科技部補助專題研究計畫成果報告
期末報告

性別差異在急性心衰竭--一個多中心前瞻性研究

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中 文 摘 要 ： 心衰竭是因為心臟功能降低造成的臨床症狀。為了促進流行病學評估和瞭解實際台灣心衰竭處理的結果，從2013年起台灣心臟學會建立一個資料庫（台灣心臟學會心衰竭資料庫）探討病人因為心衰竭住院的診斷和治療結果。

儘管性別差異議題在心血管疾病及心衰竭逐漸受到重視，資料的收集尚未完整也並未廣泛應用於臨床。隨著越來越多的證據顯示性別差異在心臟衰竭扮演著重要角色，我們想要藉由台灣心臟學會心衰竭資料庫的分析研究，瞭解性別差異對心衰竭病人死亡和住院等的影響。

我們的結果顯示，比起男性，女性病人年紀較大，較不肥胖，造成心衰竭的原因較常是高血壓和二尖瓣膜疾病。相反的，男性病人較常有缺血性心臟病及擴大性心臟病，並有較多抽煙和接受介入性手術的病史。男性病人比較多心衰竭第三期住院，女性病人比較多第四期心衰竭住院。對於非心因性原因的死亡，也存在顯著性別差異。

我們更發現隨著年紀的增加，男性心衰竭的盛行率從8.7%增加至30.3%，而女性則沒有太大的差別，約為16-17%. 雖然從整體全死亡率沒有看出性別的差異，但年紀大於65歲以上的病人，在全死亡率及心因性死亡率則有差異，男性比女性來的高。再者，男性病人在年紀大的左心室射出分率下降心衰竭病人的全死亡率，是一個獨立的危險因子。我們的研究發現，男性在亞洲年紀大左心室射出分率下降心衰竭病人有較高死亡率的危險性。

中 文 關 鍵 詞 ： 性別差異、心臟衰竭、台灣心臟學會心臟衰竭資料庫、心血管疾病、危險因子

英 文 摘 要 ： Heart Failure (HF) is a clinical syndrome characterized by typical symptoms that may be accompanied by signs caused by a structural and/or functional cardiac abnormality, resulting in a reduced cardiac output and/ or elevated intra-cardiac pressures at rest or during stress. Acute HF is characterized by rapid onset of signs and symptoms of HF secondary to cardiac decompensation, and requires urgent intervention, which can lead to further cardiac and renal injuries, and therefore contribute to deterioration of HF and increased patient mortality.

To allow improved evaluation of the epidemiology and outcomes of real-world HF management in Taiwan, the Taiwan Society of Cardiology (TSOC) had established a registry to describe the epidemiology of patients admitted to hospital with systolic HF, and the diagnostic and therapeutic procedures used to treat HF patients in Taiwan since the year of 2013, named Taiwan Society of Cardiology-Heart Failure with reduced Ejection Fraction (TSOC-HFrEF) registry.

Gender specific information regarding cardiovascular disease and HF has been raised, yet is not routinely collected nor translated into clinical practice. Due to the

increasing evidence suggesting that gender difference plays a crucial role on HF, we therefore wanted to know the effects of gender difference on mortality, hospitalization, and overall outcome in patients with heart failure from TSOC-HFrEF registry.
Our results revealed female gender was older, less obese with more hypertensive cardiovascular disease and mitral valve disease as the causes of heart failure. On the contrary, male gender had more ischemic cardiomyopathy and dilated cardiomyopathy as the causes of heart failure. Moreover, male gender had more history of current smoker and percutaneous coronary intervention compared with female gender. Regarding the heart failure functional status, more female gender presented to the hospital with functional class IV (male vs. female: 35.96% vs. 42.79%, p=0.0145) although more male gender presented to the hospital with functional class III (male vs. female: 52.24% vs. 45.19%, p=0.0144).
Moreover, we found that the prevalence of all-cause mortality in men elevated significantly from 8.7% to 30.3% with the increased age spectrums whereas the prevalence in women was consistent after the age spectrum of 45 years (17.1%, 16.0%, and 17.2%, respectively). Although there was no sex difference in mortality of the overall cohort in a Kaplan-Meier survival curve, there were sex differences in all-cause and cardiac mortality in a subcohort of patients 65 years (all p <0.05). In addition, male sex is a risk factor of all-cause mortality in the elderly patients with HFrEF (hazard ratio: 1.67, 95% confidence intervals: 1.15-2.43) independent of New York Heart Association (NYHA) functional classifications, systolic blood pressure, diabetes, hemoglobin concentrations, kidney function, and medications. Our findings suggest that male sex was associated with higher risk of all-cause mortality in the elderly eastern Asian patients with HFrEF.

英文關鍵詞：gender difference, heart failure, TSOC-HFrEF registry, cardiovascular disease, risk factor

Sex difference in the risk of morality of the elderly Asian patients with heart failure with reduced ejection fraction

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Short title: Sex difference in heart failure

Keywords:

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Abstract

Background: The sex difference in heart failure mortality might be affected by age, race, and treatment response. Although the 2016 American Heart Association (AHA) report claimed that heart failure mortality was higher in women than men, a few studies for the Asian patients showed conflicting results.

Methods: We prospectively investigated the one-year mortality risk stratified by four age spectrums (<45, 45-64, 65-84, ≥85 years) in a multicenter cohort of 1,093 male and 416 female patients with systolic heart failure (HFrEF) and admitted for decompensated symptoms in Taiwan between 2013 and 2015. Kaplan-Meier curve and Cox proportional regression analyses were used to determine the sex-specific association with mortality.

Results: The prevalence of all-cause mortality in men elevated significantly from 8.7% to 30.3% with the increased age spectrums whereas the prevalence in women was consistent after the age spectrum of 45 years (17.1%, 16.0%, and 17.2%, respectively). Although there was no sex difference in mortality of the overall cohort in a Kaplan-Meier survival curve, there were sex differences in all-cause and cardiac mortality in a subcohort of patients ≥ 65 years (all $p < 0.05$). In addition, male sex is a risk factor of all-cause mortality in the elderly patients with HFrEF (hazard ratio: 1.67, 95% confidence intervals: 1.15-2.43) independent of New York Heart Association (NYHA) functional classifications, systolic blood pressure, diabetes, hemoglobin concentrations, kidney function, and medications.

Conclusions: Our findings suggest that male sex was associated with higher risk of all-cause mortality in the elderly eastern Asian patients with HFrEF.

Introduction

Heart failure is a growing public health issue worldwide with significant prevalence and mortality, both of which increased with advancing age.[1] Although the public awareness and survival improved along with the advance in evidence-based treatment guidelines, heart failure remains a dominant cause of hospitalization of elderly population.[2, 3] How sex affecting the outcome of heart failure has long been of interest. Some observational registries demonstrated that women, compared to men, were older, and had higher blood pressure, more non-ischemic etiology, more severe New York Heart Association (NYHA) functional capacities, as well as comorbidities like diabetes, renal disease.[4-6] In addition, women had higher circulating levels of adipokines and D-dimer, and lower levels of biomarkers reflecting endothelial dysfunction and inflammatory cell recruitment.[7]

To our knowledge, in the United States, the number of annual cardiovascular disease (CVD) death of women exceeded that of men in 1984 and still remains higher until 2007.[8] But the age-adjusted CVD death rate in women fell from 263.3 to 134.4, whereas the rate of men fell from 542.9 to 266.8 deaths per 100,000 population from 1980 through 2000.[9] Several studies had been made to discuss the impact of sex differences on HF mortality, yet reached to a definite conclusion. A Dutch cohort study, comprising 29,053 patients, showed significantly better outcome for women at 28 days, 1 year, and 5 years post HF hospitalization.[10] The Meta-analysis Global Group in Chronic Heart Failure (MAGGIC) database including 41,929 patients showed better prognosis in female sex especially those with non-ischemic heart failure of etiology and in patients without

diabetes.[11] However, similar clinical outcomes in both sexes had been reported in the Acute Decompensated Heart Failure National Registry (ADHERE) database, the American Heart Association Get With The Guidelines-Heart Failure (GWTG-HF) registry, and the Efficacy of Vasopressin Antagonism in Heart Failure Outcome Study with Tolvaptan (EVEREST) trial. In a recent Asian study carried out in Japan indicated women as an independent risk factor of 2-year CVD death in patients older than 79 years.[12] Since the prognosis of HF might be affected by age, sex, and ethnicity, the aim of our study was to investigate one-year mortality risks stratified by age and sex in a prospective nationwide registry of eastern Asian patients admitted for acute decompensate symptoms of HF in Taiwan.

Methods

Study design and patients

The Taiwan Society of Cardiology-Heart Failure with reduced Ejection Fraction (TSOC-HFrEF) registry, a multi-center, prospective, observational study, was conducted in 21 medical centers nationwide. The study was approved by all participating sites' institutional review board, provided with written informed consent of all enrolled patients. This registry enrolled patients presenting with acute new onset heart failure or acute decompensation of chronic heart failure. An echocardiographic left ventricular systolic ejection fraction less than 40% should be documented. Data collection included index hospitalization, admission and discharge status, re-hospitalization, and out-patient follow-up at 6 months and 12 months after index hospitalization. Sever HF referred to a NYHA functional capacity of III or IV at admission, discharge, or follow-up.

Improved NYHA Fc referred to downstage by more than 2 during index hospitalization. No specific protocols or recommendation other than current guidelines from this registry was provided.

Statistical analysis

All of the statistical analyses were performed with the SPSS software (IBM version 22.0). Numerical data were expressed as mean and standard deviation. Categorical data were analyzed using chi-squared test A value of $p<0.05$ was considered as statistically significant. Kaplan-Meier curves and univariate/multi-variate Cox-regression hazard model were utilized to evaluate the one-year mortality.

Results

Baseline Characteristics

From May 2013 to October 2014, 1509 patients admitted to 21 medical centers for acute decompensated systolic heart failure were included, of whom 72.4% were men. Men were on average 8.6 years younger than women (61±16 versus 69.6±15.3 years, $p<0.001$). Forty-one point four percent of men aged 45 through 64 years old, while 54.1% of women aged 65 through 84 years. Thirteen point nine percent of women versus 6% of men were older than 85 years.

Ischemic heart disease was the most common cause of heart failure in both genders, followed by dilated cardiomyopathy (DCM). Hypertensive cardiovascular disease (HCVD) causes twice as much acute decompensation in women as in men (10.8% versus

5.8%, p<0.001). More men had COPD/asthma (12.2% versus 7.9%, p=0.019), whereas more women had diabetes (48.1% versus 41.9%, p=0.031). More active smoking (30.7% versus 3.4%, p<0.001) and alcohol consumption (27.7% versus 4.6%, p<0.001) were seen in men (Table 1).

Index Hospitalization

Men had significantly higher left ventricular (LV) end-diastolic diameter (65.8±27.2 versus 60.2±29.4 mm, p<0.001), higher LV mass (2.65±1.24 versus 2.03±0.92 gm, p<0.001), lower 2D ejection fraction (27.4±8.5 versus 30±8.5 %, p<0.001), and lower systolic BP (130.5±38.4 versus 132.9±27.2 mmHg, p=0.0265). Men had higher MDRD (Modification of diet in renal disease study) estimated glomerular filtration rate (eGFR) than women (55.6±35.3 versus 47.1±30.2 ml/min/m^2, p<0.001). Although both genders had similar rate of severe heart failure (NYHA Fc III and IV) at admission of index hospitalization, less men were discharged with severe HF than women (27.8% versus 32.2%). Pharmacotherapy at discharge were similar in both genders, with diuretics as the most commonly prescribed, followed by renin-angiotensin antagonists, beta-blockers, and calcium-channel blockers (Table 1).

One-year Mortality in Elderly Patients

At one-year follow-up, there was no significant difference in NYHA Fc, SBP, left ventricular ejection fraction (LVEF), and pharmacotherapy except better eGFR in men. Although all-cause mortality of all age group were similar as shown in Kaplan-Meier survival curves (Figure 1a), it seemed to worsen with age in men but not in women

(Figure 2). In elderly patients (older than 65 years), all-cause mortality and cardiac death were significantly higher in men (p=0.049, 0.035 respectively, Figure 3a,b). Multivariate Cox regression model of one-year all-cause mortality revealed increased risk in men (HR 1.669, 95%CI 1.146-2.431, p=0.008), diabetes (HR 1.448, 95%CI 1.023-2.051, p=0.037), severe HF at discharge (HR 1.825, 95%CI 1.243-2.681, p=0.002); decreased risk in patient with improved NYHA Fc during index hospitalization (HR 0.637, 95%CI 0.433-0.937, p=0.022), and ACEi/ARB usage more than 6 months (HR 0.237, 95%CI 0.147-0.382, p<0.001)(table 2).

Discussion

This TSOC-HFrEF is the first nationwide, prospective multicenter registry enrolling patients admitted for acute decompensated heart failure in Taiwan. In this study, we demonstrated that in elderly patients, men, diabetes, NYHA Fc III and IV at discharge of index hospitalization were associated with increased risk of death, whereas improved NYHA Fc during index hospitalization and receiving ACEi/ARB longer than 6 months indicated better outcomes.

Female gender had long been under-representative in heart failure studies in the past. With the recognition of heart failure as a major cause of death in female, the American Heart Association launched the first campaign for women in 1997. Doubling of the rate of awareness of heart disease impact in women and nearly halved the death rate from CVD were reported in 2009.[8, 9, 13] However, the extent of reduction of risk is affected by age, HF etiology, and comorbidities.[11, 14] In recent studies, male gender were identified

as a worsen predictor in two nationwide cohort studies, whereas Nozaki et al found that female gender in old age (>79 years) was associated with poor outcome (talbe 3).[4, 5, 10, 12] In our study, the mean age of the elderly male and female patients were 77 and 80 years, which were 72 and 79 years respectively in the study of Nozaki et al. Their study also demonstrated a significantly increased mortality risk by 3.2% per 1 year increment in age. However the effect of ageing was found insignificant in our patients older than 65 years. In the Norwegian cohort study presented by Bradsaeter et al. further stratified their data by EF, and revealed, although insignificant, a Hazard ratio of 1.094 for men in patients with a EF<50%. In our study, we focused on patients with a EF <40%. What we found in our data consisted with the results of the Meta-analysis Global Group in Chronic Heart Failure(MAGGIC) database, that female HF patients tend to be older, with less prevalence of ischemic-etiology, more hypertensive cardiovascular disease and diabetes, more severe NYHA Fc III and IV than male patients. Male gender and diabetes independently predicted worse outcomes.[11]

This study has several limitations. First, this is a one-year report from the nationwide HF registry. Longer follow-up may have different effect on the gender differences. Second, this observational study enrolled female patients less than half of the numbers of male patients, many confounding factors may have skewed the results we've seen. Third, the adherence to treatment guidelines were suboptimal. Rehospitalization more than once were similarly high in both genders (18.8% in men and 17.6% in women, p=0.892).

In conclusion, we described male gender as an independent prognostic factor in elderly heart failure patients, as well as diabetes and a worse NYHA functional capacities at discharge of acute heart failure hospitalization. Adherence to angiotensin-converting enzyme inhibitor/angiotensin II receptor blockers for more than 6 months predicts a better outcome.

Table 1

Baseline Characteristics

	Men	Women		p
Numbers[n,(%)]	1093(72.4)	416 (36.25)		
Age (mean±SD)	60.97±15.95	69.57±15.34	*	<0.001
Age group [n,(%)]			*	<0.001
Age≧85	66(6.0)	58(13.9)		
65≦Age<85	391(35.8)	225(54,1)		
45≦Age<65	453(41.4)	105(25.2)		
Age<45	183(16.7)	28(6.7)		
Cause of HF [n,(%)]				
Ischemic	506(46.3)	168(40.4)	*	0.0391
DCM	384(35.1)	123(29.6)	*	0.0408
HCVD	63(5.8)	45(10.8)	*	0.0007
VHD	46(4.2)	28(6.7)	*	0.0426

Current smoking[n,(%)]	336(30.7)	14(3.4) *	<0.001
Current alcohol[n,(%)]	303(27.7)	19(4.6) *	<0.001
Comorbidity[n,(%)]			
HTN	364(33.3)	155(37.3)	0.1482
DM	458(41.9)	200(48.1) *	0.0307
Dyslipidemia	221(20.2)	86(20.7)	0.845
COPD/Asthma	133(12.2)	33(7.9) *	0.0188
Prior HF admission	443(40.5)	167(40.1)	0.8913
CAD	490(44.8)	141(33.9) *	0.0001
CAD with previous MI	285(26.1)	87(20.9)	0.4516

Index hospitalization (mean±SD)				
NYHA Fc (adm)				
I and II[n,(%)]	129(11.8)	50(12)	.907	
III and IV[n,(%)]	964(88.2)	366(88)	.907	
NYHA Fc(dis)				
I and II[n,(%)]	789(72.2)	282(67.8)	.093	
III and IV[n,(%)]	304(27.8%)	134(32.2)	.093	
SBP(mmHg) (mean±SD)	130.5±38.4	132.9±27.2	0.232	
eGFR (ml/min/m^2) (mean±SD)	55.6±35.3	47.1±30.2	<0.001*	
Hb(g/dL) (mean±SD)	13.5±4.8	11.6±2.1	<0.001*	
LVEF [2D, % (mean±SD)]	27.4±8.5	30±8.5	<0.001*	
LVEDD [mm (mean±SD)]	65.8±27.1	60.2±29.4	<0.001*	
LVESD [mm (mean±SD)]	55.1±20.1	50.1±32.7	<0.001*	
LV mass [g (mean±SD)]	2.7±1.2	2.0±0.9	<0.001*	
ACEi/ARB [n,(%)]	668(63.2)	234(57.8)	.149	
Beta-blocker [n,(%)]	634(60)	238(58.8)	.671	
Diuretics [n,(%)]	874(82.7)	328(81)	.447	
Calcium channel blocker [n,(%)]	118(11.2)	61(15.1)	.0419	
One Year Follow-up				
NYHA Fc				
I and II[n,(%)]	592(71.5)	211(66.1)	.076	
III and IV[n,(%)]	236(28.5)	108(33.9)	.076	
SBP[mmHg (mean±SD)]	122.9±25.1	124±26.3	.579	
eGFR [ml/min/m^2 (mean±SD)]	55.3±29.6	47.7±32.5	0.002*	
LVEF[2D, % (mean±SD)]	36.3±13.8	35.6±14.7	0.727	
ACEi/ARB [n,(%)]	421(59)	137(53.3)	.249	

Beta-blocker [n,(%)]	480(67.2)	164(63.8)	.321
Diuetics [n,(%)]	546(76.5)	191(74.3)	.489
Calcium channel blocker [n,(%)]	97(13.6)	42(16.3)	.279
MACE[n,(%)]	315(38.4)	126(39.5)	.460
Frequent Re-admission(≧2) [n,(%)]	154(18.8)	56(17.6)	.892

Table 2 Factors of One-year All-cause Mortality in the Elderly

	Univariate			**Multi-variates**		
	HR	95% CI	p	HR	95% CI	p
Men	1.455	1.024-2.068	.036	1.669	1.146-2.431	.008
Age	1.01	0.988-1.033	.367			
Etiology						
Ischemic	.956	0.691-1.323	.786			
DCM	920	0.628-1.346	.666			
HCVD	824	0.433-1.569	.556			
DM	1.46	1.053-2.025	.023	1.448	1.023-2.051	.037
COPD/Asthma	1.414	0.955-2.094	.084			
CAD with old MI	1.169	0.827-1.651	.376			
NYHA Fc III/IV at discharge	2.505	1.805-3.477	<0.001	1.825	1.243-2.681	.002
Improved NYHA Fc	.46	0.332-.640	<0.001	.637	0.433-.937	.022
Smoking	.919	0.545-1.552	.753			
Alcohol	1.106	0.696-1.758	.669			
ACEi/ARB 6mo	.202	0.128-.318	<0.001	.237	0.147-0.382	<.001
SBP	.989	0.983-0.996	.002	0.994	0.988-1.000	.063
eGFR	.988	0.981-0.995	.001	0.995	0. 988-1.003	.199
*Hemoglobin	.923	0.858-0.994	.033	0.963	0.884-1.049	.390

Table 3

Figure 1

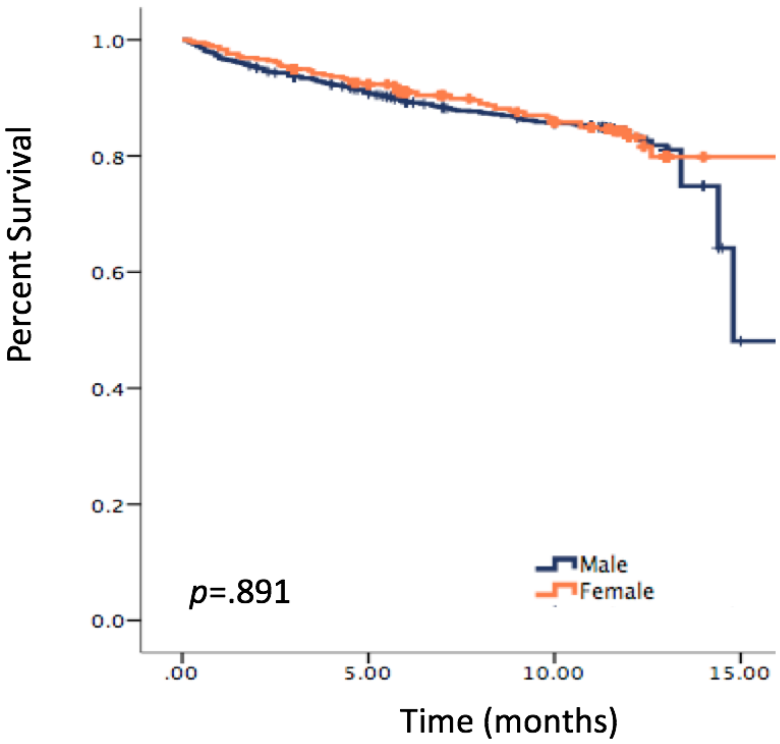
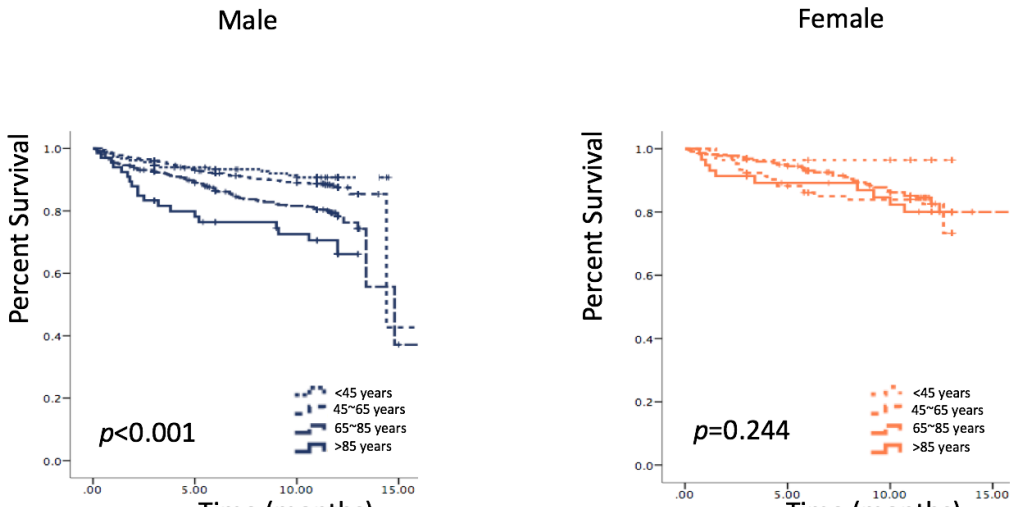


Figure 2



Age group	Median Survival(mo)			*One-year Mortality*	
	Male	Female	*p*	Male	Female
<45 years	12	12	0.344	16(8.7%)	1(3.6%)
45-65 years	12	12	0.113	54(11.9%)	18(17.1%)
65-85 years	12	12	0.087	81(20.7%)	36(16%)
>85 years	11	12	0.107	20(30.3%)	10(17.2%)

Figure 3a Overall survival in elderly patients

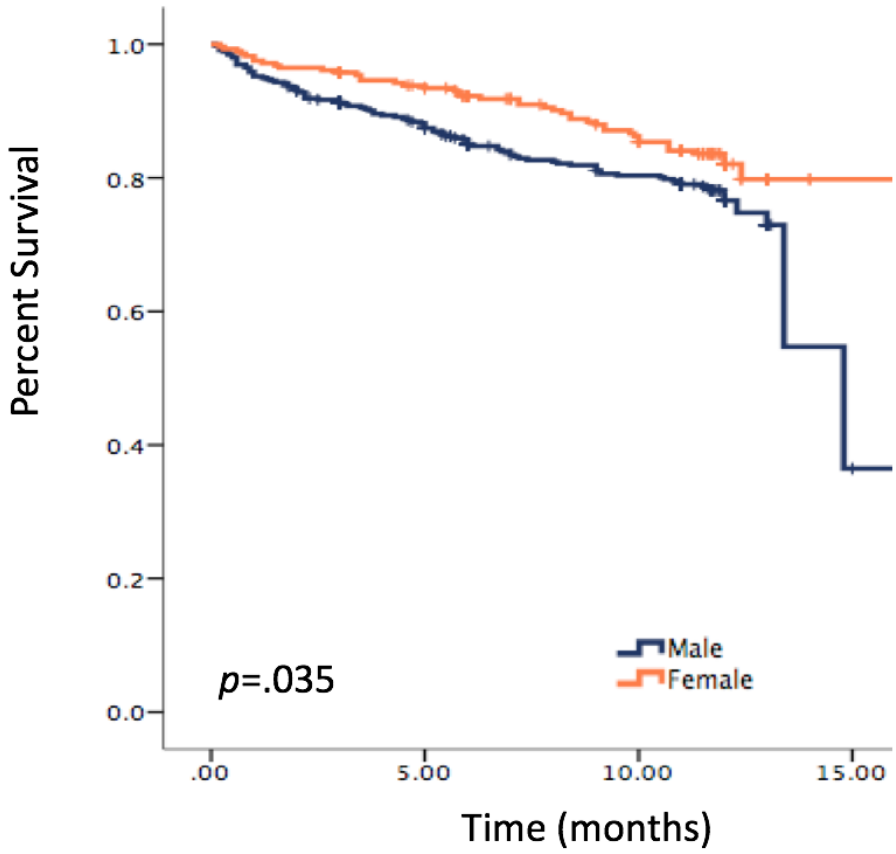
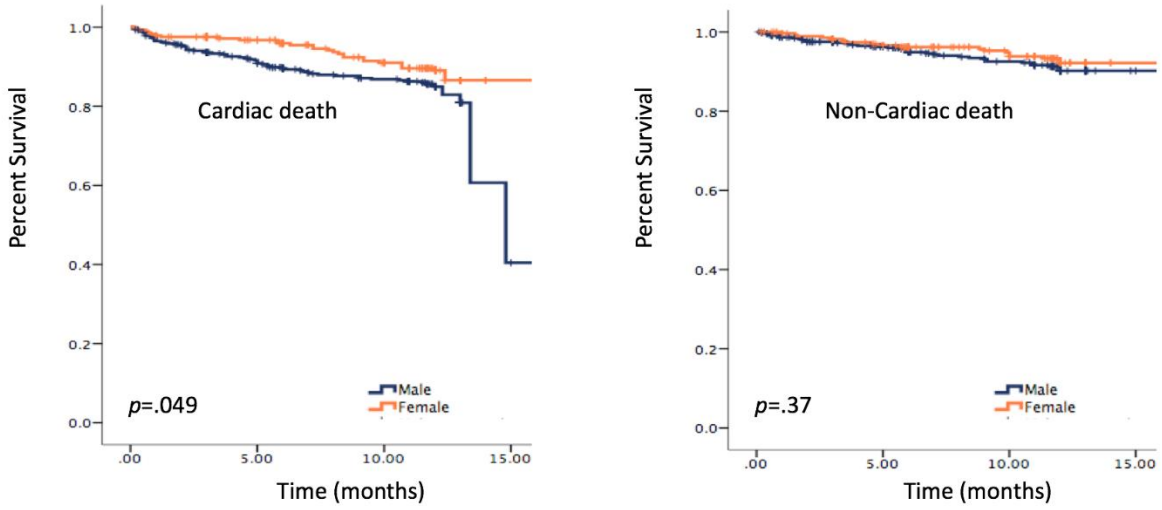


Figure 3b


Percent Survival
1.0
0.8
0.6
0.4
0.2
0.0
Cardiac death
p=.049
Male
Female
.00
5.00
10.00
15.00
Time (months)
Percent Survival
1.0
0.8
0.6
0.4
0.2
0.0
Non-Cardiac death
p=.37
Male
Female
.00
5.00
10.00
15.00
Time (months)

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106年度專題研究計畫成果彙整表

計畫主持人：林維祥	**計畫編號：**106-2629-B-016-003-
計畫名稱：性別差異在急性心衰竭---一個多中心前瞻性研究	

成果項目					量化	單位	質化 （說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等）
國內	學術性論文	期刊論文			0	篇	
		研討會論文			0		
		專書			0	本	
		專書論文			0	章	
		技術報告			0	篇	
		其他			0	篇	
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權			0		
		營業秘密			0		
		積體電路電路布局權			0		
		著作權			0		
		品種權			0		
		其他			0		
	技術移轉	件數			0	件	
		收入			0	千元	
國外	學術性論文	期刊論文			0	篇	
		研討會論文			0		
		專書			0	本	
		專書論文			0	章	
		技術報告			0	篇	
		其他			0	篇	
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權			0		
		營業秘密			0		
		積體電路電路布局權			0		
		著作權			0		
		品種權			0		
		其他			0		

	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	0	人次	
		碩士生	1		進行資料蒐整，統計分析
		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 （無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。）			已撰寫完成文章，近期投稿中		

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估
   ■達成目標
   □未達成目標（請說明，以100字為限）
   　□實驗失敗
   　□因故實驗中斷
   　□其他原因
   說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）
   論文：□已發表　□未發表之文稿　■撰寫中　□無
   專利：□已獲得　□申請中　■無
   技轉：□已技轉　□洽談中　■無
   其他：（以200字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）
   本計劃利用台灣心臟學會心衰竭資料庫，探討性別差異對於心衰竭的預後及其危險因子的影響。
   我們的結果顯示，在心衰竭的預後，確實存在性別差異的角色。茲從下列角度評估本研究的成果
   1.學術成就：利用台灣心臟學會心臟衰竭資料庫大資料的分析，我們瞭解到台灣病人性別差異對心臟衰竭的影響，這是新穎的發現，我們預計投稿至國際SCI知名期刊，提升台灣在國際間的研究能量
   2.技術創新：無。
   3.社會影響：我們的研究發現，男性在亞洲年紀大左心室射出分率下降心衰竭病人有較高死亡率的危險性，尤其是年紀越大，越有這樣的現象，提供政府公共衛生政策對於老人男性心衰竭病人，更需投入醫療資源進行預防，才能降低後續因為治療帶來的龐大花費。

4. 主要發現

本研究具有政策應用參考價值：■否　□是，建議提供機關

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現：□否　□是

說明：（以150字為限）

我們發現隨著年紀的增加，男性心衰竭的盛行率從8.7%增加至30.3%，而女性則沒有太大的差別，而年紀大於65歲以上的病人，在全死亡率及心因性死亡率則有差異，男性比女性來的高。再者，男性病人在年紀大的左心室射出分率下降心衰竭病人的全死亡率，是一個獨立的危險因子。