Kong

As an important area of modern human life, sexuality does not serve only the purposes of reproduction but it also plays an important role in quality of life and the maintenance of a family and marital relationships. Being distinct from other health issues, sexuality is a two-person issue affecting not only the patient oneself but one's partner(s). Sexuality frustrations are common among couples with ischemic heart disease (IHD). Contributing factors include the associated organic sexual impairment, suboptimal understanding of disease and its relationship with sexuality, and the change in the role and relationship within the couples resulting from the disease. A recent local study showed that around two-third of IHD patients continued to have sexual activities, in which over two-third were satisfied with one's sexual life despite a high prevalence of erectile dysfunction of various degrees. The study also revealed that only a low proportion of patients (one-fourth) had received sexuality information from health care professionals. In generally, sexual activity does increase the risk of a myocardial event, but the additional absolute risk from sexual activity is low. Proper health and medication advices related to sexuality are important and useful to couples affected by IHD and will be discussed in the conference.

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**3.**

**Enjoy the Food with Better Taste**

K CHIM

Tung Wah Group of Hospitals Subsidiaries

Obesity and hyperlipidaemia are the common problems encountered by the patients with coronary heart disease. Some of them understand exercise and healthy diet are the critical alternatives to attain a healthy life style. However they frequently complain they no longer enjoy the food when they eat less or eat green. This workshop aims to correct the myth about the "healthy diet" for the cardiac patients. Meanwhile, the workshop would introduce the strategies for choosing food and the use of herbs for seasoning. "Less is more" is stressed in the establishment of new eating habits. This workshop is conducted in Cantonese. Presentation, experiential games and demonstration are the workshop format.

**4.**

**Exercise for Abdominal Obesity**

LKY WONG

The Hong Kong Society for Rehabilitation, Hong Kong

Abdominal obesity, also known as central obesity, is when excessive abdominal fat around the stomach and abdomen has built up to the extent that it is likely to have a negative impact on health. There is a strong correlation between central obesity and cardiovascular disease. The commonly used measurement for central obesity is waist circumference (WC), which is claimed to be more superior to reflect the condition compare to using body mass index (BMI) alone. For Asian population, abdominal obesity is defined as a WC of 90 centimeters or higher in men and 80 centimeters or higher in women. According to a local Behavioural Risk Factor Survey on April 2014, it revealed that 39% of the population aged 18-64 was classified as overweight or obese, including 20.8% as obese. A higher proportion of males (49.6%) than females (29.5%) were classified as overweight or obese. People aged 45-54 had a highest rate (50.5%) of overweight or obesity. It also revealed about one-third (33.7%) of adult aged 18-64 had not done any moderate or vigorous physical activity for at least 10 minutes at a time. Physical activities need not be strenuous to be beneficial. Thirty minutes of physical activity of moderate intensity a day on at least 5 days a week is optimal for health benefit and reduce the risk of certain chronic diseases. Exercise combining weight training and aerobic activity will lead to maximal result in beating abdominal obesity. This workshop will focus on learning safe, handy and home friendly exercise for the core sets and tasting on aerobic works. It is specifically designed for beginners and people who already developed belly fat. Moreover, community resources are available to reinforce active lifestyle and exercise habit building.

ABSTRACTS

ABSTRACT PRESENTATION – BEST PAPER AWARDS

1.

**Six-minute Walking Test Predict Cardiovascular Mortality among Patients Following Cardiac Surgery**

CH LIN,<sup>1</sup> SY CHEN,<sup>1</sup> C LAN,<sup>1</sup> SS WANG,<sup>2</sup> YS CHEN,<sup>2</sup> RB HSU,<sup>2</sup> R WANG,<sup>3</sup> KL CHIEN<sup>3</sup>

<sup>1</sup>Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital; <sup>2</sup>Department of Surgery, National Taiwan University Hospital; <sup>3</sup>Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University, Taipei, Taiwan

**Objectives:** High mortality after cardiac surgery was related to poor functional capacity which can be evaluated by six-minute walking test (6MWT). Scanty literature was about the relationship between 6MWT distance and the mortality after heart surgery, and thus this retrospective study was created.

**Methods:** We conducted a retrospective cohort from National Taiwan University Hospital who received coronary artery bypass grafting and/or valve surgery in 2011 and 2012, and put 6MWT distance in early postoperative phase as the independent variable into Cox proportional hazards model for survival analysis. The main outcome is cardiovascular mortality till 2013/12/31 via linking data to the Collaboration Center of Health Information Application of Taiwan.

**Results:** A total of 383 patients (mean age 60.5±11.3 years old, 28.5% female) undertook 6MWT (301.3±97.1 m) during post-surgical hospitalization, and 14 died of cardiovascular causes during a follow-up of median 24 months (interquartile range, IQR=12 months). When 6MWT distance was put as

continuous variable, the hazard ratio (HR) was 0.27 (95% Confidence interval, CI: 0.10-0.69, p=0.007) per 100 meter increment. Compared with <200 m group, HR of ≥200 m and <300 m group was 0.22 (95% CI: 0.05-0.91), and HR of ≥300 m group was 0.09 (95% CI: 0.01-0.59).

**Conclusion:** Our findings demonstrated the prognostic value of 6MWT in the early postoperative phase after cardiac surgery, implying to identify the vulnerable patients who may need more intensive follow-up and active participation in cardiac rehabilitation.

2.

**Patients with Coronary Artery Bypass Surgery (CABG) Derived More Significant Functional Capacity Improvement with Exercise-based Cardiac Rehabilitation than Percutaneous Coronary Interventions (PCI) – Time to Expand Enrollment for Cardiac Rehabilitation Program**

JNG,<sup>1</sup> K FAN,<sup>2</sup> J LI,<sup>1</sup> D CHAN,<sup>1</sup> R FUNG,<sup>2</sup> K CHAN,<sup>2</sup> S CHAN,<sup>2</sup> YT WONG,<sup>1</sup> MY CHEUNG<sup>2</sup>

<sup>1</sup>Department of Physiotherapy; <sup>2</sup>Cardiac Medical Unit, Grantham Hospital, Hong Kong

**Background:** Traditionally cardiac rehabilitation has been provided to somewhat lower-risk patients who could exercise without complications. Two main strategies for coronary artery disease (CAD) revascularization are coronary artery bypass surgery (CABG) and percutaneous coronary intervention (PCI). Patients receiving CABG often have most significant CAD together with more co-morbidities. Longer hospitalization is usually needed among CABG patients causing worse physical deconditioning. We studied changes in exercise capacity in these two groups before and after completion of a 6-week exercise-based cardiac rehabilitation (CR) program.

**Method:** From 2006 to 2015, a total of 425 patients who underwent CABG (n=223) and post-PCI (n=202) were enrolled and completed a 6-week exercise-based CR program. The baseline demographic data were not significantly different between the 2 groups (Table 1). Exercise stress test using modified Bruce protocol was performed before and after a 6-week CR program.

**Results:** There were significant improvements in both duration and estimated METs level achieved in both groups after 6-week exercise-based CR program (Table 2). Baseline functional status was significantly lower in CABG group than PCI group at baseline. CABG group achieved most significant improvement than PCI group.

**Conclusion:** Exercise-based CR significantly improved exercise capacity in patients with treated CAD. Patients recovering from CABG had poorer functional capacity at baseline but derived more significant benefits when compared with post PCI patients. The rapid evolution of CAD management has now changed and expanded the demographics of patients who can be candidate for CR.

Table 1. Baseline demographic data

	CABG N=223 Mean±S.D.	PCI N=202 Mean±S.D.	Between Groups
Age	65±10	63±10	P=0.09 ns
Age Range	32-84	30-85	
Men (%)	76	80	P=0.23 ns
BMI	24.9±3.3	25.4±3.4	P=0.08 ns
Waist Circumference (cm)	88±9	89±10	P=0.31 ns

Table 2. Changes of exercise capacity among the two group

	CABG Mean±S.D.			PCI Mean±S.D.			Between Group	
	Before	After	Change	Before	After	Change	Baseline	Change
Exercise Duration (min.)	7.9±3.7	11.2±2.7***	72%	10.3±3.2	12.5±2.5***	32%	p<0.001	p<0.001
Max. METs	4.9±2.1	7.0±2.2***	56%	6.6±2.5	8.2±2.4***	34%	p<0.001	P<0.001

\*\*\*p<0.001

ABSTRACTS

**3. Effectiveness of a New Psychological Group Intervention in Cardiac Rehabilitation in Reducing Cardiac Anxiety and Enhancing Quality of Life**

ICY KWOK,<sup>1</sup> KC LEUNG,<sup>2</sup> SW TANG,<sup>2</sup> S KAUR,<sup>2</sup> MY SO,<sup>3</sup> HKP LP<sup>3</sup>  
<sup>1</sup>Department of Clinical Psychology, Tung Wah Eastern Hospital; <sup>2</sup>Cardiac Rehabilitation and Resource Centre, 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 research on psychological risk factors has shifted the attention to Cardiac Anxiety which involves fear of heart sensations, avoidance behaviors and heart-focused attention. Cardiac anxiety has adverse impact on rehabilitation outcome and reduces quality of life when cardiac patients are overwhelmed with cardiac-related worries and engage in avoidance behaviors. In view of this, a new psychological group intervention for cardiac patients ("Heart and Mind") was designed and run by clinical psychologist (CP) to reduce their cardiac anxiety level by teaching them coping strategies, so as to enhance life satisfaction and promote positive emotion. With collaboration between Cardiac Rehabilitation and Resource Centre and Department of Clinical Psychology, six "Heart and Mind" groups were conducted in 2015-16. Each group consisted of four 2-hour weekly sessions and a booster session two months later.

**Objectives:** To evaluate the effectiveness of "Heart and Mind" for cardiac patients in reducing cardiac anxiety, enhancing life satisfaction and promoting positive emotion.

**Methods:** Patients undergoing cardiac rehabilitation who aged 30-80 and with minimum of six years of education and cardiac anxiety symptoms were enrolled to the "Heart and Mind" groups. Participants completed Cardiac Anxiety Questionnaire (CAQ), Life Satisfaction Scale (LSS) and Positive Emotion Scale (PES) at four time points (intake, 1st, 4th and booster session).

**Results:** Forty-six patients (67% male; Figure 1) participated in the "Heart and Mind". Comparing the result between the 1st and booster session, participants reported significant reduction in both CAQ-Total (p<0.05) and CAQ-Fear (p<0.01) scores and significant enhancement in LSS (p<0.05) and PES (p<0.01). Mean percentage of CAQ-Total dropped from 44% to 37%, while CAQ-Fear dropped by 12%. Mean percentage of LSS and PES increased from 67% to 74% and 54% to 64% respectively. Although no significant drop was found in both CAQ-Avoidance and CAQ-HFA, a trend of further improvement in all measured items found in 2-month booster session suggested the sustained impact of the programme on the participants (Table 1, Figure 2). Besides, 97.3% of participants were satisfied with the group intervention.

**Conclusion:** Psychoeducation of cardiac patients to adopt adaptive coping strategies could reduce patients' cardiac anxiety, enhance life satisfaction and promote positive emotion.

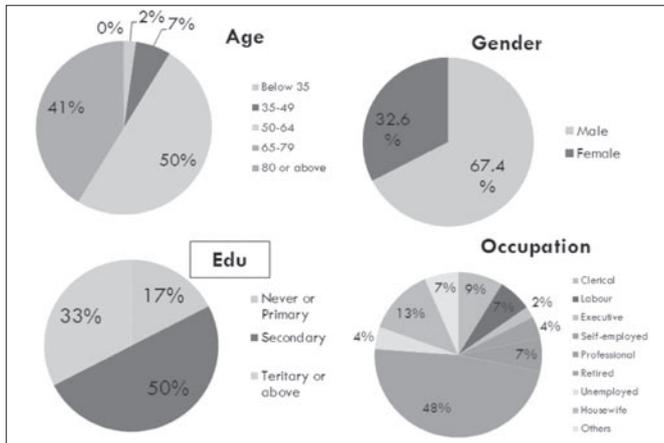


Figure 1. Demographics of "Heart and Mind".

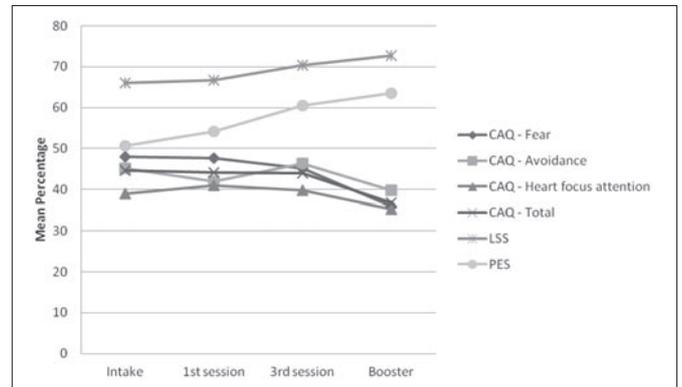


Figure 2. Mean percentage of outcome measures at different assessment time points.

Table 1.

Measures	N	F	p-value	Partial Eta Squared	1st session-4th session	4th session-Booster	1st session-Booster
CAQ-Fear	30	7.778	<0.001	0.211	2.503	9.170**	11.673**
CAQ-Avoidance	30	2.105	0.105	0.068	-4.333	6.500*	2.167
CAQ-HFA	30	1.908	0.134	0.062	1.167	4.500	5.667
CAQ-Total	30	6.961	<0.001	0.194	0.220	7.147**	7.367*
LSS	35	7.425	0.001	0.179	-3.714*	-2.286	-6.000**
PES	35	14.245	0.001	0.295	-6.357**	-2.929	-9.286**

p<0.05(\*); p<0.01 (\*\*); p<0.001 (\*\*\*)

Note: CAQ = Cardiac Anxiety Questionnaire; Fear = Fear of heart disease; Avoidance = Avoidance behaviours; HFA = Heart Focused Attention; LSS = Life Satisfaction Scale; PES = Positive Emotion Scale

ABSTRACTS

4.

**Cardiovascular Disease: Prognostic Value of MRI Risk Factors on Outcome in Peripheral Arterial Disease: 6-year Follow-up**

H van den BOSCH,<sup>1</sup> J WESTENBERG,<sup>2</sup> W SETZ-PELS,<sup>1</sup> A TIELBEEK,<sup>1</sup> L DUJIM,<sup>1</sup> J TEIJINK,<sup>1</sup> J POST,<sup>1</sup> A de ROOS<sup>2</sup>

<sup>1</sup>Catharina Hospital, Eindhoven; <sup>2</sup>Leiden University Medical Center, Leiden, The Netherlands

**Objective:** The objective of this follow-up study was to explore the prognostic value of outcome of cardiovascular magnetic resonance (MR) imaging biomarkers in patients with symptomatic peripheral arterial disease (PAD) in comparison with traditional risk factors.

**Methods:** Forty-two consecutive patients (mean age 64±11 years, 22 men) referred for contrast-enhanced MR angiography (CE-MRA) were included. A comprehensive MRI examination was performed at baseline on 3T MRI (Achieva, Philips Healthcare): CE-MRA of the infra-renal aorta and run-off vessels with 0.1 mmol/kg body weight Gd-DOTA (Guerbet), black-blood carotid vessel wall imaging, cardiac cine imaging and aortic pulse wave velocity (PWV) assessment from high-temporal one-directional through-plane velocity encoding at the ascending and descending aorta. Patients were categorized for outcome at 72±5 months follow-up.

**Results:** Over six years, six patients had died (mortality rate 14.6%), six patients (14.6%) had experienced a cardiac event and three patients (7.3%) a cerebral event. The mean MRA stenosis class (i.e., average stenosis severity visually scored over 27 standardized segments) was a significant independent predictor for all-cause mortality (beta 3.0±standard error 1.3, p=0.02).

Descending aorta PWV, age and Diabetes Mellitus were interrelated with stenosis severity but none of these were significant independent predictors. For cardiac morbidity, left ventricular ejection fraction (LVEF) and mean MRA stenosis class were associated, but only LVEF was a significant independent predictor (beta -0.14±0.05, p=0.005). Diabetes Mellitus was a significant independent predictor for cerebral morbidity (beta 2.8±1.3, p=0.03).

**Conclusion:** Mean MRA stenosis class was a significant independent predictor for all-cause mortality in patients with symptomatic peripheral arterial disease. Descending aorta PWV, age and diagnosis of Diabetes Mellitus were interrelated with PAD stenosis severity and as such associated with all-cause mortality, but did not show to be significant independent predictors. LVEF was a significant independent predictor for cardiac morbidity and diagnosis of Diabetes Mellitus a significant independent predictor for cerebral morbidity in this patient population. Further studies with larger patient groups have to confirm these results from preliminary data of the present study.

5.

**Randomized Controlled Trial on Amount of Physical Exercise of a Home-based e-health Educational Intervention for Middle-aged Adults with Coronary Heart Disease**

EM WONG, SY CHAIR, DYPLEUNG, JWH SIT

The Chinese University of Hong Kong, Hong Kong

**Objectives:** Secondary preventive strategies, such as physical activity, healthier dietary choices and giving up smoking, have been suggested as effective in decreasing the modifiable cardiovascular risk profile of existing and high-risk patients with coronary heart disease (CHD). This study aimed to evaluate the effectiveness of a home-based e-health educational intervention in promoting physical exercise for middle-aged adults with CHD.

**Methods:** Patients aged 30-65 and have CHD (n=441) were recruited to a randomized controlled trial at two cardiac follow-up clinics. They were randomly assigned to the intervention group (n=221) receiving the home-based e-health educational programme (e-HEI); and the control group (n=220) receiving standard care. All subjects were followed-up at 3- and 6-month. Total amount of physical exercise per week was measured with a modified version of the Godin-Shephard Leisure-Time Physical Activity Questionnaire (GSLTPAQ). Generalized estimating equations (GEE) compared the differential changes in GSLTPAQ between groups.

**Results:** At baseline, 66.0% (291/441) of the subjects were male and the mean age was 51.3 years old (SD=5.02). Table 1 shows the mean and standard deviation of the GSLTPAQ scores in the e-HEI and control groups across baseline, 3- and 6-month. GEE results showed that there was a significant and greater increase in the GSLTPAQ scores at 3-month in the e-HEI group than the control group (p=0.02). However, no significant difference was observed in GSLTPAQ scores between the two groups at 6-month (p=0.14).

**Conclusion:** The home-based e-HEI was effective in increasing the amount of physical exercise at 3-month but not sustained to a longer term at 6-month. The results may benefit healthcare professionals in the strategic planning of how to apply e-health education and continual support to promote exercise behavior among Chinese patients with CHD in the community.

**Table 1.** Mean and SD of GSLTPAQ score across time by group

	E-HEI	Control
Baseline	16.85 (11.72)	15.74 (14.48)
3-month	19.25 (13.21)	14.58 (11.96)
6-month	18.24 (13.51)	14.82 (12.59)

**ABSTRACTS**

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**6.**

**Effects of Tai Chi Exercise for Community-dwelling Chinese Adults with Metabolic Syndrome: A Feasibility Study**

YL LEUNG, JWH SIT, AWK CHAN

The Chinese University of Hong Kong, Hong Kong

**Background:** Metabolic syndrome (MetS) is a cluster of cardio-metabolic disturbances that increase the likelihood of developing cardiovascular diseases and type 2 diabetes mellitus. Tai Chi exercise as an approach to therapeutic lifestyle change on individuals with MetS have attracted increasing concern.

**Objectives:** To evaluate the feasibility and preliminary effects of the Tai Chi exercise intervention for adults with MetS in Hong Kong.

**Method:** In this randomized single-blinded controlled trial, subjects were randomly assigned to either Tai Chi (12-week Yang-style Tai Chi exercise) or control (usual daily activities) groups. MetS biomarkers were measured at baseline and 12th week (post-test). Paired t-test and ANCOVA were used to compare within- and between-groups differences, using intention-to-treat principle.

**Results:** A total of 54 subjects were recruited in this study (aged  $63.85 \pm 7.93$ ). Post-test findings showed no statistical between-group difference among MetS biomarkers except systolic blood pressure (SBP,  $p=0.046$ ) and fasting blood glucose (FBG,  $p=0.026$ ). Within-group changes show significant reduction in DBP ( $p=0.016$ ), and marginal increase in HDL-C ( $p=0.051$ ) of Tai Chi exercise group. Satisfaction survey was conducted using questionnaire on participants of Tai Chi exercise group. Findings showed participants' perceived positive benefits in improving their overall health status and physical strength.

**Conclusion:** Tai Chi exercise can be considered as an acceptable and feasible lifestyle intervention for people with metabolic syndrome in community setting. Preliminary findings detected an improving trend in DBP and HDL-C among participants of the Tai Chi exercise group.

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ABSTRACTS

ABSTRACT PRESENTATION

1.

**Effect of Exercise Training on Heart Failure Patients with Cardiac Resynchronization Therapy**

MM NAWAR, MM HASSANEIN, ABM ALKASIR, AK MOHAMMED, SN BOULOS, AMAE ELMEKAWY

Faculty of Medicine, Alexandria University, Alexandria, Egypt

**Objectives:** To determine the effect of exercise training (ET) on exercise capacity and quality of life (QOL), functional class and left ventricular function, following CRT in chronic heart failure (CHF) patients.

**Methods:** We studied 20 patients with CHF who underwent CRT implantation. Patients were randomized into 2 groups: ET Group (n=10) and Control Group (n=10). Supervised ET, was done three times weekly for 4 months; consisting of treadmill walking, breathing exercises, flexibility exercises, stair climbing, and resistance training. Tests of assessment consisted of: treadmill exercise testing, 6-minute walk test (6MWT), breathing tests, multiple repetition maximum (MRM) tests and stair climbing test (SCT). Patients were assessed at baseline and at a 4-month-follow-up.

**Results:** Four months of supervised ET had resulted in significant improvement in QOL with heart failure, in Minnesota Questionnaire by 30% score reduction, compared to 2% increase in the Control Group (p=0.001). Percent-predicted peak oxygen consumption improved in the trained group (p<0.001). Improvements over the Control Group were also found in NYHA class (p=0.013), several echocardiographic parameters (including the ejection fraction), 6MWT (ranges changed from 115.0-237.0 m to 129.0-426.0 m in Exercise Group compared a range change from 103.0-226.0 m to 94.0-320.0 m in the Control Group (p=0.006)), stress test time (a mean increase from 5.98±1.55 min to 10.72±3.94 min in Exercise Group compared to mean increase from 6.07±1.66 min to 6.43±2.84 min in the Control Group) and METs achieved (mean rise from 4.46±0.75 METs to 6.73±1.91 in the Exercise Group) were found. Moreover, improvements in the SCT, breathing tests (maximum inspiratory pressure and sustained maximal inspiratory pressure), MRM tests (for both upper and lower limbs), and hemodynamic measurements (circulatory power, heart rate recovery time, and systolic blood pressure) were noted compared to the Control Group.

**Conclusion:** Exercise training significantly improves the benefits of CRT. Supervised ET is safe and beneficial for CHF patients with CRT; improving functional class, exercise capacity, QOL, and heart failure symptoms.

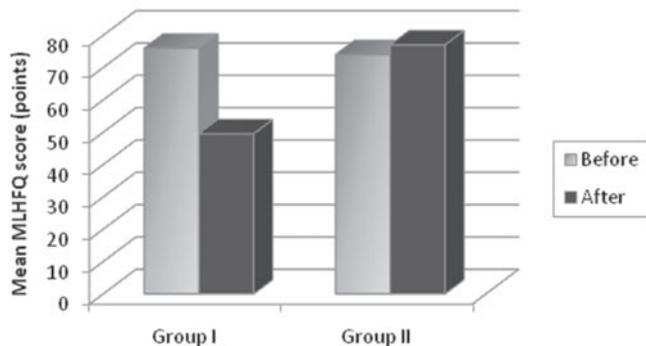


Figure 1. Comparison between the studied groups according to the mean Minnesota living with heart failure questionnaire score.

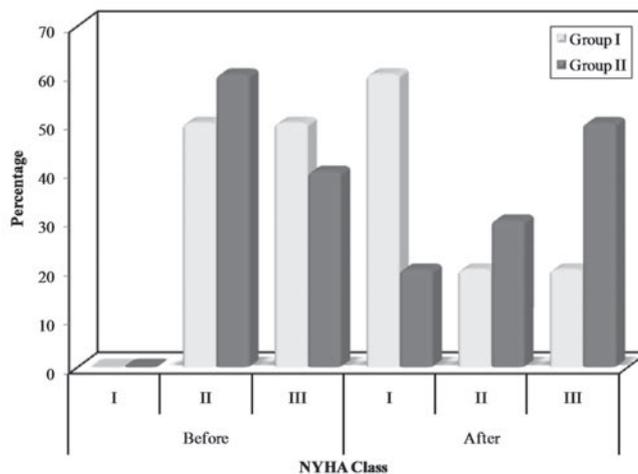


Figure 2. Comparison between the studied groups according to NYHA class.

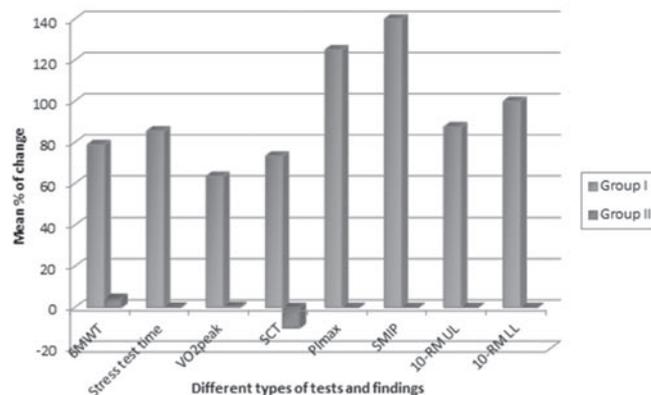


Figure 3. Comparison between the studied groups according to mean percent of change of the different tests findings in the study in relevance to exercise.

ABSTRACTS

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2.

**Needs for Exercise-based Cardiac Rehabilitation after Myocardial Infarction in Korea: Data from Korea National Health Insurance Corporation**

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<sup>1</sup>Seoul National University Bundang Hospital, Seongnam; <sup>2</sup>Gyeonggi Regional Cardiocerebrovascular Center, Seongnam, <sup>3</sup>The Catholic University of Korea, Seoul, Republic of Korea

**Objectives:** Modification of risk factors of myocardial infarction (MI) by cardiac rehabilitation (CR) could reduce the recurrences and deaths after MI but CR is under-utilized in Korea. We aimed to investigate the needs for CR in Korea by observing the changes in health-related behaviors after MI and their associations with recurrence and death.

**Methods:** Insurance claim and health checkup records from Korea National Health Insurance Corporation (NHIC) from 2002 to 2014 were used. Patients who admitted to a hospital with the acute MI as a major diagnosis in 2011 at the first time, with ages from 40 to 70 years old, were included for analysis. Data from questionnaires during health checkup before and after MI were used to investigate changes in the health-related behaviors (exercise, alcohol consumption and smoking).

**Results:** Total 13,831 patients (62.8±9.0 years old) with MI were included. Only 26.3% of binge drinkers and 13.2 % of smokers completely quit the drinking or smoking after MI. Among patients who did not join the regular moderate intensity exercise before MI, only 9.5% of patients participated in regular exercise with moderate intensity after MI. Only 15.9% of patients changed to join regular vigorous exercise after MI. Patients who participated in regular vigorous exercise after MI showed lower risk of MI recurrence

(odds ratio=0.83, 95% confidence interval: 0.70-0.98) in the multiple logistic regression model.

**Conclusion:** Better health-related behaviors after MI could not be achieved without the systematic efforts such as nationwide cardiac rehabilitation programs. Exercise-based cardiac rehabilitation may also reduce the recurrence of MI in Korea.

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3.

**Relationship between Skeletal Muscle Mass and Exercise Intolerance in Participants of Chronic Phase Cardiac Rehabilitation Program for Chronic Heart Failure**

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<sup>1</sup>Kobe Rosai Hospital; <sup>2</sup>Kobe University, Kobe, Hyogo, Japan

**Objectives:** Chronic heart failure is a clinical syndrome characterized by decreased exercise capacity. Skeletal muscle atrophy is frequently associated with heart failure, and exercise intolerance in heart failure is partly caused by skeletal muscle atrophy. Skeletal muscle atrophy contributes to poor prognosis in heart failure patients. Given the importance of skeletal muscle atrophy in heart failure, the methodology to clinically estimate the amount of skeletal muscle is important for the risk stratification. Bioelectrical impedance analysis (BIA) is one of useful methods to evaluate the body composition, and it is easily performed using multi-frequency BIA with eight tactile electrodes (InBody). Using InBody, we hereby propose a simple index of skeletal muscle atrophy, that is, Body Muscle Index. The equation is  $BMuI = \text{total body skeletal muscle weight in kilograms} / \text{height in meters squared}$ . The purpose of this study was to investigate whether exercise intolerance was dependent on BMuI in heart failure.

**Methods:** Consecutive 28 patients with chronic heart failure aged 49–85 years, who are participating the cardiac rehabilitation program were enrolled. Exercise tolerance was quantified by measuring peakVO<sub>2</sub> by using CPEX. Skeletal muscle mass was measured by InBody. To assess skeletal muscle mass as corrected value by physical size, we used BMuI as the parameter.

**Results:** PeakVO<sub>2</sub> was neither correlated with ejection fraction nor the levels of BNP. However, the peakVO<sub>2</sub> was significantly correlated with BMuI. Furthermore, the VE/VCO<sub>2</sub> was negatively correlated with BMuI.

**Conclusion:** We found that there was a significant relationship between BMuI and various parameters of exercise tolerance assessed by CPX. These results indicate that the amount of skeletal muscle mass might directly associate with exercise tolerance. BMuI seems to be useful for the assessment of sarcopenia or cardiac cachexia; furthermore, BMuI could be a marker for clinical outcome for heart failure.

**ABSTRACTS**

**4.**

**Early Rehabilitation Mode in Transcatheter Aortic Valve Implantation of Perioperative Implementation and Effects on Patient Life Ability**

XY YAN

Fuwai Hospital, Beijing, China

**Objective:** The aim of this study is to evaluate the effectiveness of perioperative rehabilitation on life abilities of TAVI patients.

**Methods:** This study is a single-center, retrospective study including one hundred patients underwent TAVI from March 2012 to December 2015 in Fuwai Hospital. All the patients were identified from the database and randomly assigned to two groups, 50 patients each. Both groups were cared with basic nursing. Group 1 (n=50) underwent early rehabilitation in perioperative period, including exercises in bed and exercises off bed. Exercises in bed include active joint movement, turning on bed, resistance training of lower limbs, sitting up. Exercises off bed include sitting on the edge of the bed, standing by the bed, walking with help and walking by oneself. Five-minute exercises in bed, in the morning and afternoon, were permitted among patients in stable condition first day after operation. Five-minute exercises off bed were recommended if situation was permitted on the second day.

**Results:** Barthel grades evaluated pre-operation and on the 1st post-operative day were no significant difference between group 1 and group 2 (p>0.05). However, differences of the results in the compare of mean hospital stay, mean hospital cost, complication rate, the time of getting out of bed were statistically significant (p<0.05).

**Conclusion:** Patients with perioperative rehabilitation who underwent TAVI show clinical and statistical improvements in reducing hospital stay, hospital cost, complication rate, the time of getting out of bed. As such, the early rehabilitation should be considered as an effective strategy in perioperative period when treating patients with TAVI.

**5.**

**Exercise-based Cardiac Rehabilitation Program is Extremely Effective and Safe in Elderly Patients with Treated Coronary Artery Disease**

J NG,<sup>1</sup> J LI,<sup>1</sup> D CHAN,<sup>1</sup> R FUNG,<sup>2</sup> K CHAN,<sup>2</sup> S CHAN,<sup>2</sup> YT WONG,<sup>1</sup> MY CHEUNG,<sup>2</sup> K FAN<sup>2</sup>

<sup>1</sup>Department of Physiotherapy; <sup>2</sup>Cardiac Medical Unit, Grantham Hospital, Hong Kong

**Introduction:** Advanced age is associated with a higher prevalence of coronary artery disease (CAD) as well as increased morbidity and mortality. Exercise-based cardiac rehabilitation (CR) has been shown to improve functional capacity and other indices of cardiovascular health. Prior to an initial cardiac event, elderly patients are generally more deconditioned and less fit compared to their younger counterparts, with accelerated deconditioning once CAD is established. Similarly, they are typically at higher risk of complications from myocardial infarction and coronary revascularization procedures, leading to prolonged hospital stays and greater vulnerability to subsequent clinical sequelae and deconditioning. CR remains underutilized in older adults who were considered of moderate to high risk group. The impact of functional capacity improvement in the elderly patient group (age ≥70) in a 6-week exercise-based CR program was reviewed and compared with patients who were <70 years old in our hospital.

**Method:** From 2006 to 2015, a total of consecutive 448 pts who underwent coronary revascularization procedures were enrolled into our CR program. There were 137 patients ≥70 years and 311 patients <70 years. Amongst the ≥70 years group, 84 received coronary artery bypass graft (CABG) and 53 after percutaneous coronary intervention (PCI) completed the submaximal exercise stress test on treadmill with modified Bruce protocol before and after a 6-week CR program. The 6-week aerobic exercise training consisted of 3 modes of exercise (treadmill walking + cycling exercise + upper limb ergometer/rowing) with a total duration progressed gradually from 30 minutes to 45 minutes in each exercise session. The intensity was started from 60% heart rate reserve calculated from the initial exercise test with modified Bruce protocol on treadmill. Tailor-made exercise prescription was given to individuals with special needs.

**Results:** The demographic characteristics were shown in Table 1. There were significant improvements in both duration and estimated METs level achieved after 6-week aerobic exercise training in both groups. However, the ≥70 years group began with significantly lower functional capacity yet their degree of improvement after CR was markedly more significant than the <70 years group (Table 2).

**Conclusion:** The exercise based CR program is safe and extremely effective intervention in elderly patients with CAD with degree of improvement much more significant than younger patient group participating in similar program. More effort should be made in actively enrolling elderly patients in CR in order to improve function capacity as well as possible therapeutic lifestyle changes.

**Table 1.** Patients Demographic Data

	Elderly Group (n=137) Mean±S.D.	Adult Group (n=311) Mean±S.D.
Age	75±4	59±7
Age Range	70-85	30-69
Men (%)	69	80
BMI	24.5±2.9	25.2±3.5
BMI Range	17-33	17-41
Waist Circumference (cm)	88±9	89±10

**Table 2.** Changes of exercise capacity in pre and post-test after 6-week cardiac rehabilitation program among elderly (age ≥70) and adult (age <70) patients with coronary artery disease

	Age≥70 Mean±S.D.			Age<70 Mean±S.D.			Between Group	
	Before	After	Change	Before	After	Change	Baseline	Change
Duration (min.)	6.9±3.3	10±2.5***	80%	10.1±3.2	12.5±2.4***	41%	P<0.001	P<0.001
METs	4.2±1.8	6±1.8***	57%	6.4±2.4	8.3±2.2***	39%	P<0.001	P<0.001

\*\*\*p<0.001

**ABSTRACTS**

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**6.**

**Cardiac Rehabilitation after Acute Myocardial Infarction in South Korea**

S LEE,<sup>1</sup> T AHN,<sup>2</sup> JB KIM,<sup>3</sup> SH PARK,<sup>1</sup> EJ KIM<sup>1</sup>

<sup>1</sup>Korea University Guro Hospital, Seoul; <sup>2</sup>Gachon University Gil Medical Center, Incheon; <sup>3</sup>Sejong Hospital, Bucheon, Republic of Korea

**Background:** Cardiac rehabilitation (CR) services are mostly underutilized, in spite of the documentation of substantial morbidity and mortality benefits of CR in acute myocardial infarction (AMI) patients.

**Objective:** We assessed the implementation rate of CR after AMI, and ascertained the barriers for CR in South Korea.

**Methods and Results:** Questionnaire data were collected via email from a total of 93 hospitals in South Korea, which were all certified institutes for coronary interventions. The response rate for questionnaire was 77% (72/93 hospitals). Of the 72 hospitals, 39 (54%) were tertiary and 33 (46%) were secondary medical centers. The percentages of hospitals treating AMI patients and the rate of emergency percutaneous coronary intervention were 100%, and the rate of performing coronary artery bypass graft surgery was 79% (57/72 hospitals) in all centers. However, the rate of implementation of CR was low (26%, 19/72 hospitals) in overall and was extremely lower in secondary medical centers (9%, 3/33 hospitals,  $p=0.002$ ) when compared to tertiary centers (41%, 16/39 hospitals). The major barrier for CR included: lack of staff (59%) and lack of space (33%).

**Conclusion:** In contrast to the broad dissemination of acute phase invasive treatment for AMI, overall implementation of CR is extremely poor in South Korea and is more pronounced in secondary rather than tertiary medical centers.

**7.**

**Follistatin-like 1 Protects Cardiomyoblasts from Injury Induced by Endotoxin Shock**

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<sup>1</sup>Institute for Cardiovascular Science & Department of Cardiovascular Surgery of the First Affiliated Hospital, Soochow University; <sup>2</sup>Department of Cardiology, the First Affiliated Hospital of Soochow University, Suzhou, China

**Objectives:** Sepsis is a systemic inflammatory response syndrome (SIRS) caused by infection or trauma. Myocardial contractile dysfunction during septic shock is associated with its increased morbidity and mortality. Previous studies have shown that cardiac cell death contributes to sepsis-induced cardiac dysfunction. Therefore, developing effective approaches for preventing cardiac cell death would be highly needed. We and others have demonstrated the cardioprotective role of follistatin-like 1 (FSTL1) under various pathological stress, including excessive nitric oxide, myocardial infarction, ischemic reperfusion, and pressure overload. However, whether FSTL1 mediates cytoprotection against endotoxin-induced cardiac injury remains to be further elucidated.

**Methods:** Rat cardiomyoblast H9c2 cells were cultured in the presence of lipopolysaccharide (LPS, 1  $\mu\text{g}/\text{mL}$ ) or PBS for 6 hours. C57/Bl6 mice were injected intraperitoneally with LPS (10 mg/kg) or saline for 6 hours. Expression of FSTL1 was examined with qRT-PCR and western blot. H9c2 cells were pretreated with FSTL1 (100 ng/mL) alone, or together with BMP4 (20 ng/mL) for 30 minutes and then exposed to LPS for 48 hours. TUNEL assay and nuclear condensation examined by DAPI staining were used for evaluation of cell apoptosis.

**Results:** Cardiac expression of FSTL1 is elevated following LPS treatment both *in vitro* and *in vivo*. FSTL1 pretreatment significantly attenuates LPS-induced cardiac cell death. Lastly, FSTL1-mediated cytoprotection is independent of Smad1/5/9 signaling, as BMP4 fails to remove its protective role.

**Conclusion:** Our study provides novel insights into cardioprotective role of FSTL1 on cardiac cell death in LPS-induced septic shock.

ABSTRACTS

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8.

**High-intensity Interval Training in Cardiac Rehabilitation for Coronary Artery Disease**

EYW TAM,<sup>1</sup> LSW LI,<sup>2</sup> FHF CHUNG,<sup>2</sup> J YUAN,<sup>2</sup> EWY KWOK,<sup>2</sup> HF TSE<sup>1</sup>  
<sup>1</sup>The University of Hong Kong; <sup>2</sup>Tung Wah Hospital, Hong Kong

**Objective:** To compare high-intensity interval training (HIIT) with moderate-intensity aerobic exercise (MICE) as part of cardiac rehabilitation in patients with type 2 diabetes and coronary artery disease.

**Methods:** Diabetic patients with coronary artery disease were randomized to three groups for eight weeks: HIIT, MICE and control. HIIT and MICE groups performed two exercise sessions per week. Training zones for HIIT and MICE groups were calculated by maximal stress test; HIIT was conducted with bursts at 90% of heart rate reserve (HRR) spaced with recovery phases at 40% HRR. MICE was conducted as a thirty-minute session of aerobic exercise at 65% HRR. Vascular endothelial function was quantified by flow-mediated dilation using ultrasonography of the brachial artery. Clinical autonomic function tests were conducted to assess cardiovascular sympathetic and parasympathetic function. Time-domain measures of heart rate variability were obtained by 24-hour Holter ECG. Statistical analysis was conducted by one-way ANOVA.

**Results:** 41 patients were recruited (HIIT: 12; MICE: 15; Control: 14). Metabolic capacity improved in all groups (mean improvements HIIT: 2.75 METs; MICE: 2.75 METs; Control: 1.37 METs;  $p=0.069$ ; post hoc analysis revealed significant differences between HIIT and Control,  $p=0.038$ ; and between MICE and Control,  $p=0.049$ ). There was no significant difference in improvement of FMD (mean improvements HIIT: 5.62%; MICE: 1.02%; Control: 0.29%;  $p=0.138$ ). There were no significant differences in improvement in performance of clinical autonomic tests, time domain

measures of HRV and heart rate recovery after maximal stress test (all  $p>0.05$ ).

**Conclusion:** This pilot study in our locality demonstrated that high-intensity interval training may be an effective alternative to moderate intensity continuous aerobic exercise in cardiac rehabilitation. Though there were significant intra-group differences in the exercised groups, non-significant inter-group differences may be attributed to a low sample size.

9.

**Design and Rationale of the Application for Self-improvement (AnSim) Trial: A Smart Phone Based Message Intervention for Secondary Prevention in Patients with Coronary Artery Disease**

JB KIM,<sup>1</sup> SK LEE,<sup>2</sup> SH PARK,<sup>2</sup> JY CHOI,<sup>2</sup> EJ PARK,<sup>2</sup> JO NA,<sup>2</sup> CU CHOI,<sup>2</sup> HS SEO,<sup>2</sup> DJ OH,<sup>2</sup> RK CHOI,<sup>1</sup> EJ KIM<sup>2</sup>

<sup>1</sup>Division of Cardiology, Department of Internal Medicine, Sejong General Hospital, Bucheon; <sup>2</sup>Department of Cardiology, Cardiovascular Center, Korea University Guro Hospital, Seoul, Republic of Korea

**Background:** Despite strong evidence for the benefits of cardiac rehabilitation (CR), center-based CR programs are severely underutilized. With the rapid increase in the smartphone penetration rate, smartphone application based CR is a promising tool for increasing CR participation.

**Objectives:** This study aims: 1) to develop a smartphone-based, patient-specific messaging application for CR to enhance self-management of cardiovascular risk factors and 2) to evaluate the effects of app-based CR on the control of cardiovascular risk factors in patients underwent percutaneous coronary intervention within 1 month as compared with control group with usual care.

**Method:** Patient-specific messaging application for secondary prevention was developed based on international guidelines and behavior change theories through multidisciplinary team collaboration. The messages and patient-specific taxonomy algorithm was revised several times according to the peer reviews and patients feedback. The present multicenter, double-blinded, randomized clinical trial with 6 months of follow-up will enroll a total of 120 patients who will be randomized to either of treatment (app-based CR) group or control group. As usual care, an app developed by the Korean society of

cardiology for providing general information about heart disease and self-tacking of biometric data will be commonly applied to both groups. The app has been available for free since October 2015. The treatment group will receive multiple weekly messages for 6 months to promote a healthy diet, exercise, knowledge about disease and risk factors, adherence to therapy, stress management and smoking cessation if necessary. The primary endpoint is a change in cardiovascular risk factors at the 6th month. Secondary endpoints include behavioral change, self-efficacy, quality of life, cost effectiveness, and satisfaction for the applications. Each variable will be re-evaluated at the 9th month to investigate sustainability of changes after intervention.

**Conclusion:** The study is designed to investigate the efficacy of the patient-specific messaging smartphone application in secondary prevention of coronary heart disease, as compared to usual care. Results would be able to suggest directions for future development of app-based CR.

## ABSTRACTS

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### Abstracts Presentation (Poster):

#### 1.

##### **HeartFit: Preliminary Results of a Pilot Cardiac Outpatient Self-Management Programme**

J CHOY, M TAY

Tan Tock Seng Hospital, Singapore

**Objectives:** This study aims to evaluate the effectiveness of a pilot cardiac outpatient self-management group programme.

**Methods:** Participants were cardiac patients (n=8; mean age=67) recruited from a large metropolitan acute-care hospital, with primary diagnosis of acute myocardial infarct. Participants attended five sessions of a lifestyle redesign group programme incorporating theory and practical sessions. Modules included: Understanding Cardiac Symptoms and its Impact on Daily Activities, Application of Work Efficiency Principles in the Home, Workplace and Community, Stress Management and Sexuality. Standardised and validated self-report measures: The Self-Efficacy for Managing Chronic Disease 6-Item Scale (SEM-CD) and RAND 36-Item Health Survey 1.0 (SF-36) were administered on Session 1 and Session 5.

**Results:** For SF-36, there was an average increase of 15 points from 49 to 64 for Physical Functioning, an average increase of 16 points from 44 to 60 for General Health, an average increase of 29 points from 5 to 34 for Role Limitations due to Physical Health, an average increase of 13 points from 37 to 50 for Role Limitations due to Emotional Problems, an average increase of 11 points from 59 to 70 for Emotional Well-being, an average increase of 14 points from 59 to 73 for Social Functioning, an average increase of 13 points from 73 to 86 for Pain and an average increase of 10 points from 49 to 59 for Energy. For SEM-CD, there was an average increase of 1.5 points from 5.2 to 6.7 on a 10-point scale. Participants reported that HeartFit was

an "empowering experience". Application of work efficiency principles was beneficial in increasing activity endurance and participation in valued activities. Peer learning was effective in providing psychosocial support.

**Conclusions:** Participation in HeartFit led to an improvement in quality of life and an increase in self-efficacy in management of heart disease.

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#### 2.

##### **A Correlational Study of Skinfold Thickness with Physical Activity and Resting Heart Rate in Overweight and Obese Adolescents in Bangalore High Schools**

L RUSIZANA

Rwanda Allied Health Professionals Council, Kigali, Rwanda

**Background:** Overweight and obesity are undebatable risk factors for many cardiovascular diseases. Lack of regular physical activity together with high fat foods and excess energy foods intake continue to lead to overweight and obesity among adolescents. Overweight and obesity in adolescents can be evaluated by BMI percentile measurements. Whereas skinfold thickness measurements in adolescents can be used to correlate subcutaneous fat with BMI percentile measurements.

**Objective:** This study was to find if there is a correlation between skinfold thickness with physical activity and resting heart rate in overweight and obese adolescents.

**Methods:** The study was done on 71 overweight and obese male and female adolescents the age group of 10 to 19 years. Overweight and obese subjects were selected using BMI percentile charts where each subjects BMI was plotted against his/her age. A convenient sampling method was used. Selected subjects were given consent forms before they could voluntarily participate in the study. Those that fulfilled the criteria were allowed to rest in a chair and their RHR measured and recorded. The male subscapular skinfold thicknesses taken in mm and recorded, where female skinfold thicknesses were taken from triceps both on the right side of the body and in standing. Physical activity questionnaire for adolescents was given to each subject to assess his/her previous 7 days of exercise life. Then the statistical analysis was done by using repeated measures t test.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 3.

##### **Evaluation on Education and Exercise Training Effect on High-risk Cardiac Cases with and without Diabetes Mellitus**

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<sup>1</sup>Department of Physiotherapy; <sup>2</sup>Extended Rehab Centre and Division of Rehabilitation, Department of Medicine and Geriatrics; <sup>3</sup>Cardiac Rehabilitation Team, Tuen Mun Hospital, Hong Kong

In cardiac rehabilitation program, we encountered cardiovascular patients with DM but the chronotropic incompetence response related to diabetes raises the challenges in exercise prescription, exercise monitoring and its progression. The study aimed at providing exercises training program for high-risk cardiac patients (functional capacity <5 METs and left ventricular function <40%) with and without diabetes mellitus and to evaluate the effectiveness of education and exercise training for high-risk cardiac patients with and without diabetes mellitus. A group of high-risk cardiac patients were recruited by stratification from a group of cardiac patients using American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) Risk Stratification Criteria. High-risk cardiac patients were classified by an echocardiogram findings of left ventricular ejection fraction <40% and functional capacity <5 METs. In high-risk cardiac patients with DM, diabetic-related complications, including automatic neuropathy and retinopathy, were closely monitored through physical signs and electrocardiogram with reference to American Physical Therapy Association Guidelines and Education for Diabetics. Forty cases (28 male and 12 female) were recruited from April 2014 to March 2016, with 15 high-risk cardiac cases with DM and 25 high-risk cardiac cases without DM. The baseline fitness from pre-exercise stress test (p=0.63) and 6MWT (p=0.24) were similar. For high-risk cardiac patients without DM, 6MWT and exercise stress

test significantly improved from 433 m±80 m to 516 m±90 m (p<0.001) and 3.7 METs±0.6 METs to 5.7 METs±1.6 METs (p<0.001) respectively. For high-risk cardiac patients with DM, 6MWT and exercise stress test significantly improved from 398 m±82 m to 491 m±108 m (p=0.001) and 3.9 METs±0.7 METs to 5.6 METs±1.6 METs (p<0.001). Post exercise stress test (p=0.63) and 6MWT (p=0.37) between two groups showed no statistical significance difference. Patients without and with DM attended 10 and 11 sessions respectively. Cardiac rehabilitation program improved cardiopulmonary fitness in both groups. Physiotherapists educated and monitored safe exercise training, diabetes complications for all high-risk cardiac patients participating regular exercises to prevent future cardiovascular complications.

#### 4.

##### **Chronotropic Incompetence in Patients with Chronic Heart Failure after ICD or CRT-D Implantation**

N YOSHIDA, N IKEDA, Y UGATA, Y SUGAWARA, T MITSUHASHI, H FUJITA, S MOMOMURA

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**Objectives:** Chronotropic incompetence (CI), broadly defined as the inability of the heart to increase its rate commensurate with increased activity or demand, is prevalent in heart failure (HF) and Device Therapy recipients. CI is known predictors of all-cause mortality and cardiovascular events and produces exercise intolerance that impairs quality of life. We evaluated the relationship between the degree of chronotropic incompetence and medications and variables measured during a cardiopulmonary exercise (CPX) test in patients with HF with reduced ejection fraction (HFrEF).

**Methods:** From July 2013 through July 2014, 64 patients with chronic heart failure (CHF) with reduced ejection fraction (EF<40%) within 1 year before and after ICD or CRT-D implantation underwent CPX test. CI was defined as a failure to achieved 80% of the maximum predicted heart rate (HR). This series of investigations consisted of a retrospective study and assessed relationship between CI and CPX test variables, medications, and cardiac events.

**Results:** CI was present in 78.1% of the population. Patients with CI was more likely to be higher BNP (278±235 versus 695±913, p=0.097). Atrial fibrillation, diabetes, and varieties and quantities of  $\beta$ -blocker didn't associate with CI. Patients with CI had lower peak VO<sub>2</sub> and AT despite similar EF and comorbidities. Patients with CI increased cardiac mortality.

**Conclusion:** Patients with CI is severe heart failure. CI was associated with cardiac mortality. Patients after ICD or CRT-D implantation can be found CI and these findings could be important for diagnosing prognosis.

## ABSTRACTS

Abstracts Presentation (Poster):

### 5.

#### Simple Indicators that Ejection-fraction and Heart Rate at Rest Can Distinguish Positive Patients and False Positive Patients in Treadmill Exercise Test

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Tokyo Yamate Medical Center, Tokyo, Japan

**Background:** Treadmill exercise test (Ex-t) is a non-invasive routine laboratory modality for induction of myocardial ischemia, and ST-depression (ST-dep) is a specific finding in CAD. However, false positive cases cannot be excluded completely.

**Purpose and Method:** we divided patients who received the treadmill exercise test into 3 groups as a positive group (ST-dep and any revascularization therapy) and a false positive group (ST-dep with normal coronary) or a negative group (no ST-dep). We compared positive patients and negative patients about EF on UCG and HR at rest.

**Results and Conclusion:** HR at rest in positive group is higher than in false positive group (70.8 bpm vs 65.3 bpm  $P=0.017$ ). EF in positive group is lower than in false positive group (61.6% vs 67.4%  $P=0.000037$ ). By using cut off point (both HR at rest; 70.0 bpm and EF; 61%), positive group was discriminated significantly from false positive group [sensitivity: 1, specificity: 0.80, positive predictive value: 0.31, negative predictive value: 1 (chi-test)]. When we saw the patient whose ECG shows ST segment depression, We can judge the Patient (whose HR is higher than 70.0% and EF on UCG is lower than 61.0%) is positive case.

Usually sympathetic nerve is enhanced and vagal nerve is suppressed in patients with ischemic heart disease, as a result, HR at rest increases in such patients. Myocardial ischemia reduce the cardiac contractility. Therefore HR at rest and EF on UCG may be an additional tool for diagnosis of Ex-induced myocardial ischemia.

### 6.

#### What Does It Mean the Slowly Lowering of the Heart Rate During Recovery Stage of the Treadmill Exercise Test?

S WATANABE, K KASANO, M SEYA, N KAWAGUCHI, T MURAKAMI, H ITO, Y YAMAMOTO, A SUZUKI, M USUI  
Tokyo Yamate Medical Center, Tokyo, Japan

**Background and Purpose:** There is an individual difference in the lowering of the heart rate (HR) during the recovery stage of the treadmill exercise test (TMT). We hypothesized that the slowly lowering of HR during the recovery stage represents the activated sympathetic nerve and the suppressed parasympathetic nerve of the patients. We investigated the autonomic nerve activity and clinical characters of patients who received TMT. The autonomic nerve activity was assessed by HF (msec<sup>2</sup>) and LF/HF that were measured by heart rate variability (Mem-calc method)

**Method and Result:** Autonomic activity was measured to consecutive 640 cases referred to the TMT. We measured the HR 5 minutes later after the recovery stage starts (=Rec-HR), and we calculated the ratio of Rec HR and max HR during the exercise (=Rec-HR/Max-HR). The average value of Rec-HR/Max-HR was 0.588. There was a significant correlation between Rec-HR/Max-HR and HR at rest ( $R=0.62$ ), HF ( $R=-0.32$ ), LF/HF ( $R=0.10$ ), HDL-cholesterol ( $R=-0.199$ ), TG ( $R=0.164$ ) and BMI ( $R=0.221$ ). We divided patients who received TMT into two groups, as the Large-group (Rec-HR/Max-HR is larger than the average value ( $N=313$ )) and as the Small-group (Rec-HR/Max-HR is smaller than the average value ( $N=327$ )). HR at rest, LF/HF, BMI and TG of Large-group were significantly higher than those of Small-group. HF and HDL-cholesterol of Large-group were lower than those of Small-group. In the 640 cases, 23 cases were positive for myocardial

ischemia, which consist of 18 cases in Large-group and 5 cases in Small-group. By using cut-off point of Rec-HR/Max-HR(0.588), positive cases were discriminated significantly from negative cases [ $p=0.004$ , sensitivity: 0.78, specificity: 0.52, positive predictive value: 0.057, negative predictive value: 0.98]

**Conclusion:** The slowly lowering of the heart rate during the recovery stage means the activated sympathetic nerves and the suppressed parasympathetic nerves of patients who received TMT, and it can detect positive patients for myocardial ischemia.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 7.

##### **Current State of Exercise Tolerance Test in Cardiac Rehabilitation Program**

SHIM,<sup>1</sup> SY LEE,<sup>2</sup> EY HAN<sup>2</sup>

<sup>1</sup>CHA Bundang Medical Center; <sup>2</sup>Jeju National University Hospital, Jeju National University School of Medicine, Jeju, Republic of Korea

**Objectives:** This study aimed to investigate the current state of the cardiopulmonary assessment in cardiac rehabilitation (CR) program of one regional cardiocerebrovascular center in South Korea.

**Methods:** Data was retrospectively collected from January 2011 to December 2015. Three hundred and eighty-nine patients with acute myocardial infarction (AMI) were referred for on phase I CR after percutaneous coronary intervention (PCI) and 221 patients (56.8%) underwent ETT before the initiation of phase II CR. The demographic, clinical characteristics and functional ability, including six-minute walk test (6 MWT) were reviewed. And, cardiopulmonary parameters including maximal oxygen consumption ( $VO_{2peak}$ ), metabolic equivalents ( $MET_{peak}$ ), resting heart rate (RHR), resting systolic and diastolic blood pressure (RSBP and RDBP), maximal heart rate (MHR), maximal systolic and diastolic blood pressure (MSBP and MDBP), maximal rate pressure product (MRPP), ETT duration and respiratory exchange ratio (RER) were obtained.

**Results:** All patients (178 male, 43 female; average age  $60.20 \pm 12.79$  years) participated in this study had no serious adverse events. Mean duration between onset and ETT was  $20.21 \pm 9.89$  days. And 176 patients (79.6%) underwent a modified Bruce protocol and another 45 patients (20.4%) performed a Ramp protocol. Ramp group revealed older age, lower peak aerobic capacity and gait endurance and shorter duration of ETT than modified Bruce group, but there were no significant difference between two groups in RER, MHR and MSBP.

**Conclusion:** The 56.8% of all referred patients post-PCI were conducted at about  $20.21 \pm 9.89$  days and most of them were assessed using modified Bruce protocol. However, for older patients with lower functional capacity, Ramp protocol might be considered.

#### 8.

##### **Report of Cardiac Rehabilitation in Single Cardiocerebrovascular Center in 3 Years**

SJEE,<sup>1,2</sup> W HONG<sup>1,2</sup>

<sup>1</sup>Chungnam National University Hospital; <sup>2</sup>Daejeon-Chungnam Regional Cardiocerebrovascular Center, Daejeon, Republic of Korea

**Objective:** To assess the outcomes of cardiac rehabilitation by analyzing the changes in the cardiac rehabilitation utilization during 3 year in a single Cardiocerebrovascular Center.

**Methods:** We retrospectively analyzed the patients of 2013 to 2015 in OO Hospital, Department of Rehabilitation Medicine. Inclusion criteria were: (1) Those who diagnosed MI (Myocardial Infarction); (2) Had admitted to Cardiology department. Data were abstracted from healthcare records.

##### **Results:**

###### *Equipment and Facilities*

Exercise area is 120 m<sup>2</sup>, clinics area of 15.42 m<sup>2</sup>, counseling and education room was 13.5 m<sup>2</sup> and the bathroom was 6.46 m<sup>2</sup>. The treadmill which is available of modulating low speed and tilting degree, and has emergency stop button was 3, EKG telemetry was 8 channels, 6 lower extremity ergometers, 2 upper extremity ergometers, and no floor matt and resistive exercise device. For cardiopulmonary exercise test facility, 1 treadmill and 1 lower extremity ergometer. We had emergency cart. For specialist, 1 physical medicine and rehabilitation physician and two ACLS certification specialist, 1 exercise therapist, 1 nurse specializes in cardiac rehabilitation, 1 medicine physician who participate in exercise test.

**Patient status:** The rate of referral to rehabilitation medicine was 41.94% in 2011. It is increased after and it was 93.13% in 2013, 92.45% in 2014, 92.99% in 2016. The rate of out patient follow up was 57 patients in 2013, 112 patients in 2014, 110 patients in 2015.

**Conclusion:** These data will be used as an important basis for determine future government policy of cardiac rehabilitation. And by identifying current status of cardiac rehabilitation, it will be an opportunity to think about future improvements.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 9.

##### **Quality of Life and Recognition for Cardiac Rehabilitation Services of People with Cardiovascular Disease**

W HONG, S JEE

Chungnam National University Hospital, Daejeon, Republic of Korea

**Objective:** To evaluate the level of health related-quality of life (HRQoL), life satisfaction, and present status of cognizance of cardiac rehabilitation (CR) services in people with cardiovascular disease.

**Methods:** This study was designed as a questionnaire survey. Data were collected through a questionnaire answered by 53 patients (65.7±11.6 years, 33 men) with unstable angina, myocardial infarction, and heart failure. The questionnaire included the Medical Outcome Study 36-item Short-Form Health Survey (MOS SF-36), life domain satisfaction measure (LDSM), the recognition and degree of CR services.

**Results:** The average scores of physical component summary (PCS) were 47.7±18.5 and mental component summary (MCS) were 56.5±19.5. There were significant mean difference in physical role (F=4.2, p=0.02), vitality (F=10.7, p<0.001), mental health (F=15.9, p<0.001), PCS (F=3.6, p=0.034), MCS (F=11.9, p<0.001) among disease categories. The average score of LDSM was 4.7±1.5. Age and disease duration had a negative correlation with multiple areas of HRQoL (p<0.05). Monthly income, ejection fraction, and LDSM had positive correlation with several items of MOS SF-36 (p<0.05). However, number of modifiable risk factors and medication had no significant correlation. Thirty seven subjects (69.8%) answered that they had not been heard about CR services. Seventeen patients (32.1%) reported that they will participate CR services actively. Most of the people said proper monthly payment is below 100,000 won.

**Conclusion:** In cardiac disease, physical component seems to be affected more than mental health. CR needs to focus about that area. Also, there are little recognition about CR services. Psychiatrists should take an active participation to the cardiovascular community for extension of recognition and role of rehabilitation medicine.

#### 10.

##### **Very Low-carbohydrate Diet can Effectively Reduce Weight without Deterioration in Physical Fitness**

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<sup>1</sup>Hokusho University, Ebetsu; <sup>2</sup>Hokkaido University Graduate School of Medicine, Sapporo, Hokkaido, Japan

**Background:** Regular physical activity combined with diet therapy is ideal for treating obese patients at risk. Lines of evidences demonstrated that a very low-carbohydrate diet (VLCD) is extremely effective for weight loss. However, there is a potential for VLCD to deteriorate physical fitness by depleting muscle glycogen stores and reducing insulin stimulus.

**Purpose:** We examined the effects of VLCD and a conventional caloric restriction (CR) on physical fitness.

**Methods:** We recruited 24 subjects with overweight and/or glucose intolerance (20±2 yr). The subjects were randomly assigned to VLCD (carbohydrate intake <20 g) and CR group (ideal weight kcal). We measured body composition, blood parameters (glucose tolerance, lipids, uric acid, liver enzymes, ketone bodies, C-reactive protein, growth hormone, testosterone, and dehydroepiandrosterone), and various physical performance aspects (leg extension, handgrip dynamometry, sit-up, and bicycle ergometer) before and after 1 month of each diet.

**Results:** Ketone bodies were remarkably elevated in VLCD group (64.9±33.0 vs 962.1±1047.0 μmol/L, p=0.017), while those were not changed in CR group (64.8±10.2 vs 239.0±336.9 μmol/L, p=0.107). Hemoglobin A1c, HOMA-IR (homeostasis model assessment of insulin resistance) and C-reactive protein are decreased only in VLCD group. Body mass index significantly decreased in both VLCD (24.9±3.5 vs 23.5±3.5 kg/m<sup>2</sup>, p<0.001) and CR group

(24.7±3.8 vs 24.1±3.8 kg/m<sup>2</sup>, p=0.026). Waist circumference significantly decreased only in VLCD group (84.9±3.5 vs 81.1±10.2 cm, p=0.001). Consequently, physical performance aspects were similarly maintained in both groups after each diet.

**Conclusions:** We have demonstrated that VLCD can improve obesity measures and related factors more effectively without negative effects on physical fitness compared to CR.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 11.

##### **Characteristics and Physical Fitness for Discharge to Home in Patients with Heart Failure**

Y HAMADA,<sup>1</sup> S KUROSE,<sup>1</sup> M IMAI,<sup>2</sup> R KUSABA,<sup>1</sup> S OGINO,<sup>1</sup> T SHICHISAWA,<sup>1</sup> S YOSHIDA,<sup>1</sup> K OZASA,<sup>1</sup> Y SASAKI,<sup>3</sup> C WATANABE,<sup>3</sup> T HASHIMOTO,<sup>3</sup> N AZUMA,<sup>4</sup> I MASUDA<sup>5</sup>

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**Objectives:** The number of cases of hospitalization due to heart failure (HF) has been increasing owing to a decrease in exercise tolerance and activities of daily living, making discharge to home impossible. The aim of this study was to investigate the characteristics and physical fitness of patients with HF who could be discharged home.

**Methods:** Subjects were 105 consecutive patients with HF (77.4±11.5 years, 66 men) who underwent acute-phase cardiac rehabilitation and whose physical fitness was measured before discharge from the hospital. Data regarding the patients' characteristics were collected, such as medical history, body composition, cardiac function, laboratory data, and family structure from the medical record. Physical fitness was measured by analyzing variables such as hand grip, 10-m walking speed, 10 times sit-to-stand, one-leg standing time with eyes open, and 6-minutes walking distance. The HF patients were divided into two groups, namely discharge to home (Home group) and transfer to another hospital (Transfer group).

**Results:** The Home group consisted of 91 (86%) patients. Patients in the Home group had a significantly lower age (75.0 vs. 83.6 years) and 10 times sit-to-stand (36.9 vs. 56.0 sec), but significantly higher body mass index (23.4 vs. 20.0 kg/m<sup>2</sup>), Barthel index (87.7 vs. 80.7 points), and one-leg standing time with the eyes opened (16.6 vs. 6.4 sec) than those in the Transfer group. The prevalence of dementia and the certification rate of long-term care were slightly lower in the Home group than in the Transfer group. No significant differences were observed in cardiac function between the two groups. Multiple logistic regression analysis revealed that the 10 times sit-to-stand was an independent predictor of discharge to home (OR=0.96, 95% CI=0.94-0.99, p<0.05).

**Conclusion:** The results showed that 86% of the HF patients could have been discharged home, and the independent factor was only leg strength.

#### 12.

##### **Phase 1 Cardiac Rehabilitation Program Improves Risk Factor Control & Patient Knowledge**

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Pok Oi Hospital, Hong Kong

**Introduction:** Coronary heart disease (CHD) is one of the leading causes of mortality worldwide<sup>1</sup>. Cardiac rehabilitation program (CRP) is constantly underutilized despite its well established benefits<sup>2</sup>. A multi-disciplinary CRP Phase 1 was implemented in November 2013 in CCU of Pok Oi Hospital.

**Objectives:** 1) Ensure evidence-based medication prescription; 2) Risk factors control; 3) Improve patient's knowledge on CHD; 4) Provide early mobilization

**Methodology:** From November 2013 to 2015, we recruited 182 CHD patients admitted to CCU after stabilization. Risk factors were identified by attending cardiologist on admission. Nurses then offered education program about CHD and risk factor control. Patient's knowledge was assessed using a standardized pre- and post-questionnaire. Selected patients underwent revascularization were referred to physiotherapist for early mobilization. Blood test including fasting lipid, fasting glucose, HbA1c was evaluated during recruitment and follow-up at specialist out-patient clinic. Nurses would ensure evidence-based medication was properly prescribed. Nurses would inform cardiologists if risk factor control was not optimized.

**Results:** 182 patients were recruited. Mean age was 60.95±11.76. Majority of patients (79%) were suffering from acute coronary syndrome (ACS). Majority of CHD patients (92%) had percutaneous coronary intervention (PCI) performed. Mean follow-up was 53 days. All risk factors were improved

significantly. Mean fasting glucose improved from 6.94 to 6.06 (p<0.001), triglyceride improved from 1.48 to 1.34 (p=0.038), total cholesterol improved from 4.29 to 3.67 (p<0.001), LDL were improved from 2.56 to 1.9 (p<0.001) and HDL was raised from 1.1 to 1.17 (p<0.01). Mean knowledge score of CHD improved after education program (12.19 to 13.81, Max 15; p<0.001). Prescription percentage of evidence-based medication including ACEI (from 54.9% to 76.9%), beta-blocker (from 47.3% to 64.3%) and statin (from 96.7% to 97.8%) 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):

#### 13.

##### **Participation in Cardiac Rehabilitation Program for Patients with Different Risk Categories in Sarawak Heart Center**

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<sup>1</sup>Sarawak General Hospital; <sup>2</sup>Sarawak Heart Center, Kuching, Sarawak, Malaysia

**Objective:** Exercise therapy and education program are two important components of cardiac rehabilitation program (CRP). Compliance to the prescribed program is important in order to achieve the desired therapeutic effects. The study compared the various risk categories of participation in the CRP.

**Methods:** This cross-sectional retrospective study enrolled 148 consecutive patients who attended the CRP in Sarawak Heart Center from March 2014 to February 2015. Subsequently, 106 patients proceeded for exercise stress test (EST) prior to enrolling into CRP. We analyzed the demographic, functional profile, association between risk category and participation in CRP.

**Results:** The results showed that the cohort mean age was 54 years with a range of 30 and 75. As for functional assessment with six minute walk test, our participants could cover a varying distance of 132 to 600 meters with a mean distance of 407 meters. The mean maximum workload achievable for EST was 8.2 Mets (range 1.4-14.5 Mets). All low risk group patients were enrolled into the full program with only 8% default rate. 84.7% of moderate risk group entered the program with 15.3% default rate. Fifty percent of the high-risk group enrolled for the full program when they could achieve more than 4 Mets of maximum workload during the EST. The remaining of the high risk group alternatively participated in the education program which

recorded the highest default rate of 18.2%. The low risk group had the best compliance rate which could be attributed to higher exercise program enjoyment. This study showed the association of the different risk categories and the level of participation in our center CRP.

**Conclusion:** Our cardiac rehabilitation program had overall high participation rate in all risk categories, we could improve further the level of participation for the high risk group by introducing telemetry monitoring which allow more patients to enroll in full program.

#### 14.

##### **The Effectiveness of Work Hardening Program on Self-efficacy in Lifting and Carrying for Patients with Cardiovascular Diseases**

WWS CHAN,<sup>1</sup> RHC LIN,<sup>1</sup> SFL LEE,<sup>1</sup> CSF YAU,<sup>1</sup> LSW LI,<sup>2</sup> HF TSE<sup>3</sup>

<sup>1</sup>Occupational Therapy Unit, Tung Wah Hospital; <sup>2</sup>Cardiac Rehabilitation and Prevention Center, Tung Wah Hospital; <sup>3</sup>Department of Medicine, The University of Hong Kong, Hong Kong

**Aim:** The aim of this study is to examine the effect of self-efficacy in lifting and carrying objects after work hardening program for cardiac day-patients.

**Method:** From 8/2014 to 8/2015, 74 cardiac day-patients in Tung Wah Hospital were recruited into 16-session cardiac rehabilitation program and received conventional education and exercise training in 2 months. Thirty-eight cases having functional demands in manual handling tasks were selected into work hardening group (WH group) and received additional work hardening training in Occupational Therapy Unit. The remaining 36 cases were served as control (non-WH group). Patients have to rate the self-efficacy in lifting different weights (10 lbs, 20 lbs, 30 lbs, 40 lbs) and carrying by using the visual analog scale ranging from 0 to 100 (100=full confidence) in pre and posttest for both groups. Paired t-test was used for analysis.

**Result:** There were similar characteristics between two groups in age, gender, Metabolic Equivalent (MET) and Ejection Fraction (EF) in pretest. No significant difference in MET and EF between two groups in pretest indicated that the baseline was comparable. In WH group, self-efficacy scores increased in all loading in lifting and carrying, moreover; significant differences were shown between pre and posttest, especially in heavy lifting (30 lbs and 40 lbs). In non-WH group, scores increase in lifting 20 lbs, 30 lbs, 40 lbs and carrying but the results were not significant in all loadings. In posttest, MET

increased 3.2 (76.9%) for WH group and 2.8 (62.1%) for non-WH group, while EF increased 2.2 (4.8%) and 2.7 (7.3%) for WH group and non-WH group respectively. For both groups, outcomes in MET and EF showed improvement significantly.

**Conclusion:** The cardiac day-patients increased self-efficacy in lifting and carrying especially in heavy lifting after participate in work hardening program. The physical capacity improves in both groups because both groups received exercise training.

## ABSTRACTS

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Abstracts Presentation (Poster):

### 15.

#### **Different Cardiopulmonary Response during Recumbent Cycling and Upright Cycling in Healthy Subjects: Clinical Implication for Cardiac Rehabilitation Program in Heart Failure Patients**

HY RYU, J OH, D YUN, J KIM, SM KANG

Yonsei Cardiovascular Hospital, Seoul, Republic of Korea

**Background:** Cycling is widely used to improve cardiopulmonary function in cardiac rehabilitation centers. Despite previous studies demonstrated recumbent cycling (RC) with sub-maximal intensity was associated with less hemodynamic burden compared to upright cycling (UC), there are little data about comparison of cardiopulmonary response between RC and UC.

**Methods:** The study population consisted of 12 healthy volunteers (male=7, mean age 29.7±5.7, female=5, 25.4±5.7 years old). Each subject was randomly assigned to perform RC or UC, and started workload at 10 W and increased by maximal pedaling (to 100 W). After taking a rest as much as their heart rate (HR) reached to baseline HR, they performed cycling vice versa.

**Results:** Baseline parameters including HR, systolic blood pressure (SBP), diastolic blood pressure, and rate pressure product (RPP) are comparable between RC and UC group. Submaximal SBP (138.1±10.8 vs. 151.3±15.9 mmHg, p=0.027), submaximal RPP (15244.2±1860.8 vs. 17698.8±3325.4, p=0.036), and maximal RPP (25328.3±3032.9 vs. 28443.8±3139.4, p=0.022) in RC group were significantly lower than those of UC group, respectively. Peak VO<sub>2</sub> (27.2±3.6 vs. 29.5±2.8 mL/kg/min, p=0.087) in RC group tends to be lower than UC group. However, maximal HR was not significantly different between RC and UC group (163.7±16.2 vs. 171.7±15.6 beats/min, p=0.231). Also, there was no significantly different in rating of sub-optimal perceived exertion between two groups (10.8±1.8 vs. 11.7±2.0, p=0.285).

**Conclusion:** This study showed that RC was significantly associated with lower submaximal SBP, submaximal RPP, and maximal RPP compared to UC in healthy subjects. These results provide useful information when we consider cardiac rehabilitation program based on cycling exercise in heart failure patients, especially in elderly or reduced left ventricular function.

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### 16.

#### **The Relationship Between Functional Capacity and Quality of Life After Percutaneous Coronary Intervention**

SH PARK,<sup>1</sup> EJ KIM,<sup>2</sup> SK LEE,<sup>2</sup> JP KIM,<sup>3</sup> SH PARK<sup>2</sup>

<sup>1</sup>Korea Uni. Guro Hospital, Sports Medicine Center, Seoul, Guro-gu; <sup>2</sup>Korea Uni. Guro Hospital, Department of Cardiology, Seoul, Guro-gu; <sup>3</sup>Sejong Hospital, Department of Cardiology, Gyeonggi-do, Buchun-si, Republic of Korea

**Objectives:** Exercise program has been known to reduce mortality and morbidity in patients with angina. It improved not only functional capacity but also quality of life (QOL) after percutaneous coronary intervention (PCI). This study was performed to assess the relationship between functional capacity and QOL in patients with angina after PCI.

**Methods:** A total of 77 patients undergoing PCI were included. All patients were tested for functional capacity and QOL two weeks after PCI. The functional capacity was measured by Metabolic Equivalent of Task (METs)-value using cardiopulmonary exercise testing (CPX) and six-minute walk test (6MWT). The QOL was evaluated by Seattle Angina Questionnaire (SAQ) and WHO-Quality of life-BREF (WHOQOL-BRIEF). SPSS version 20.0 was used for the statistical analysis.

**Results:** METs-value, 6MWT was correlated with question part1 physical health status\* and question part2 mental health status\*\* in the WHOQOL-BRIEF (question part1-6). However it did not demonstrate the correlation with SAQ (question part1-5). (correlation is significant at the 0.01 level\*\*, correlation is significant at the 0.05 level\*).

**Conclusion:** Functional capacity was correlated with QOL, both physical and mental health status, in patient with angina after PCI.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 17.

##### **Rasch Analysis and Item Reduction of the Chinese Version of the Cardiac Anxiety Questionnaire (CAQ) for Clinical Setting in Hong Kong**

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<sup>1</sup>Princess Margaret Hospital; <sup>2</sup>Tung Wah Hospital, Hong Kong

**Objectives:** The CAQ is a psychometrically validated instrument for assessing cardiac anxiety. Increasing evidence has suggested that gender differences exist in anxiety symptoms in cardiac patients. This study aimed at validating the Chinese version of the CAQ (CAQ-HK).

**Methods:** The CAQ-HK was tested in patients who attended Cardiac Rehabilitation & Prevention Centre at Tung Wah Hospital before starting rehabilitation. In Study 1 involving 663 male patients aged between 25 and 64 (M=53, SD=7.5), psychometric properties of CAQ were assessed by using Rasch modelling and principal component analysis (PCA) in which misfitting and redundant items were identified and eliminated. In Study 2 involving 86 female patients aged between 19 and 64 (M=55, SD=9.3), confirmatory factor analysis (CFA) assessed the fit of the factor structure of this refined scale derived from Study 1.

**Results:** Rasch analysis of Study 1 showed that the concepts of the original 18-item CAQ could be retained by the 16-item Hong Kong version. PCA yielded a four-factor solution, including somatic attention, hypervigilance, avoidance and fear (explaining 61% of the total variance,  $r_s > 0.40$ ) - such a factor-model was also confirmed in the female patients by CFA (CFI=0.90) in Study 2. Internal consistency was good in both samples (alphas  $> 0.84$ ).

**Conclusion:** The 16-item CAQ-HK is a reliable and valid instrument for use in patients attending cardiac care service. The four meaningful clusters of CAQ-HK indicated a unique frame of reference among cardiac patients in Hong Kong, and were found to be stable across gender. Future research is necessary to determine the factor structure of CAQ-HK in older adult patients.

#### 18.

##### **Early Return to Work Program: A Safe Strategy to Facilitate Young Cardiac Patients for Work Resumption**

PK YU, WY CHU, WC CHENG, NY CHAN

Princess Margaret Hospital, Hong Kong

**Background:** Myocardial infarction (MI) is increasingly common in young population. Apart from direct medical costs, the economy will also suffer from productivity loss when resuming work is delayed. Potential risks for safe work resumption are expected in patients with more impairment in cardiac function, physical capacity or psychosocial function. Better strategies are needed for enhancing patients' potential for work resumption.

**Methods:** A pilot program was implemented from June 2014 till present. Target cases were post-MI patients of working age. Pre-discharge assessment was conducted to identify medical factors, occupational or psychosocial barriers. Medical factors were improved by complete revascularization by direct percutaneous coronary intervention (PCI) and risk stratification procedure including post-PCI treadmill test and echocardiogram. Early comprehensive work rehabilitation would be initiated after patient discharge.

**Results:** 29 patients (27 male, 2 female) with mean age of 52.6 years old were recruited. Major diagnoses included ST elevation myocardial infarction (58.6%), non-ST elevation myocardial infarction (20.7%), unstable angina (10.3%) and others (10.4%). Post-PCI treadmill test revealed mean level of metabolic equivalent of 8.3 and the post-PCI echocardiogram showed mean left ventricular ejection fraction of 61.5%, indicating low medical risks. Fifteen (51.8%) patients attended work capacity evaluation only, 10 (34.4%) patients required training after work assessment and 4 (13.8%) patients defaulted the program. Work capacity evaluation revealed high physical

demands characteristics (PDC) in 14 (56%) patients and medium or lower PDC at work in 11 (44%) patients. The overall work performance showed 52% matched, 32% marginally-matched and 16% unmatched with previous work demands. The total return to work rate was 96% with 68% direct work resumption. The mean time for patients resuming work after operation and hospital discharge was 38.6 (SD=39.1) and 37.3 (SD=37.5) days respectively. SF36 was employed as outcome indicator. Significant improvement was found in physical functioning ( $p=0.031$ ). Although improvement in bodily pain ( $p=0.053$ ) and general health ( $p=0.054$ ) were insignificant, there were observable positive changes after the program.

**Conclusion:** Early return to work program, with systematic procedure to improve medical factors, reduce risks and enhance work capacity, could facilitate post-MI patients to resume work earlier in a safe manner.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 19.

##### **To Explore the Risk Factors When Applying High-Intensity Interval Training in a RCT Study in a Local Cardiac Rehabilitation Centre** FHF CHUNG,<sup>1</sup> J YUAN,<sup>1</sup> EFM SO,<sup>1</sup> LSW LI,<sup>2</sup> HF TSE,<sup>3</sup> EYW TAM,<sup>3</sup> EWY KWOK<sup>2</sup>

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**Objective:** To explore the risk factors of applying High-Intensity Interval Training (HIIT) in cardiac rehabilitation.

**Method:** HIIT was applied to patients randomized into HIIT group in a cardiac rehabilitation centre of Tung Wah Hospital in December 2015. The HIIT zone (90-95% heart rate reserve, HRR) was calculated according to the maximal heart rate and resting heart rate measured in a maximal stress test. The heart rate zone for the recovery phase, aerobic warm-up and cool-down was set at 40-50% HRR. The achievement of the HIIT zone (90-95% HRR) was a crucial component to distinguish it from the traditional moderate-intensity training method (MIT) (40-85% HRR). Patients were asked to pedal at full effort to reach the HIIT zone at every exercise bout as soon as possible. They were asked to pedal faster and / or the pedaling resistance of the stationary bike was increased.

**Result:** In total, 41 patients were recruited (HIIT group-12; MIT group-15; Control group-14). Only one patient dropped out from the HIIT group of the study due to manageable post-exercise hypotension. Among the 11 patients in the HIIT group, 8 patients (73%) were able to reach the target HIIT zone while 3 patients (27%) could not reach their training zone. There is no severe adverse effect due to the HIIT training. The achievement of HIIT zone varied between patients. The inability to reach HIIT zone was usually owing to the

following reasons: (1) inadequate muscle strength / endurance; (2) suppression of HR by beta-blocker; and (3) non-full-effort exertion in fear of subsequent BP rise.

**Conclusion:** Achievement of high-intensity training zone was important in HIIT. Selection of patients with adequate strength / endurance, optimal BP control and consideration of effect of beta-blocker would make it easier to achieve the target training zone. There is no identifiable high risk factors found.

#### 20.

##### **Outcomes after Completion of Phase II Cardiac Rehabilitation in Coronary Artery Disease Patients: A One Year Follow Up**

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**Objectives:** Regular exercise is needed continuously after completion of phase II cardiac rehabilitation (CR). However, the compliance for doing home-based exercise was low. Phase II CR program in Dr. Hasan Sadikin Hospital is newly modified. This study aims to investigate the patients outcomes (compliance for regular home-based exercise, re-hospitalization, and mortality rate) after completion of phase II CR.

**Methods:** Thirty six CAD patients participated in phase II CR at Dr. Hasan Sadikin Hospital from September 2014 to January 2015. The program lasts 4-8 weeks, consist of 6-12 education, aerobic exercise, moderate intensity and continuous training, minimum once weekly, for 30 minutes each. After completion of the program, patients are prescribed a home-based exercise program. One year after the end of the program, the patients were asked to complete a set of questionnaire regarding re-hospitalization and mortality due to cardiac event, so does their compliance for regular home-based exercise by brief interview or phone call. Participants then grouped into three groups based on their compliance. Regular exercise of 30 minutes/day; at least 3 times/week for good compliance, 1-2 times/week for moderate compliance

and poor compliance for those without any regular exercise. Resistance exercise confirmed "Yes" if they did 2 times/week regularly.

**Result:** 77.8% participants are male and have mean age 57.92±6.81 years. Most participants (77.8%) had prior PCI. Compliance category showed 72.2% participants was good, 27.8% was moderate, but only 0.05% participants continued resistance exercise. The re-hospitalization and mortality rate after 1-year completion of phase II CR is 0%.

**Conclusion:** One year after completion of CR program, all participants showed very good clinical outcomes and good compliance for endurance exercise, but in the contrary of resistance exercise. This data encourage us to integrate this program to the routine practice with improvement in resistance exercise program.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 21.

##### **Factors Influencing Recruitment into Cardiac Rehabilitation Program in Patients after Acute Coronary Syndrome post Percutaneous Coronary Intervention: A Retrospective Study**

MG LEGISLADOR, S LIM, T A/P KARAYA KAVUDAN, J WEN, KT NAW, J TANG, CW LEE, KL LEOW, M LIANG, TK ANG, LF LING, SS IMRAN, D SOON, HY ONG, CP WONG

Khoo Teck Puat Hospital, Singapore, Singapore

**Objectives:** Cardiac rehabilitation program (CRP) is an important part of the holistic care for patients after acute coronary syndrome (ACS). We aim to identify factors which influence the recruitment into CRP.

**Methods:** This is a retrospective study of patients who have admitted for ACS and undergone percutaneous coronary intervention (PCI) between January 2015 and December 2015. A total of 371 patients were identified and included in this study.

**Results:** Only 147 (39.6%) patients were recruited into CRP. There is no significant difference in both sex distribution (male: 88.4% vs. 89.7%;  $p=0.694$ ) and age ( $56.1\pm 9.2$  vs.  $55.7\pm 8.8$  years;  $p=0.731$ ) between the two groups.

Four factors are identified, which significantly influence the recruitment rate (RR), namely patient's education level, types of living flats, monthly income and level of anxiety during index admission based on the cardiac anxiety questionnaire (CAQ) score. High educational level was defined as the level of Diploma or above, which is associated with a significantly higher RR (58.3% vs. 38.0%;  $p=0.018$ ). Patients with high monthly income, i.e.  $\geq S\$3000$ , RR is also significantly higher (56.8% vs. 36.6%;  $p<0.01$ ). Moreover, RR is significantly higher in patients living in self-owned flats (42.9% vs. 16.8%;  $p<0.01$ ). Higher level of anxiety is also associated with significantly higher RR (CAQ score:  $23.1\pm 13.5$  vs.  $18.5\pm 12.6$ ;  $p<0.01$ ). The level of anxiety is

significantly higher in patients with high educational level (CAQ score:  $27.6\pm 9.4$  vs.  $19.6\pm 13.2$ ;  $p<0.01$ ) or high monthly income (CAQ score:  $26.4\pm 11.5$  vs.  $19.5\pm 13.0$ ;  $p<0.01$ ) respectively.

Other factors such as cardiovascular risk factors and the type of ACS on presentation do not significantly affect the RR.

**Conclusion:** Higher socio-economic status is associated with significantly higher RR into CRP. Higher level of anxiety is associated with significantly higher RR, which is also associated with higher educational level and monthly income. In order to improve RR, education is important, which should not only stress on the benefit of CRP but also the potential complications of ACS.

#### 22.

##### **Case Report: Physical Ability and Functional Status Improvement after Exercise Training Program in High-Risk Non Revascularized Stable Coronary Artery Disease**

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Exercise training as part of cardiac rehabilitation program is underutilized in non revascularized stable coronary artery disease (SCAD), although it has several benefit in reducing mortality and morbidity. This is might be due to its unpopularity and also high concern of its complications, such as angina induced exercise. This case illustrates about exercise training program in a 77 years old male, diagnosed with three vessels and left main disease, stable angina pectoris Canadian Society Class III, who has been chosen underwent conservative therapy due to high risk for any revascularization. He was classified as high risk according to treadmill stress test result. The patient already on optimal medical treatment. Supervised exercise training program with telemetry were performed 12 times, 2 times per week with moderate intensity (40%-60% Heart Rate Reserve). The maximum exercise heart rate was 10 beats below ischemic heart rate threshold, based on baseline modified Bruce protocol (submaximal stress test). During the program, patient suffered angina once, which relieved with rest and sublingual nitrate. No major cardiovascular event occurred. After the program, although ischemic parameter by treadmill stress test was not improved, the patient's physical ability was

increased 30% (from 210 to 273 meter) as measured by 6 minutes walking test (6MWT). Before the program, non-limiting angina occurred at minute 5 during 6MWT, while after the program, it's not occurred until the test was stopped. The functional status (physical limitation, anginal frequency, anginal stability, and treatment satisfaction) were also improved by 6.7%, 33%, 11%, and 28.5% respectively, as measured by Seattle Angina Questionnaire. But, the quality of life wasn't improve. This case showed that supervised exercise training program can improve physical ability physical limitation, anginal frequency, anginal stability, and treatment satisfaction safely, without major complication, in patient with high-risk non revascularized stable coronary artery disease.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 23.

##### **Correlation of Demographical and Clinical Profile with Post Operative Length of Hospital Stay in Post Coronary Artery Bypass Graft (CABG) Surgery Patients**

A NAZIR

Dr. Hasan Sadikin General Hospital/Faculty of Medicine Padjadjaran University, Bandung, West Java, Indonesia

**Objectives:** This study is aimed to obtain demographical and clinical profile of post CABG surgery patients and to evaluate correlation between these profiles and post operative length of hospital stay.

**Methods:** Medical records of all post CABG patients in Dr. Hasan Sadikin General Hospital Bandung within the year of 2014 were collected. Forty seven of 70 medical records were eligible. Data presented descriptively were demographical and clinical profile as well as the length of hospital stay. Spearman's Rank-Order Correlation Test was performed to identify correlation between age, sex, education, total modifiable risk factors, comorbid medical conditions and post operative complaints with post operative length of hospital stay.

**Results:** The mean value of post CABG surgery patients' age was  $59.36 \pm 5.72$  with 76.60% were male. About 48.94% patients were graduated from high school, 42.55% from university while the rest were elementary school graduated. Occupations were civil government retirees (27.66%), civil government employees (23.40%) and other private employees (21.28%). About 72.34% among all lives in Bandung. The length of hospital stay median value was 11 days (total), 4 days (pre operative) and 7 days (post operative). Spearman's Rank-Order Correlation Test demonstrated no correlation between

age ( $p=0.35$ ), sex ( $p=0.95$ ), education ( $p=0.21$ ), total modifiable risk factors ( $p=0.96$ ), comorbid medical conditions ( $p=0.66$ ) and post operative complaints ( $p=0.67$ ) with post operative length of hospital stay.

**Conclusion:** No correlation was found between demographical and clinical profile with post operative length of hospital stay in post CABG surgery patients.

#### 24.

##### **Effect of Exercise-based Cardiac Rehabilitation on Autonomic Function Measured by Heart Rate Recovery in Revascularized Coronary Artery Disease Patients Taking Beta-blocker**

B TIKSNADI,<sup>1</sup> M ARSYI,<sup>1</sup> AW ASTUTI,<sup>1</sup> DA SETYANINGRUM,<sup>1</sup> KP SURJADI,<sup>2</sup> SB SASTRADIMAJA,<sup>3</sup> A PURNOMOWATI,<sup>1</sup> TM APRAMI<sup>1</sup>

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**Background:** Heart Rate Recovery (HRR) after exercise test is a known predictor of cardiovascular outcomes. Beta-blocker (BB) is known to attenuate the chronotropic competence of the heart. This study aimed to investigate the effect of phase II Cardiac Rehabilitation (CR) on HRR changes in CAD patients taking beta-blocker and to determine its the association with clinical data.

**Methods:** Thirty-five consecutive revascularized CAD patients participated in the phase II CR at Dr. Hasan Sadikin Hospital from October 2014 to April 2015. The program lasts 4-8 weeks, continuous aerobic exercise on moderate intensity. HRR was taken from maximum exercise test at the beginning and end of phase II, and was categorized into normal and abnormal based on established cutoff point of 12 bpm. Patient not taking BB as their daily regiment was excluded. The data was analyzed to determine HRR changes and its association with baseline characteristics, risk factors, revascularization methods, and functional capacity reflected by METs.

**Result:** The participants were mostly male (82.9%), with mean age of  $57.9 \pm 6.9$  years. All patients received BB (1,25-5 mg) and had undergone either percutaneous (80%) or surgical (20%) revascularization. Prior to phase II CR, 26 patients had abnormal HRR with initial mean of  $5.4 \pm 4$  bpm. At the end of phase II it was  $14.00 \pm 6.9$  bpm. Most patients (70.4%) had their HRR improved significantly from abnormal to normal ( $p < 0.05$ ). We did not find any statistically significant association between changes in HRR with risk factors, revascularization methods, and functional capacity reflected by METs ( $p > 0.05$ ).

**Conclusion:** CR improves autonomic function as measured by HRR, in CAD patients using beta-blocker. This improvement was independent of baseline and clinical characteristics. Further investigation is needed to explore factors influencing persistent abnormal HRR regardless of CR completion.

**ABSTRACTS**

Abstracts Presentation (Poster):

**25.**

**Acute Effects of Music-assisted Breathing Exercise on Changes in Heart Rate Variability and Distress Level of CAD Patients: A Local Pilot Program**

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<sup>1</sup>Department of Occupational Therapy; <sup>2</sup>Department of Medicine and Geriatrics, Tuen Mun Hospital, Hong Kong

**Objective:** To evaluate the immediate effect of a single session of music-assisted slow breathing in CAD patients.

**Methods:** Patients with high anxiety and/or depression scores were selected, and were asked for their willingness to attend the program. Patient was asked to avoid caffeine at least 2 hours before the session. The heart rate variability (HRV) was measured for 5 minutes as baseline. After which the patient was asked about his or her subjective distress level, ranged from "very little": (1) to "very much": (10). The patient then rested for 5 minutes and HRV was measured as patient's own control. After that, patient was asked to perform a single session music-assisted slow breathing. The LF/HF after the session for assessing sympathetic nervous system was used as one of the outcome. An increase in LF/HF is an indicator of increased sympathetic nervous system activity. At the end of the session, the patient rated his or her subjective distress level again.

**Results:**

*Summary of demographics characteristics of patients*

	Patient A	Patient B	Patient C
Age/Sex	M/54	F/67	M/45
Diagnosis	STEMI	STEMI with cardiac arrest	STEMI with VT
Anxiety score (HADS)	11	9	8
Depression score (HADS)	8	11	7

*Comparison of the outcome variables*

Patient	A	B	C
LF/HF (baseline)	2.58	0.3	0.94
LF/HF (5 min. rest)	3.68	0.63	1.83
LF/HF (post-breathing exercise)	2.29	0.4	2.19
Compliance to treatment	good	good	unsatisfactory
Difference in distress level (VAS 1-10)	↓2 (6→4)	↓1 (7→6)	0 (5→5)
Difference of LF/HF after rest	↑42.6%	↑110%	↑94.6%
Difference of LF/HF after treatment	↓11.2%	↑33.3%	↑132.9%

(LF/HF between 0.5-2.0, is clinically considered as balanced status)

After the treatment, patient A and B both decreased their distress level and decreasing or lessen the LF/HF as compared with no treatment. For patient C, there was no change in the distress level and not decreasing LF/HF.

**Conclusion:** Though these findings must be conservatively interpreted as very small sample size and no randomization, yet the trend of positive emotion induction resulted from the session of music-assisted breathing was still observed. Further studies on this cost-effective relaxation exercise will be necessary to verify its efficacy.

**26.**

**Transformation of Cardiac Rehabilitation Program in Performance and Outcome Using Whatsapp Mobile Application: (POINT ASARA)**

CY TAN, HB LIEW, R CHANG, MHM ASNAWI, NY SIN, M MAH, WP BEH, SY LIAU

Queen Elizabeth Hospital II, Kota Kinabalu, Sabah, Malaysia

**Background:** Cardiac rehabilitation programs (CRP) are shown to improve outcomes for coronary artery disease (CAD) patients. CRP involves effective team communication for collaboration, which is a challenge in real world when members are dispersed within hospital. We explore novel use of mobile-phone application to improve communication-coordination team dynamics.

**Objective:** To review performance and outcome of CRP after transformation using Whatsapp application.

**Methodology:** Patients admitted to cardiology between September 2015 to July 2016 were enrolled. Our CRP philosophy is patient-centred, outcome-focus, inclusiveness, need-based, team-approach (POINT). Team includes cardiologist, program director; medical officer, coordinator; nurse, liaison officer; others include pharmacist, physiotherapist, occupational therapist (OT) and dietician. Key performance, outcomes are defined for each CRP component and the whole. Standard process and form were prepared by consensus. A virtual chatroom using Whatsapp, an application downloaded on mobile phones. Coordinator sent daily summary of patient status, to activate CRP phase I; CRP team assess and provide interventions, at their own time schedule, on principle of "as soon as reasonable, appropriate" (ASARA).

**Results:** Total 582 recruited. Mean age 55 years old. Male 86.4%. Acute coronary syndromes 64%. Impaired left ventricular 46%. Prevalence of

hypertension, smoking, dyslipidaemia, diabetes and family history CAD were 64%, 58%, 47%, 29%, and 22% respectively. Overweight and obesity were 49% and 21%. During phase I CRP: performance assessment as follow: Dietician 84%, OT 76%, physiotherapist 59%. Pre-discharge (n=298), mean 6-minute-walk-test (6MWT) was 4.5METS. Only 26% showed good dietary knowledge. OT assessment shows mean Duke activity score index 6.8 METS; 76% readiness to return-to-work; 1% moderate-severe anxiety/depression. Upon discharge, 34% proceed to phase 2. Non-participation include logistic issues, 37% were high-risk awaiting revascularization. Phase II assessment showed: 6MWT improved to 5.7 METS (n=40). Dietary knowledge improved to 76% (n=55).

One in-hospital mortality. None post-discharge during phase II.

**Conclusion:** Our novel use of Whatsapp application showed successful transformation in improving the multidisciplinary CRP team. Our early experience showed improvement in both performance and outcome.

## ABSTRACTS

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### Abstracts Presentation (Poster):

27.

#### **Barriers to Participation in a Phase II Cardiac Rehabilitation Program: Did Latest Interventions Improve the Uptake?**

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Division of Cardiology, Department of Medicine and Geriatrics, United Christian Hospital, Hong Kong

**Objectives:** A study was conducted in July 2002 to January 2003 to explore the barriers to participation in phase II cardiac rehabilitation program in a regional hospital. After that study, two interventions were applied to address barriers including physical unfit for or fear after exercise treadmill testing, and work or time conflicts. Those eligible patients could be enrolled in training program with assessment by using six-minute walk test or participate in a two-session class. The purpose of this study was to review if those interventions could improve the participation rate in the hospital-based phase II cardiac rehabilitation program.

**Methods:** Cardiac patients referred to inpatient CRP in year 2014 were studied. Possible factors contributing to non-participation in phase II cardiac rehabilitation were reviewed. Those results were compared with our previous study done from July 2002 to January 2003.

**Results:** Of the 328 patients who were referred to phase I CRP, 66 patients (20%) proceeded to phase II. As compared to previous study, percentage of patients that could not participate in phase II CRP due to physical disability or fear after exercise stress testing and work or time conflicts was reduced from 79/152 (52%) to 115/262 (44%) and from 24/152 (16%) to 37/262 (14%), respectively. Need to attend scheduled cardiac interventions was reduced from 19/152 (13%) to 0%. The proportion of patients that preferred exercise or managing heart problem on their own, or considered cardiac rehabilitation non-essential was increased from 8/152 (5%) to 37/262 (14%).

**Conclusions:** The study showed a trend in improvement in the participation rate with new interventions applied to address specific barriers. However, the overall participation rate in phase II cardiac rehabilitation remained low. Other strategies to address those specific barriers are warranted.

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28.

#### **Comparison of Exercise in a Green Outdoor Environment Versus Indoor Activity among Cardiac Survivors**

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<sup>1</sup>Hospital Serdang; <sup>2</sup>University Putra Malaysia, Selangor, Malaysia

**Introduction:** The rehabilitation therapy for the cardiac survivors is mostly using the equipment found in the rehabilitation unit or community centre, rather than utilising the green outdoor environments which can be found within the hospitals' compounds or community's garden. There is still a lack of study using green outdoor environments for cardiac survivors' rehabilitation therapy.

**Objective:** The main purpose of this study is to determine the Green Outdoor Environment (GOE) is influencing the cardiac survivors' physiological responses that consist of heart rate (bpm) and blood pressure (mmHg) during the rehabilitation treatment held.

**Methodology:** Eighteen cardiac survivors who completed all six-week cardiac rehabilitation programs which involved with the outdoor and indoor sessions were chosen as the respondents. Walking distance without obstacles represents the outdoor session while walking on the treadmill represents the indoor session. The heart rate and blood pressure are taken immediately after they finished the activity. A questionnaire was given to identify their preferences regarding the ideal outdoor setting of GOE during reassessment session and were analysed.

**Results:** Out of 18 cardiac survivors, there are 61% (n=11) had higher differences of heart rate's readings in outdoor session (p=0.009) than 39% (n=7) had higher differences of heart rate's readings during indoor session (p=0.096). There are no significant difference of systolic and diastolic pressure

(mmHg) between before and after outdoor and indoor sessions (p>0.04). The results from the findings indicated that outdoor session has influenced the readings of the patient's heart rate but it is vice versa towards the readings of their blood pressure. The readings of heart rate and blood pressure of the patients did not being influenced by indoor session.

**Conclusion:** This shown that an ideal outdoor setting of green outdoor environments had influence the heart rate of cardiac survivor during exercise. Utilizing nature-based surrounding for cardiac rehabilitation provide comfort and as the positive vibes for cardiac survivors.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 29.

##### **Examine the Barriers to Enrollment in Home-based Cardiac Rehabilitation**

YMW MAK,<sup>1</sup> LT CHIU,<sup>2</sup> KY LEE,<sup>2</sup> CSS YUE<sup>1</sup>

<sup>1</sup>Division of Cardiology, Department of Medicine and Geriatrics; <sup>2</sup>Community Nursing Service, United Christian Hospital, Hong Kong

**Objectives:** For continuum of cardiac rehabilitation, a seamless home-based cardiac rehabilitation (HBCR) service was provided to eligible cardiac patients upon their discharge from hospital. The purposes were to aid recovery and promote clinical stability. Home visit was made by community nurses on the next day after patients left hospital. Services included education, counselling, exercise, support, self-monitoring skills and phone calls. Despite systemic review showed that home and center based cardiac rehabilitation were equally effective in improving quality of life and cardiac risk factors, the HBCR service was also underutilized. The purpose of this study was to review barriers to participation in the HBCR.

**Methods:** This was a retrospective study. Patients recruited into inpatient cardiac rehabilitation would be referred to community nurses for interview and arrangement of home visit by time of their discharge from hospital. Reasons for ineligibility and nonparticipation in HBCR were explored.

**Results:** Of 355 referrals into phase I cardiac rehabilitation in year 2014, 102 (29%) patients accepted HBCR service. Ninety-two (26%) patients were ineligible to made referral to community nurses. Patients lived in district out of community nursing service provision area (50/92, 54%), patients transferred to other hospitals for further care (25/92, 27%), deaths (12/92, 13%) and patients self-discharge from hospital against medical advice (5/92, 5%) were considered ineligible to HBCR. Lack of referrals to community nursing service and missing data were found in 37 and 15 patients, respectively. One hundred

and nine (31%) patients did not participate in HBCR. Barriers to participant in HBCR included confidence in self-care or with adequate family support in 59 patients, work in 24 patients, reject home visit in 17 patients and financial hardship in 9 patients.

**Conclusion:** The participation rate to home-based cardiac rehabilitation service was low (29%). Significant patients did not receive HBCR as they resided out of service provision area. Similar barriers to participant in hospital-based cardiac rehabilitation including confidence in self-care, work, and lack of referrals were reviewed.

#### 30.

##### **Rationale and Methods of the Single Center Randomized Trial of Shortened Cardiac Rehabilitation Program**

SH PARK,<sup>1</sup> EJ KIM,<sup>1</sup> JB KIM,<sup>2</sup> SE SHIN,<sup>1</sup> W KIM,<sup>1</sup> JH KANG,<sup>1</sup> EJ PARK,<sup>1</sup> JY CHOI,<sup>1</sup> S LEE,<sup>1</sup> JO NA,<sup>1</sup> CU CHOI,<sup>1</sup> HE LIM,<sup>1</sup> JW KIM,<sup>1</sup> SW RHA,<sup>1</sup> CG PARK,<sup>1</sup> HS SEO,<sup>1</sup> DJ OH,<sup>1</sup> SHP PARK<sup>1</sup>

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**Backgrounds:** Cardiac rehabilitation (CR) has been known to reduce mortality and morbidity in patients with angina. Thus current guidelines recommended CR as Class I indication in coronary artery disease (CAD) patients including percutaneous coronary intervention (PCI) and coronary artery bypass graft (CABG). However the rate of CR adoption was still low in developed nations as well as developing nations. Especially, monotonous CR program irrespective of individual functional capacity could lower the compliance to CR.

**Objectives:** This study protocol was designated to evaluate the effectiveness and safety of shortened course of CR in patients with higher functional capacity undergoing PCI.

**Methods/Design:** Hypothesis is that shortened CR will be equally effective and safe compared with CR in patients undergoing PCI if they are functionally capable. Study protocol is as followed. (Figure 1) A total of 100 patients undergoing PCI would be randomized into shortened course CR (n=50) and ordinary course CR (n=50) consecutively. All patients will be tested for functional capacity before and after CR. The functional capacity will be measured by Metabolic Equivalent of Task (METs)-value using cardiopulmonary exercise testing (CPX). Inclusion criteria are male/female

older than 40, diagnosed with MI, unstable angina, stable angina, treated with PCI, and moderate to vigorous functional capacity at baseline CPX. Exclusion criteria are history of cerebrovascular accident (CVA), severe muscular skeletal disease, cancer, pregnancy, and refusal to consent to study participation. Ordinary CR group would have 12 weeks course, and shortened CR group would have 8 weeks course or 4 weeks course, if moderate or vigorous functional capacity respectively. Primary endpoint is the ratio of patients maintaining vigorous functional capacity after CR. Secondary endpoint are ratio of patients completing CR program and complications during the CR. In addition, an assessment will be made of the impact of CR on quality of life (QOL) by questionnaire.

**Discussion:** Monotonous CR may be associated with low adoption rate and poor compliance. This study will provide the evidence on the effectiveness and safety of shortened CR according to functional capacity by CPX, and will demonstrate that individualized CR could enhance compliance to CR.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 31.

##### **Designing and Evaluating a Diabetes Empowerment Self-management Interactive Research (DESIRE) Program: Study Protocol**

L CHENG, J SIT

The Chinese University of Hong Kong, Hong Kong

**Background:** Prospective studies indicated that HbA1c was a strong predictor of cardiovascular events. Despite numerous breakthroughs in diabetes treatment and evidence-based self-management education, poor glycemic control still remains the most challenging issue in diabetes care. This study aims to develop a Diabetes Empowerment Self-management Interactive and REsearch (DESIRE) program specifically targeting patients with poorly controlled type 2 diabetes and evaluate its effectiveness in reducing cardiovascular risk.

**Methods:** A randomized controlled trial will be conducted to compare the effectiveness of the DESIRE program with attentional control by recruiting a total of 242 patients with poorly controlled type 2 diabetes [Glycated hemoglobin (HbA1c) >7.5%]. Participants in the intervention group will receive the DESIRE, which is developed from the Empowerment Process Model. It comprises of 2 small patient-centered small-group sessions (6-8 participants per group), 2 individual consultations, and 2 maintenance sessions. Participants in the control group will receive two weekly general health education classes and four post-discharge general consultation. The primary outcome include glycemic control and body weight. Additionally, measures of self-management behaviors, empowerment level, and quality of life serve as secondary outcomes. Analysis will be carried out on intention-to-treat principle. Semi-structured, individual in-depth interview will be conducted in a purposefully selected sample to explore how the mechanism

of how DESIRE program optimize the glycemic control (if any). Quantitative and qualitative data will be integrated to examine the confirmation, complementarity, silence, and dissonance of the two data sets.

**Discussion:** The result of this mixed-method study could provide a valuable insight into the efficacy of a patient-centered, empowerment-based intervention program. This study will have direct implication to diabetes care and cardiovascular disease prevention in China.

*Trial registration The registration number of the randomized controlled trial is ChiCTR-IPR-14005492.*

#### 32.

##### **Employment Outcomes of Rehabilitation after a Cardiac Event**

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<sup>1</sup>Cardiac Rehabilitation Team and NTWC Rehabilitation Center; <sup>2</sup>Department of Medicine and Geriatrics; <sup>3</sup>Department of Occupational Therapy; <sup>4</sup>Department of Physiotherapy; <sup>5</sup>Department of Clinical Psychology, Tuen Mun Hospital, Hong Kong

**Introduction:** Coronary heart disease is a major cause of morbidity and mortality in Hong Kong, with a significant number occurring in the younger working age group. Continuation to have a paid employment has an important impact not only to the patients concerned but also to their families. On the other hand, absence from work leads to a loss-loss situation with both a productivity loss and an additional socioeconomic burden to the society. There were limited local studies on the situation of returning to work (RTW) of cardiac patients in Hong Kong.

**Objective:** To study the working conditions of cardiac patients referred to work rehabilitation services after a cardiac event.

**Methodology:** From October 2014 to October 2015, a total of 40 patients who had a paid-employment before one's index cardiac event were referred to the specialized cluster work rehabilitation service of a regional rehabilitation center. A retrospective review was conducted on the work outcomes for these patients.

**Results:** All of these patients were male with mean age of 54.8 (range 28 to 71). Twenty-four (60%) of them were commercial/ passenger vehicle drivers. Eleven (28%) of them were manual workers. There were 3 police officers (8%) whose duties involved firearm carriage and 2 sedentary workers (5%). All of the patients underwent specialized rehabilitation assessment and work counseling with 10 patients (25%) subsequently underwent further high-intensity rehabilitation training. At the end of the study period, the outcomes of thirty-five patients (88%) were known, with 24 out of the 35 patients (69%) had a paid employment, and another 3 patients (9%) planned to resume work after the sick leave period ended. For the remaining 8 patients (23%), 5 patients (age range 57-71) decided to retire and 3 remained unemployed.

**Conclusion:** A high proportion of working patients after a cardiac event had a paid employment after specialized rehabilitation service. Further studies are warranted to understand further the impact of rehabilitation on the working outcomes of cardiac patients.

## ABSTRACTS

### Abstracts Presentation (Poster):

#### 33.

##### **The Investigation of the Relationship Between the Habit and Type of Exercise and the Long Term Variations of Nonhemodynamic Parameters from Cardiac Implantable Devices in Severe Heart Failure Patients**

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**Background:** Chronic heart failure (CHF) is a global epidemic in health care and a leading cause of mortality and morbidity worldwide. Evidence has shown that comprehensive cardiac rehabilitation (CCR) reduce mortality and improve the quality of life in CHF patients. Contemporary cardiac rhythm management devices (CRM) are able to continuously monitor, store, and display long-term diagnostic information. Daily diagnostic information includes intrathoracic impedance (ITI) and patient activity. Available device observations could provide an effective method to stratify patients at varying risk of heart failure hospitalization. We investigated if these existing device observations can evaluate the relevance of the conditions of CHF patients and their exercise habit. Patients' general condition was evaluated with trends of ITI and activity.

**Methods:** Twenty-two CRM implanted CHF patients were enrolled. The trend graphs of ITI and activity data for 12 months obtained from CRM were examined. We also compared these trends and patients' exercise habit.

**Results:** Similar tendencies were found between the trend of ITI and activity. Eight of nine patients showed decreasing ITI with reduced activity. However, about 38% (5/13) of decreasing ITI cases showed no reducing or improvement in their activity.

The tendencies were found that many patients with no exercise habit showed reduction or no improvement in activity, worsening of ITI and no improvement or worsening of their general condition. Indeed, in CCR group, many patients showed improvement of ITI, activity and general condition.

In addition, fine tendencies of ITI and activity were found in CCR group in comparison with self-exercise group.

**Conclusions:** These results suggested that bird's-eye examinations of trend graphs of ITI and activity from CRM might be facilitate the evaluation of CHF management, especially of exercise and CCR.

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##### **Return to Work Program for Young Cardiac Patients: The Contributing Factors for Early Work Resumption**

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Traditionally, return to work was advised within a wide timeframe after major coronary events and the process of work resumption was also not well understood. However, better understanding on factors contributing early work resumption for young cardiac patients will help to develop more effective strategies for better outcomes. A pilot program was implemented since June 2014. Target cases were patients of working age admitted for acute coronary events. Pre-discharge assessment was conducted to identify medical factors, occupational or psychosocial barriers. Cardiovascular status was improved by early medical intervention including direct percutaneous coronary intervention (PCI). Risk stratification procedure including post-PCI treadmill test and echocardiogram would be arranged. Early comprehensive work rehabilitation would be initiated after patient discharge. Twenty-nine patients (7 male, 2 female) with mean age of 52.6 years old were recruited. The majority of diagnoses were myocardial infarction (MI) (79.4%). Fifteen (51.8%) patients (Group 1) attended work capacity evaluation (WCE) only, 10 (34.4%) patients (Group 2) required training after work assessment and 4 (13.8%) patients defaulted the program. The characteristics of Group 1 and Group 2 were compared. Significantly more patients in Group 1 were diagnosed with MI as compared to Group 2 (93% vs 50%; p=0.011). Early PCI was performed to all patients in Group 1 and 80% patients in Group 2.

Group 2 had taken significantly longer time for medical stabilization before discharge than Group 1 (12.4 days vs 7.4 days; p=0.024). Group 1 had attained better results than Group 2 in the post-PCI treadmill test (MET 8.9 vs MET 7.4; p=0.024). WCE revealed significantly more patients were either marginally matched (70% vs 13.3%; p<0.001) or non-matched (30% vs 6.7%; p<0.001) with previous work demands in Group 2 than Group 1. For SF36, physical functioning (p=0.027) and mental health (p=0.040) were found be significantly better in Group 1 than Group 2. The total return to work rate was 96% with mean time for resuming work after hospital discharge was 37.3 days. Early medical intervention, risk reduction procedure and early assessment on medical, occupational and psychosocial factors would facilitate timely implementation of work rehabilitation program for early work resumption for young cardiac patients.

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