อัตราตายและอัตราการเข้ารักษาซ้ำของผู้ป่วยภาวะหัวใจล้มเหลวในโรงพยาบาลพังงา

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Outcomes of patients admitted with Heart failure at Phang Nga Hospital

Abstract

Introduction

Heart failure is a significant syndrome that has a high burden. To date 3 subgroups have been divided by left ventricular ejection fraction according to 2016 The European Society of Cardiology (ESC) heart failure guideline (Heart failure with reduced, mid-range and preserved ejection fraction). These subgroups might have different outcomes. The aim of this study to define the mortality and heart failure rehospitalization rate of all heart failure patients and compare data of 3 heart failure subgroups at Phang Nga hospital.

Method

This is a cross-sectional descriptive study. The Phang Nga hospital inpatient charts were review from October 2015 to September 2017 with principal diagnosis codes I11.0 and I50.* of International Classification of Disease (ICD-10). The primary outcomes are in-hospital mortality, 1-year mortality and 1-year heart failure rehospitalization rate. The secondary outcomes are the comparison of outcomes between 3 subgroups.

Results

289 patients were enrolled. Most of the patients were elderly with mean age 71.6 years and slightly more female (53.3%) with have the underlying disease of hypertension (80.3%) and dyslipidemia (67.1%). About 51.8% of the patients are in Heart failure with preserved ejection fraction subgroup. The in-hospital mortality, 1-year mortality, and rehospitalization rate due to heart failure were 4.2% 18.0% and 34.6 %, respectively. There is no significant difference between 3 subgroups.

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Conclusion

The outcomes show 18.0 % of one-year mortality rate and 34.6 % of one-year heart failure rehospitalization rate. Among three subgroups, There was no significant difference in mortality and rehospitalization rate.

Key words: Heart failure, Mortality, Rehospitalization, LVEF

บทคัดย่อ

บทนำ

ภาวะหัวใจล้มเหลวเป็นภาวะที่มีความสำคัญและมีค่าใช้จ่ายในการรักษาสูง ในปัจจุบันสามารถแบ่งตามการบีบตัวของหัวใจห้องล่างซ้ายได้เป็น 3 กลุ่มย่อย คือ หัวใจล้มเหลวชนิดที่มีการบีบตัวของหัวใจน้อย, ปานกลาง และดี ตามการแบ่งของแนวทางการรักษาหัวใจล้มเหลวของ The European Society of Cardiology (ESC) ปีค.ศ. 2016 โดยทั้งสามกลุ่มน่าจะมีผลลัพธ์ที่แตกต่างกัน การศึกษานี้จะศึกษาอัตราตาย และอัตราการนอนโรงพยาบาลซ้ำด้วยหัวใจล้มเหลว ของภาวะหัวใจวายทั้งหมดและเปรียบเทียบทั้ง 3 กลุ่มในโรงพยาบาลพังงา

วิธีการศึกษา

การศึกษานี้เป็นการศึกษาการศึกษาการวิจัยเชิงพรรณนา ณ จุดเวลาใดเวลาหนึ่ง แบบตัดขวาง โดยรวบรวมข้อมูลจากเวชระเบียนผู้ป่วยในของโรงพยาบาลพังงาที่มีโรคหลักเป็นตามรหัส ICD-10 I11.0 และ I50 ในช่วงเวลา 1 ตุลาคม 2558 ถึง 31 กันยายน 2560 และสัมภาษณ์ประวัติกับญาติของผู้ป่วย ผลการศึกษาหลักประกอบด้วย อัตราตายในโรงพยาบาล, อัตราตายใน 1 ปี และอัตราการนอนโรงพยาบาลซ้ำใน 1 ปี ผลการศึกษารอง คือ การเปรียบเทียบข้อมูลระหว่าง 3 กลุ่มย่อยของภาวะหัวใจล้มเหลว

ผลการศึกษา

มีผู้ป่วย 289 รายเข้าเกณฑ์เข้าร่วมการวิจัย ผู้ป่วยมีอายุเฉลี่ย 71.6 ปี เป็นผู้หญิงร้อยละ 53.3 และมีโรคประจำตัวเป็น ความดันโลหิตสูง และไขมันในหลอดเลือดสูง (ร้อยละ 80.3 และ 67.1 ตามลำดับ) ผู้ป่วยส่วนใหญ่เป็นผู้ป่วยหัวใจล้มเหลวชนิดที่มีการบีบตัวของหัวใจดี (ร้อยละ 51.8) อัตราตายในโรงพยาบาล, อัตราตายใน 1 ปีและอัตราการรับรักษาในโรงพยาบาลซ้ำด้วยภาวะหัวใจล้มเหลวในระยะเวลา 1 ปี คือ ร้อยละ 4.2, 18.0 และ 34.6 ตามลำดับ ซึ่งเปรียบเทียบทั้ง 3 กลุ่มแล้วไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ

สรุปผลการวิจัย

อัตราตายและอัตราการรับรักษาในโรงพยาบาลซ้ำภายใน 1 ปีหลังรักษาครั้งแรกในระดับที่มีความสำคัญ กล่าวคือ ประมาณร้อยละ 18.0 และ 34.6 ตามลำดับ โดยไม่พบความแตกต่างอย่างมีนัยสำคัญของผลดังกล่าวใน 3 กลุ่มที่แบ่งตามการบีบตัวของหัวใจห้องล่างซ้าย

คำรหัส : หัวใจล้มเหลว, อัตราตาย, อัตราการรับรักษาในโรงพยาบาลซ้ำ, การบีบตัวของหัวใจห้องล่างซ้าย

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หน่วยโรคหัวใจ กลุ่มงานอายุรกรรม โรงพยาบาลพังงา

Introduction

Heart failure is the significant syndrome that has high burden around the world. Over 26 million patients admitted with this syndrome worldwide.[1] High one-year mortality rate of the United States of America heart failure patients was observed as 29.6% in 2018. [2] The rehospitalization rate was also high, more than 50 percent of heart failure was rehospitalization.[3] Treatment cost was also high too. In 2012, the total cost of heart failure treatment was high as 108,120 million US$ in 197 countries.[4]

The prevalence of heart failure was varied among different countries from 1.44 to 6.7% [5] In Asia the prevalence of heart failure was at the same rate. (1-3%) [6]

In Thailand, The prevalence of heart failure was quite low as 0.4% But quite high hospitalization cost as 3606 US$ per patient per year.[6] And the in-hospital mortality rate was also high as 5.5 – 6%.[6, 7]

In May 2016, the European Society of Cardiology (ESC) launched heart failure guideline that divided heart failure into 3 subgroups by left ventricular ejection fraction (LVEF). Heart failure with preserved ejection fraction (HFpEF) defined as LVEF ≥ 50 %, heart failure with mid-range ejection fraction (HFmrEF) defined as LVEF 40 – 49 % and heart failure with reduced ejection fraction (HErEF) defined as LVEF < 40%.[8] It was the first time that the new identity "HFmrEF" was introduced. The clinical characteristics, treatments, and outcomes between 3 subgroups are varied in previous studies. In some studies, HFmrEF had overlap the other subgroups. [9-12] But in some studies, HFmrEF was a distinct identity. [13-15]

Data from Medical record department Phang Nga hospital, there were 203 heart failure hospitalizations from October 2013 to September 2014, this syndrome is the seventh highest admission in the Internal Medicine department. And the total cost was high as 3,160,126 bahts. But there was no previous data of death and rehospitalization of heart failure in Phang Nga hospital before. This study aims to find primary outcomes of heart failure such as in-hospital mortality one-year mortality and one-year heart failure rehospitalization rate at Phang Nga hospital. And the secondary outcome is to compare the outcomes of all 3 subgroups of heart failure.

Methods and Patients

This study was performed with a cross-sectional descriptive design. All medical records since October 2015 to September 2017 at Phang Nga hospital with heart failure classified by International Classification of Diseases (ICD-10) diagnosis codes I11.0 and I50.* were included to meet inclusion criteria and excluded by exclusion criteria of this study.

The inclusion criteria are 1) First episode of heart failure as a principal diagnosis of admission and 2) Age more than 15 years old.

The exclusion criteria are 1) Previous hospitalized at Phang Nga hospital with the diagnosis of heart failure, 2) Pregnancy, 3) Non-cardiovascular terminal illness such as cancer with survival less than twelve months., 4) Foreign pa-

tient and 5) Misdiagnosis by the physician of other diagnoses to ICD-10 code I50 and I11.0

Data Collection

Data collection was performed by extensive Inpatient charts review, Echocardiography review and a telephone interview of relatives of the patients. The data were included of 1) Demographic data include gender, age, weight, height, and BMI. 2) Underlying diseases include Hypertension, Diabetes mellitus, Dyslipidemia, Chronic kidney disease stage more than 3a, Atrial fibrillation, Coronary artery disease, Cerebrovascular disease, Chronic lung disease. 3) Hospitalization data include Admission duration, Heart rate at admission, Systolic blood pressure at admission, Need of mechanical ventilation and Need of dialysis. 4) Laboratories include Hemoglobin, serum Creatinine,Glomerular filtration rate calculated by the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) Equation, Serum Sodium. 5) Echocardiography performed within hospital ization by Phillips EPIQ 5c Cardiology Ultrasound Machine. Echocardio-graphic parameters include left ventricular ejection fraction (LVEF), left ventricular end diastolic diameter (LVEDD), Left atrial volume indexed to Body Surface Area (LAVI), diastolic function, right ventricular systolic pressure (RVSP), mean pulmonary artery pressure (mPAP) and significant valvular lesions. 6) Discharge medications. 7) Primary etiologies of heart failure. 8) The outcome includes in-hospital death, death after 1 year of diagnosis and heart failure rehospitalization rate after 1 year of diagnosis.

Statistic analysis

This study uses Descriptive analysis. For Qualitative variables such as gender, underlying disease etc., I use frequency and percentage to analysis. And for Quantitative continuous variables such as age, weight, BMI, LVEF etc, I use mean and SD values.

To compare continuous data between subgroups, Using non-parametric test (Kruskal-Wallis). To compare categorical data, Using Chi-square test or Fisher exact's test depend on expected cell count of data.

All of the statistical outcomes were calculated by IBM SPSS Statistics version 22.

Result

Between October 2015 and September 2017, there were 502 admission charts with ICD-10 code I50.* and I11.0 at Phang Nga hospital. Of these, 205 charts were excluded by exclusion criteria.

In total 297 charts, There were 8 charts that could not be found. Therefore 289 patients were included in this study. Echocardiography was performed in 253 patients. (87.5%) Most of the patients are older age and within normal weight. There were 53.3 % female patients. 80.3% and 67.1 % of the patients had the underlying disease of Hypertension and Dyslipidemia accordingly. HFpEF had the most number of patients among the 3 groups. The baseline characteristics are present as Table 1. Figure 1 shows the distribution of patients according to LVEF.

Compare between subgroups found significant differences in Gender, BMI and Underlying disease of Chronic kidney disease, Atrial fibrillation, and Coronary artery disease.

Table 1. Patient characteristics					
	All (n = 289)	HFrEF (n = 88)	HFmrEF (n=34)	HFpEF (n=131)	P- value
Age (years) (Mean ± SD)	71.6 ± 13.9	69.8 ± 14.2	69.0 ± 17.4	74.1 ± 11.9	0.083
Female gender (n (%))	154 (53.3)	37 (42.0)	15 (44.1)	81 (61.8)	*0.009*
Weight (kg.) (Mean ± SD)	61.47 ± 16.4	57.8 ± 14.4	59.5 ± 10.6	63.7 ± 18.2	0.052
Height (cm.) (Mean ± SD)	161.7 ± 8.7	162.86 ± 9.7	163.0 ± 6.5	160.8 ± 8.1	0.068
BMI (kg/m2) (Mean ± SD)	23.2 ± 5.6	21.5 ± 4.4	22.4 ± 4.0	24.5 ± 6.3	*0.001*
Table 1. Patient characteristics (Continued)					
	All (n = 289)	HFrEF (n = 88)	HFmrEF (n=34)	HFpEF (n=131)	P- value
Underlying diseases (n (%))					
- Hypertension	232 (80.3)	67 (76.1)	24 (70.6)	111 (84.7)	0.105
- Dyslipidemia	194 (67.1)	56 (63.6)	21 (61.8)	88 (67.2)	0.516
- Diabetes mellitus	95 (32.9)	30 (34.1)	13 (38.2)	38 (29.0)	0.780
- CKD*	86 (29.8)	17 (19.3)	11 (32.4)	46 (35.1)	*0.038*
- AF[†]	77 (26.6)	14 (15.9)	5 (14.7)	42 (32.1)	*0.010*
- CAD[‡]	74 (25.6)	34 (38.6)	11 (32.4)	20 (15.3)	*<0.001*
- Respiratory disease	32 (11.1)	11 (12.5)	2 (5.9)	19 (14.5)	0.296
- CVA[§]	9 (3.1)	1 (1.1)	2 (5.9)	4 (3.1)	0.453

*CKD = Chronic kidney disease stage more than 3a, [†]AF = Atrial fibrillation, [‡]CAD = Coronary artery disease , [§]CVA = Previous cerebral infarction or hemorrhage
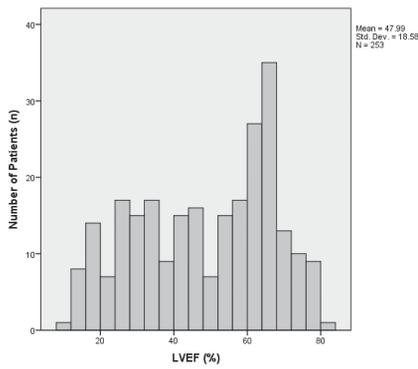
Figure 1. Number of paitents and LVEF histogram

During Hospitalization, Mean duration of admission was at 5.3 days, Mean admission heart rate was 83.5 BPM and mean Systolic blood pressure was quite high as 144.7 mmHg. The need for ventilator and need of acute dialysis are 8.7 and 1.0

percent in orderly. Heart rate seems higher in HFrEF subgroups. Laboratories showed mild anemia, impaired GFR (mean 52.7 ml/min/1.73 m2) and high normal serum sodium. Which were not significant difference between 3 subgroups. The 3 most discharge medications were Loop diuretic, Beta blockers, and Statins accordingly. Beta blockers, Aspirin, Angiotensin-converting-enzyme inhibitors (ACEI), Clopidogrel, Calcium channel blockers (CCB), Spironolactone were significant different in population prescribed among 3 subgroups. Hospitalized data were shown in Table 2.

Table 2. Hospitalized data					
	All (n = 289)	HFrEF (n = 88)	HFmrEF (n=34)	HFpEF (n=131)	P- value
Admission					
- Duration (days)(Mean ± SD)	5.3 ± 5.5	5.6 ± 4.6	5.6 ± 3.5	5.5 ± 6.9	0.329
- HR (BPM) (Mean ± SD)	83.5 ± 19.4	88.4 ± 20.4	82.1 ± 18.0	80.2 ± 18.8	*0.012*
- SBP (mmHg)(Mean ± SD)	144.7 ± 29.2	141.34 ± 27.2	151.6 ± 30.0	146.0 ± 29.5	0.169
- Ventilator (n (%))	25 (8.7)	8 (12.5)	4 (11.8)	8 (6.1)	0.230
- Dialysis (n (%))	3 (1.0)	1 (1.1)	1 (2.9)	1 (0.8)	0.578
Laboratories					
- Hemoglobin(g/dl)(Mean± SD)	11.4 ± 2.3	11.7 ± 2.3	11.0 ± 2.7	11.3 ± 2.1	0.132
- Creatinine (mg/dl) (Mean ± SD)	1.8 ± 1.6	1.7 ± 1.6	2.2 ± 4.0	1.6 ± 1.3	0.385
- GFR* (ml/min/1.73 m2) (Mean ± SD)	52.7 ± 28.9	54.7 ± 27.4	48.1 ± 30.5	52.7 ± 30.0	0.551
- Serum sodium(mEq/L)(Mean ± SD)	139.8 ± 5.0	139.7 ± 5.1	139.3 ± 6.1	140.0 ± 4.6	0.768

Table 2. Hospitalized data					
	All (n = 289)	HFrEF (n = 88)	HFmrEF (n=34)	HFpEF (n=131)	P- value
Discharge medication (n (%))					
- Loop diuretic	237 (82)	74 (84.1)	27 (79.4)	108 (82.4)	0.827
- Beta- blockers	187 (64.7)	72 (81.8)	25 (73.5)	69 (52.7)	*<0.001*
- Statins	158 (54.7)	55 (62.5)	19 (55.9)	64 (48.9)	0.137
- Aspirin	115 (39.8)	46 (52.3)	12 (35.3)	43 (32.8)	*0.013*
- ACEI[†]	110 (38.1)	54 (61.4)	17 (50)	31 (23.7)	*<0.001*
- Hydralazine	64 (22.1)	16 (18.2)	7 (20.6)	33 (25.2)	0.460
- Clopidogrel	58 (20.1)	33 (37.5)	9 (26.5)	11 (8.4)	*<0.001*
- Warfarin	58 (20.1)	13 (14.8)	6 (17.6)	27 (20.6)	0.545
- CCB[‡]	46 (15.9)	3 (3.42)	5 (14.7)	30 (22.9)	*<0.001*
- Nitrate	29 (10)	14 (15.9)	5 (14.7)	8 (6.1)	*0.041*
- Spironolactone	28 (9.7)	20 (22.7)	3 (8.8)	1 (0.8)	*<0.001*
- ARB[§]	25 (8.7)	6 (6.8)	1 (2.9)	11 (8.4)	0.620
- Digoxin	4 (1.4)	0 (0)	0 (0)	2 (1.5)	0.638
- Thiazide	1 (0.3)	0	0	0	

*GFR = Glomerular filtration rate derived by The CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) equation.

[†]ACEI = angiotensin-converting-enzyme inhibitors, [‡]CCB = Calcium channel blockers, [§]ARB = Angiotensin II receptor blockers

Of 289 total patients, Echocardiography was done in 253 patients. (87.5%) Table 3, showed the echocardiographic data. Some of the data were missed due to technical problems eg. Poor acoustic windows, Could not obtain Tricuspid or Pulmonic regurgitation jer for RVSP, mPAP calculation etc. About 51.8% of 253 patients were HFpEF patients. Pulmonary hypertension was found in all heart failure patients and all 3 subgroups. (Defined by RVSP ≥ 50 mmHg or mPAP ≥ 25 mmHg) Left ventricular dilatation (defined by LVEDD ≥ 55mmHg, Severe diastolic dysfunction (defined by MV E/A > 2) and Moderate to severe Mitral valve regurgitation or stenosis had significant difference among 3 subgroups.

Table 3. Echocardiographic data

	All	HFrEF	HFmrEF	HFpEF	P-value
LVEF (%) (Mean ± SD)	48.0 ± 18.6	26.1 ± 7.6	44.0 ± 2.7	63.7 ± 7.1	*< 0.001*
Total n (%)	253 (100%)	88 (34.8%)	34 (13.4%)	131 (51.8%)	
LVEDD (mm) (Mean ± SD)	48.6 ± 9.7	56.1 ± 8.5	48.8 ± 8.1	43.2 ± 7.1	*< 0.001*
Total n	246	87	34	125	
LAVI (mL/m2) (Mean ± SD)	61.7 ± 43.9	64.4 ± 58.7	58.2 ± 27.7	60.6 ± 34.0	0.725
Total n	225	82	31	112	
MV E/A > 2[*] (n (%))	18 (12.8)	15 (29.4)	0 (0)	3 (4.1)	*< 0.001*
Total n	141	51	17	73	
RVSP (mmHg)	53.5 ± 17.9	55.2 ± 13.1	49.2 ± 22.3	53.2 ± 19.9	0.083
Total n	137	50	14	73	
mPAP (mmHg)	31.0 ± 9.1	33.3 ± 8.5	30.1 ± 11.6	29.5 ± 8.7	0.096
Total n	114	43	14	57	
Valves (Total n)	249	88	33	128	
- Mod- severe AS (n (%))	20 (8.0)	3 (3.4)	2 (6.1)	15 (11.7)	0.077
- Mod- severe AR (n (%))	15 (6.0)	5 (5.7)	3 (9.1)	7 (5.5)	0.701
- Mod- severe MS (n (%))	10 (4.0)	2 (2.3)	4 (12.1)	4 (3.1)	*0.049*
- Mod- severe MR (n (%))	48 (19.3)	28 (31.8)	7 (14.6)	13 (10.2)	*< 0.001*
- Mod- severe TR (n (%))	52 (21.0)	21 (24.1)	5 (15.2)	26 (20.3)	0.539

*MV E/A = Mitral inflow E/A ratio

Table 4 showed etiologies of heart failure. The 2 most common causes of overall heart failure were Ischemic heart disease and significant valvular heart disease. The 2 most common causes of HFrEF and HFmrEF subgroups are Ischemic heart disease and Dilated Cardiomyopathy. On the other hand, Significant valvular heart disease and Hypertensive heart disease were the 2 most common causes of HFpEF. Noted unknown etiology was found 26.7% in HFpEF patients. Among the 3 subgroups found a significant difference in all etiologies.

Table 4. Etiologies of heart failure

	All (n = 252)	HFrEF (n=88)	HFmrEF (n=33)	HFpEF (n=131)	P-value
- IHD[*] (n (%))	77 (30.6)	49 (55.7)	19 (57.6)	9 (6.9)	*< 0.001*
- Valvular (n (%))	52 (20.6)	7 (13.5)	8 (15.4)	37 (28.2)	*0.001*
- DCM[†] (n (%))	42 (16.7)	33 (37.5)	8 (24.2)	1 (0.8)	*< 0.001*
- Hypertensive heart (n (%))	39 (15.5)	1 (2.6)	1 (3.0)	37 (28.2)	*< 0.001*
- Tachycardia (n (%))	0 (0)	0 (0)	0 (0)	0 (0)	
- Unknown (n (%))	35 (13.9)	0 (0)	0 (0)	35 (26.7)	*< 0.001*

[*]IHD = Ischemic heart disease, [†]DCM = Dilated cardiomyopathy

Outcomes of overall heart failure included 4.2% in-hospital mortality rate, 18.0% one-year mortality rate and 34.6% one-year heart failure rehospitalization after the first admission of heart failure. All 3 subgroups had no significant difference in all outcomes. Data showed in Table 5

Table 5. Heart failure outcomes

	All (n = 289)	HFrEF (n= 88)	HFmrEF (n=34)	HFpEF (n=131)	P-value
In hospital death (n(%))	12 (4.2)	2 (2.3)	1 (2.9)	7 (5.3)	0.552
1 year mortality(n(%))	52 (18.0)	16 (20.0)	8 (19.0)	18 (14.9)	0.215
HF* rehospitalization (n(%))	83 (34.6)	26 (31.3)	13 (43.3)	44 (34.6)	0.492
HF* rehospitalization (times) (Mean ± SD)	0.6 ± 1.1	0.5 ± 1.0	1.0 ± 1.8	0.5 ± 0.9	0.305

*HF = Heart failure

Discussion

This study provides data on heart failure patient characteristics, clinical data, Echocardio-graphic data, Mortality rate, and Heart failure rehospitalized rate of Phang Nga hospital. Moreover, It shows data divided into 3 heart failure subgroups according to 2016 ESC heart failure guideline.[8]

Patient characteristics

Like the earlier studies [5, 7, 12-14], This study shows elderly patients. But unlike the earlier studies, [5, 10, 12-14, 16] This study has more female patients than male patients. Patient gender is quite similar with Thai Acute Decompensated Heart Failure Registry (Thai ADHERE) study[7], this might be due to ethnic influence. In this study shows normal BMI patients like the Korean Acute Heart Failure (KorAHF) registry[14], but unlike in the European studies,[12, 13] that showed more BMI than this study. That because European people have more overweight problem than in Asia. The most common underlying diseases are Hypertension like the earlier studies,[1, 12-14, 16] but unlike data in Thai ADHERE study that had Ischemic heart disease as the most common underlying disease.[7]

Mention before, in this study HFpEF subgroup has the most number of patients. (51.8%) This finding is unlike the ESC Heart Failure Long-Term Registry,[13] that has HFrEF as the major population.

There were significant differences among subgroups. In HFpEF subgroup, There was more female, BMI and Atrial fibrillation but less coronary artery disease than the other groups. In HFrEF subgroup, Chronic kidneys disease seem lower than the others. These findings are not like other studies. [9, 10, 13-15]

Hospitalized data

Duration of hospitalization is quite short compared to Kyoto Congestive Heart Failure (KCHF) study (5.3 VS 21 days)[15] The initial heart rate and systolic blood pressure are not different from the other studies. [10, 13-15] As their studies are in normal range and not different among subgroups. The need for mechanical ventilation and need of dialysis in this study are low as 8.7% and 1.0%, unlike the Thai ADHERE, they have more need for ventilator and dialysis. (20.4%, 5.2) [7] It may imply that Phang Nga hospital patients are less severe than the other centers.

Laboratory shows mild anemia that is different from Cho JH et al study.[14] But they have showed impaired GFR and normal serum sodium like this study.

The 2 most common discharge med-ications are Loop diuretic and Beta Blockers. This finding is similar to the earlier study.[16] But Statins are the third most common prescribe in this study, unlike the other study. RAAS blockage, Beta Blockers, Aspirin, ACEI, Clopidogrel, and Spironolactone have more prescribe significantly in HFrEF subgroups than the others. Because of ESC and American College of Cardiology (ACC) Heart failure guidelines are indicated those medications as the standard treatment of HFrEF subgroup patients. [8, 17] For Aspirin and Clopidogrel, it may imply that most HFrEF patients have ischemic heart disease. Calcium channel blockers are significant more prescribe in HFpEF subgroup.

Echocardiographic data

Like the earlier studies,[13, 14] HFrEF subgroup has more dilatation of LVEDD and LAVI than the others. The diastolic dysfunction grade III (Mitral inflow E/A ratio > 2) is significantly more in HFrEF subgroup too, like the finding in the ESC Heart Failure Long-Term Registry.[13] Pulmonary hypertension found in this study without significant difference in all subgroups that resemble the ESC Heart Failure Long-Term Registry.[13]

Significant Mitral valve regurgitation is significantly more in HFrEF subgroup because secondary Mitral valve regurgitation are commonly found in severe reduced LVEF condition. Despite Mitral valve stenosis, that has found more in HFmrEF subgroups. In the ESC Heart Failure Long-Term Registry,[13] Mitral valve regurgitation is more in HFrEF than the other subgroup and Aortic stenosis are more in HFpEF than the other subgroups. But their study did not mention Mitral valve stenosis. Because European countries have a very low incidence of rheumatic mitral valve stenosis.

The most common cause of overall heart failure is Ischemic heart disease. This finding resembles to the earlier studies.[10, 12, 14] The second most common cause of overall heart failure is valvular heart disease, that unlike the earlier studies, which indicated Hypertensive heart disease or Cardiomyopathy.[10, 12, 14] Somehow, Valvular heart disease is the second most common cause of heart failure in Thai ADHERE study too.[7] It may imply that in Thailand, Ischemic heart disease and valvular heart disease are significant

causes of heart failure. From subgroup analysis, found significant differences between subgroups of all etiologies of heart failure like the earlier studies.[10, 14] Ischemic heart disease and Dilated cardiomyopathy have significant higher percentage of patients in HFrEF and HFmrEF compared to HFpEF. On the other hand, HFpEF subgroup has a significant higher percentage of patients in valvular heart disease and Hypertensive heart disease. Noted unknown etiology was found about a quarter of patient in HFpEF subgroup. This finding was not noted in earlier studies.[10, 12, 14, 16]

Heart failure outcomes

In-hospital death was found 4.2% of patients in this study. This finding is similar to the earlier studies. [7, 11, 14-16] 1-year mortality and heart failure rehospitalization rate were 18.0% and 34.6% respectively in this study. Which is much higher than the ESC Heart Failure Long-Term Registry. (8.1% and 12.4%) Because they enrolled chronic patients who presented routinely at outpatient visits. [13] But one-year mortality are lower than the American data (AHA Heart Disease and Stroke Statistics 2018). [2] Compare one-year heart failure rehospitalization rate which Desai and Stevenson report found lower than their report. (≥ 50%) [3]

In this study, Comparison outcomes among subgroups show no significant difference in mortality rate and heart failure rehospitalization rate. Again, unlike the ESC Heart Failure Long-Term Registry (13), they found significantly more heart failure rehospitalization rate in HFrEF among subgroups. This may imply that among 3 subgroups of hospitalized heart failure patients have equal risk

of death and heart failure rehospitalization rate. On the other hands, HFrEF has increased risk of death and heart failure rehsopitalization among 3 subgroups of outpatient heart failure patients.

Limitations

First, this study protocol is cross-sectional study, so that some pieces of information are missing and may be effected to the analyzing process such as the outcome data sometimes are missing because the relatives of patients forgot the exact number and time of hospitalizations, Transthoracic echo was not requested in some patients etc. Second, this study use ICD-10 code to identified heart failure patients but sometimes Clinicians are miscoding "Heart failure" code as the other codes when they summarized the discharged summary. Finally, this study did not include outpatient heart failure patients, so it may not represent as the entire population of heart failure.

Conclusion

This study is the first report of heart failure demographic, hospitalized data, Echocardiographic data and heart failure outcomes in Phang Nga hospital. The outcomes of overall heart failure were In-hospital mortality rate as 4.2%, One-year mortality rate as 18.0% and heart failure rehospitalization rate as 34.6%. The significant difference among subgroups of heart failure is Gender, BMI, Underlying disease of Chronic kidney disease, Atrial fibrillation and Coronary artery disease, Heart rate at admission, Some discharge medications, Some Echocardiographic parameters such as

LVEDD, Significant Mitral valve regurgitation and stenosis, and all of the etiologies of heart failure. All three subgroups of heart failure have no significant difference in the outcomes.

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