



## Heart Failure in NCVC Jakarta and 5 hospitals in Indonesia

Bambang Budi Siswanto <sup>a,\*</sup>, Basuni Radi <sup>a</sup>, Harmani Kalim <sup>a</sup>, Anwar Santoso <sup>b</sup>, Rurus Suryawan <sup>c</sup>, Erwinanto <sup>d</sup>, Eko Antono <sup>d</sup>, T. Santoso <sup>e</sup>,  
On behalf of all ADHERE study Indonesia team 2006

<sup>a</sup> Department of Cardiology and Vascular Medicine, University of Indonesia, Indonesia

<sup>b</sup> National Cardiovascular Center Jakarta, Indonesia & Department of Cardiology and Vascular Medicine, University Udayana, Sanglah Hospital Denpasar Bali, Indonesia

<sup>c</sup> Department of Cardiology and Vascular Medicine, University Airlangga Dr Sutomo Hospital, Surabaya, Indonesia

<sup>d</sup> Department of Cardiology & Vascular Medicine University Padjadjaran, Hasan Sadikin Hospital, Bandung, Indonesia

<sup>e</sup> Medistra Hospital Jakarta, Indonesia

Received 16 February 2010; accepted 17 March 2010

### KEYWORDS

Acute Decompensated Heart Failure Registry; NCVC Jakarta; Re-hospitalization; Mortality

### Summary

Indonesia is an archipelago consisting of 17,000 islands (6000 inhabited) to spanning by the equator in South East Asia. The total area is 741,096 sq mil (1,919,440 km sq). The population in 2005 was 241,973,879, with a population growth rate of 1.5%, a birth rate of 20.7/1000 population and a life expectancy of 69.6 years. There are 1246 hospitals in Indonesia, of which 49.8% are in private hospitals and 50.5% are located in Java. There is a total of 132,231 beds or one hospital bed per 1628 population.

In 2005 we did a pilot cohort study of 100 consecutive new cases of Acute Decompensated Heart Failure (ADHF) at NCVC Jakarta to search for predictors of mortality and re-hospitalization. We found the independent predictors for mortality and re-hospitalization are high NT proBNP at entry, NT proBNP at discharge, not decreased >35% during hospitalization, NYHA functional class 4, edema with a BMI >30 kg/m<sup>2</sup>, ejection fraction <20%, acute pulmonary edema, not on a beta-blocker, hemoglobin <12 g/dl and Hyponatremia <130 mmol/L. More than 78% using ACEI/ARB, diuretic and aldosterone antagonist, but only 32% using beta-blocker.

In 2006, we conducted an Acute Decompensated Heart Failure Registry (ADHERE) with the participation of five hospitals including National Cardiovascular Center (NCVC) Jakarta, the top cardiovascular referral hospital. In total, there were 1687 patients admitted with ADHF. The mean age was 60 years and male patients were 64.5%. Compared to other countries, our heart failure patients were younger, had more severe symptoms and there were more new patients

\* Corresponding author. Tel.: +62 0816924957; fax: +62 21 5686203.  
E-mail address: [bambbs@cbn.net.id](mailto:bambbs@cbn.net.id) (B.B. Siswanto).

(de novo acute ADHF). Hypertension (54.8%), coronary artery disease (49.9%), diabetes (31.2%), myocardial infarction (23.3%) and atrial fibrillation (14.6%) are the leading etiologies of our ADHF patients. There were 62.7% patients with ejection fraction (EF) <40% and the mean EF was 33%. The median hospital length of stay was 7.1 days and the hospital mortality was 6.7% [15].

In NCVC Jakarta, compliance with medical evaluation and drugs and diets are the predictors of hospitalizations. There were 47% non-compliant patients and the survival probability at 5 years was only 54%. The 5 year predictors of mortality are poor EF, Diabetes and male gender. The 5 year survival of males with poor EF and Diabetes was only 36%. Among socio-economic factors, only 33.5% had health insurance and 54.5% lived >20 km from hospital [16].

There are increasing numbers of hospitalized heart failure patients in NCVC Jakarta. In 2007 there were 1409 patients and an increase in 2008 to 1476 hospital admissions. Also there has been an increase in in-hospital mortality to around 12%.

*Conclusion:* Heart failure is a leading cause of hospitalization and readmission in NCVC. Indonesian heart failure patients were younger, sicker, with a poor EF and Diabetes compared to others. The in-hospital mortality ranges from 6% to 12% and the re-hospitalization rate is 29%. Poor compliance, poor EF and Diabetes are the predictor for readmission. Health insurance improves survival probability. There is a need for better heart failure services.

© 2010 World Heart Federation. Published by Elsevier Ltd. All rights reserved.

## Introduction

Indonesia is the world's largest archipelagic state spanning the equator. It lies in the tropical zone of Southeast Asia, between two continents (Asia and Australia), and two oceans (Pacific and Indian). The archipelago of Indonesia comprises about 17,508 big and small islands, of which only about 6000 are inhabited. The total area is 741,096 mil sq (1,919,440 km sq). Five main islands and 30 smaller island groups are home to the majority of the population. The main islands are Sumatera (425,606 km<sup>2</sup>), Kalimantan (539,460 km<sup>2</sup>), Sulawesi (174,219 km<sup>2</sup>), Irian Jaya (421,981 km<sup>2</sup>), and Java (129,187 km<sup>2</sup>) which is home to about 70% of the country's population. Based on its administrative divisions, Indonesia is divided into 32 provinces, two special regions and one special capital city district. Jakarta is the capital city of Republic of Indonesia located on the north coast of West Java. It is the government and economic center of Indonesia. According to the Population Census 2005, the total population in Indonesia is 241,973,879. The distribution of the population, however, is not even. The island of Java with less than 7% of total land area is the home of almost 60% of the total population, while the island of Papua that covers almost 21% of total land area is inhabited by only 1% of the total population. The population growth rate is 1.5% per year. The birth rate is approximately 20.7 births/1000 population and life expectancy is 69.6 years. There are 1246 hospitals in Indonesia, of which 49.8% are private hospitals and (50.5%) are located in Java. Hospital beds total 132,231 or one hospital bed per 1628 population.

Heart failure (HF) has become a major burden to the community worldwide due to the cost of care, poor quality of life and premature death of affected people. It is estimated to increase continuously during the next few decades. In fact, the number of people  $\geq 60$  years of age is expected to double by 2025 and to triple by 2050 globally [1]. The incidence in developing countries is increasing from 1.5–4% to 6.7–9% [2,3]. In our National Cardiovascu-

lar Center at Jakarta, heart failure is the most common diagnosis with a high mortality [4–6]. Although HF is believed to be the leading cause of hospitalization in developed countries, little is known about the outcomes of Acute Decompensated Heart Failure (ADHF) within regions outside Europe and the United States. Moreover, there is only limited data on ADHF mortality and re-hospitalization rates as well as the predictors of mortality and re-hospitalization. Therefore, we sought to document the characteristics, management and in-hospital outcomes of ADHF patients in Indonesia, including our National Cardiovascular Center, Jakarta.

## Methods

In 2005 from May to November we conducted a prospective cohort study of 100 new consecutive cases of ADHF admitted at the emergency room NCVC Jakarta. We completely evaluated 50 parameters from risk factor, history, physical examination, ECG, CXR, laboratory including three biomarker of heart failure and also complete echocardiography evaluation including treatment to identify predictors for re-hospitalization and mortality at 6 months follow up.

In 2006 from January to December, we established an Acute Decompensated Heart Failure Registry (ADHERE) with the participation of four other hospitals i.e. Medistra Hospital Jakarta, Dr. Hasan Sadikin Hospital Bandung, Dr. Sutomo Hospital Surabaya and Sanglah Hospital Denpasar Bali. This registry was part of The Acute Decompensated Heart Failure Registry (ADHERE<sup>®</sup>) International – Asia Pacific and Latin America (APLA), which is a multi-country, multi-center, observational electronic web-based database of patients hospitalized for ADHF, within the Asia Pacific and Latin America regions. We registered data on demographics, medical history and symptoms, essential laboratory tests, echocardiography, medications and mortality. Both provide the first prospective data on heart failure in Indonesia.

## Results

In our 2005 pilot cohort study of 100 consecutive ADHF cases at NCVJ Jakarta, three cases were lost to follow up. The independent predictors for mortality and re-hospitalization were high NTproBNP on admission >17.860 pg/mL, high NTproBNP at discharge >8.499 pg/mL, not decreased >35% during hospitalization, NYHA class 4, acute lung edema, BMI >30 with edema, not on a beta-blocker, left ventricle wall thickness <11 mm, EF <20%, anemia, hyponatremia [14].

In 2006 the Indonesia ADHERE study registered 1687 patients admitted with ADHF at five different hospitals. The demographic characteristics are shown in Table 1. Overall, our patients had a mean age of 60 years and there were 64.5% male patients. Compared to the patients in Europe, our patients tend to be younger, i.e. 60 years compared to a mean age of 69.9 years in Europe [7]. Our patients also presented with more severe clinical signs and symptoms than those in US. Dyspnea was found in 97.4% of our patients vs. 89% in US and dyspnea at rest was noted in 31.5% of our patients compared to 32% in US. Rales were noted in 86.3% vs. 60% in US. However, peripheral edema was only found in 42.6% vs. 62% in US [8,9]. We also noted more new patients

**Table 1** Demographic characteristics.

Demographic characteristics	Percentage	<i>n</i> = 1687
Median age (years)	60.0	
<i>Age distribution (%)</i>		
<50 years	21.6	
50–59 years	25.7	
60–69 years	30.7	
70–79 years	17.9	
80+ years	4.1	
<i>Gender</i>		
Male (%)	64.5	
Female (%)	35.5	
<i>Ethnicity</i>		
Indonesian (%)	99.6	
Others (%)	0.4	
<i>Past medical history</i>		
Prior heart failure (%)	66.7	<i>n</i> = 639
Prior LVEF assessed (%)	37.9	
LVEF <40% moderate impairment (%)	62.7	
Hypertension (%)	54.8	
Coronary artery diseases (%)	49.9	
Hyper/dyslipidemia (%)	23.1	
Myocardial infarction (%)	23.3	
Atrial fibrillation (%)	14.6	
Stroke or TIA (%)	8.6	
Peripheral vascular diseases (%)	1.5	
Pacemaker or ICD (%)	1.7	
Diabetes (%)	31.2	
Chronic renal insufficiency (%)	13.3	
Chronic dialysis (%)	2.2	
COPD or asthma (%)	6.9	
Ever smoked (%)	21.3	
Current smoker (%)	74.0	

**Table 2** Clinical presentation.

Clinical presentation	Percentage	<i>n</i> = 1687
Any dyspnea (%)	97.4	
Dyspnea at rest (%)	31.5	
Fatigue (%)	92.5	
Rales (%)	86.3	
Peripheral edema (%)	42.6	
Systolic pressure assessed (%) <i>n</i> = 1681		
SBP <90 mm Hg (%)	2.4	
SBP 90–140 mm Hg (%)	58.9	
SBP >140 mm Hg (%)	38.7	
Initial ECG Assessed (%) <i>n</i> = 1683		
A-Fib/Flutter (%)	21.6	<i>n</i> = 1605
Other abnormal rhythm (%)	17.9	<i>n</i> = 1662
Initial chest X-ray assessed (%)		
Pulmonary congestion (%)	95.2	
Initial serum creatinine assessed (%)		
Creatinine >1.5 mg/dl (%)	32.1	
LVEF assessed (%) <i>n</i> = 639		
<40% or mod/severe impairment (%)	62.7	
Initial CKMB assessed (%) <i>n</i> = 418		
Median CKMB value	20.0	<i>n</i> = 8
Troponin I assessed (%)		
Positive (%)	100.0	

(de novo acute ADHF) as represented by a lower percentage of a prior heart failure history compared to the US data (66.7% vs. 76%) (Table 2).

In our ADHF cases, we found hypertension (54.8%), coronary artery disease (49.9%), diabetes (31.2%), myocardial infarction (23.3%) and atrial fibrillation (14.6%) to be the leading etiologies. Demographic and clinical differences between ethnic groups are noted in many aspects of heart disease, including heart failure [10–12]. The incidence of coronary artery disease, a major cause of heart failure in Western countries, is relatively low in South Asian countries. This ethnic predisposition can be exaggerated by nutritional and environmental factors [13]. However, our data in Indonesia demonstrated the astonishing finding that coronary artery disease tends to be higher and has an important role for the development of heart failure.

The median hospital length of stay was 7.1 days – a shorter period than in Europe and Latin America, with 9.0 and 9.9 days, respectively. We found a hospital mortality of 6.7% which was higher compared to the mortality rate in Asia Pacific Region (4.8%) vs. US (3.0%), similar to Europe (6.7%) and lower than Latin America (8.0%) [9]. There were 62.7% patients with an ejection fraction (EF) <40% which was higher than in US patients (54%). Moreover, the mean EF was 33%. Such facts indicated that most of our patients came in worse condition, and with a poor prognosis.

## Discussion

This is the first international publication of prospective data of heart failure in Indonesia showing the burden of heart

failure morbidity and mortality. Shortness of breath and edema are the most common symptoms, however most patients presented late due to ignorance, lack of health insurance and being far from hospital. Our heart failure patients are younger (mean 55 years old at NCVJ and 60 years old at other Indonesia Hospital) compared to other countries. The younger age may imply socioeconomic influences, education, diet, smoking and life style). Male are twice as common as females, and the most leading etiologies of heart failure are hypertension, coronary artery disease, diabetes, dyslipidemia, myocardial infarction and atrial fibrillation. Current smoker was 74% showing the very high influence of smoking in patients with heart failure on admission. Stopping smoking and tobacco bans should be strongly supported by government legislation and penalties.

In the pilot study of 100 pts with ADHF at NCVJ Jakarta, 58.8% had pathologic Q wave, 57.7% with LVH Sokolov Lyon criteria, 30.9% with wide QRS and 23.7% with atrial fibrillation, however in the Indonesia ADHERE study of 1687 cases, 21.6% with atrial fibrillation/atrial flutter. ECG is an important and inexpensive tool for detecting cardiovascular disease. In 2008, the Indonesia Heart Association had suggested the Research and Development Bureau of Ministry of Health to use ECG in the Basic Health Research of Indonesia population with random sampling of 1 million populations, but there is a financial constraint.

The Indonesia ADHERE study did not detect the important of reaching ideal body weight, however in our previous pilot study at NCVJ we found that a high Body Mass Index with edema is a predictor of mortality. A mass campaign is needed for Indonesian people to avoid obesity with the goal of ideal body weight. Many of our heart failure patients are new cases. They are sicker with a mean EF  $\pm$  33% so that many of them are difficult to manage. More required a ventilator in the Asia Pacific ADHERE study population compared to US and Europe.

The use of biomarkers for heart failure diagnosis and evaluation is very small and may influence the diagnosis and monitoring. LVEF was assessed in only 37.9% cases. The availability of urgent echocardiography or biomarkers may influence accurate treatment.

From these initial data, now we are doing a national registry of heart failure according to ESC and APSC format. We need to convince the doctors and the government that heart failure has become an epidemic cardiovascular disease with a high mortality and morbidity and high cost that could be prevented by a national health program addressing hypertension, coronary artery disease and diabetes prevention.

To improve heart failure service, every big hospital should have a heart failure clinic with a prevention program that will decrease the cost, morbidity and mortality of heart failure.

## Conclusion

Heart failure is the leading cause of readmission and mortality at National Cardiovascular Center Jakarta. The independent predictors of mortality are high NT proBNP, not decreased >35% during hospitalization, NYHA functional

class 4, acute pulmonary edema, BMI >30 kg/m<sup>2</sup> with edema, EF <20%, not on a beta-blocker, anemia <12 g/dL, hyponatremia <130 mmol/L. From ADHERE Indonesia, heart failure patients are younger, sicker, poor EF and more diabetes. More frequent use of ventilator was noted from Asia Pacific ADHERE study including Indonesia. Non adherence to medical check up, non compliance to drug and diet are the predictors of readmission. A comprehensive cardiovascular preventive program is urgently needed in Indonesia.

## References

- [1] Asia Pacific Cohort Studies Collaboration. The impact of cardiovascular risk factors on the age-related excess risk of coronary heart disease. *Int J Epidemiol* 2006;35:1025–33.
- [2] Mendez GF, Cowie MR. The epidemiological features of heart failure in developing countries: a review of the literature. *Int J Cardiol* 2001;80:213–9.
- [3] Cleland JG, Khand A, Clark A. The heart failure epidemic: exactly how big is it? *Eur Heart J* 2001;22:67676–83.
- [4] Utami S, Suparno, Meilantoro. Harapan Kita National Health Center Year Report; 1999. Jakarta, p. 17–25.
- [5] Utami S, Suparno, Meilantoro. Harapan Kita National Health Center Year Report; 2000. Jakarta, p. 32–9.
- [6] Utami S, Suparno, Meilantoro. National Health Center Year Report; 2001. Jakarta, p. 32–9.
- [7] EuroHeart Failure Survey II (EHFS II): a survey on hospitalized acute heart failure patients: description of population. Nieminen MS, Brutsaert D, Dickstein K, et al. *EuroHeart Survey Investigators; Heart Failure Association. Eur Soc Cardiol Eur Heart J* 2006;27(22):2725–36.
- [8] ADHERE US Q1 2006. Final Cumulative National Benchmark Report, Scios production no. P0305409.
- [9] The ADHERE International Benchmark Report; January 1, 2006–March 31, 2009.
- [10] Martiniuk AL, Lee CM, Lawes CM, Ueshima H, Suh I, Lam TH, et al. Hypertension: its prevalence and population-attributable fraction for mortality from cardiovascular disease in the Asia-Pacific region. *J Hypertens* 2007;25:73–9 [medline, order article via infotrieve].
- [11] Yeo KK, Tai BC, Heng D, Lee JM, Ma S, Hughes K, et al. Ethnicity modifies the association between diabetes mellitus and ischemic heart disease in Chinese, Malays and Asian Indians living in Singapore. *Diabetologia* 2006;49:2866–73 [crossref, medline, order article via infotrieve].
- [12] Asia Pacific Cohort Studies Collaboration. Joint effects of systolic blood pressure and serum cholesterol on cardiovascular disease in the Asia Pacific region. *Circulation* 2005;112:3384–90 [abstract/free full text].
- [13] Enas EA, Yusuf S, Mehta J. Meeting of the International Working Group on Coronary Artery Disease in South Asians: 24 March 1996, Orlando, Florida, USA. *Indian Heart J* 1996; 48: 727–2. [Medline, order article via infotrieve].
- [14] Siswanto BB, Sunanto, Munawar M, Kusmana D, Hanafiah A, Waspadji S, Bachtiar A. Predictor of mortality and rehospitalization of acute decompensated heart failure at six months follow up. *Crit Care Shock* 2006;9(3):61–7.
- [15] Radi B et al. Profile of Acute Decompensated Heart Failure in Indonesia. ADHERE study indonesia. WECOC; 2007. [Abstract].
- [16] Amran, Siswanto BB, Mahkota R, Yuniadi Y. The impact of compliance on five year survival rate of patients hospitalized for congestive heart failure at National Cardiovascular Center. Thesis. Dept Epidemiology, Faculty of Public Health, University of Indonesia, Depok; 2007.