

Pilot Survey of the Diagnosis and Management of Heart Failure in Primary Care: A Singaporean Perspective

SR Soon,¹ R Yong,¹ ZH Chew,¹ JMJ Lee,² MBBS CSP Lam³ MBBS, MRCP

Abstract

Introduction: The diagnosis and management of congestive heart failure at the primary care level is difficult. Despite advances in medical therapy, namely angiotensin-converting enzyme inhibitors and β -blockers, congestive heart failure remains a common cause of hospital visits. The extent to which these advances have been implemented in primary care is uncertain. We therefore sought to assess current practice patterns of primary care physicians and identify obstacles to optimal diagnosis and management of congestive heart failure in Singapore. **Materials and Methods:** Telephone interviews of 100 primary care physicians using structured questionnaires. **Results:** Primary care physicians diagnose congestive heart failure based on the presence of breathlessness (92.5%), lung crackles (52.5%), peripheral oedema (55.0%) and findings on chest radiography (76.8%). Only 1 in 3 mentioned raised jugular venous pressure as a useful diagnostic sign. Echocardiography was not commonly obtained (5%), mainly due to inaccessibility. While many (47.5%) were aware of the importance of angiotensin-converting enzyme inhibitors, few (16.2%) knew of the impact of β -blockers on morbidity and mortality. Instead, diuretics were thought to be most important for prolonging survival in congestive heart failure (47.5%). The main obstacle to widespread angiotensin-converting enzyme inhibitors usage was dry cough. Patient compliance (57.5%) and cost (82.5%) were the main obstacles to optimising care. **Conclusions:** Local primary care physicians diagnose congestive heart failure using non-specific symptoms and signs. Obstacles to optimal congestive heart failure management were identified. We hope our results will lead to strategies to improve patient care.

Ann Acad Med Singapore 2004;33:413-8

Key words: Cardiac oedema, Heart decompensation, Heart disease

Introduction

Congestive heart failure is an increasingly common disorder and a major cause of morbidity and mortality in developed countries around the world. It is a clinical syndrome that represents the end point of a myriad of heart conditions. Diagnosis of heart failure is clinical, with cardinal signs and symptoms, such as lethargy, breathlessness, changes in effort tolerance, a raised jugular venous pressure and a gallop rhythm on auscultation, all of which may be non-specific. In the United States, it is the underlying reason for 6.5 million hospital days each year and nearly 300,000 deaths a year.¹ Congestive heart failure is also the cause of 4.5% of the hospital admissions and 2.5% of the overall mortality in the elderly population (≥ 65 years of

age) in Singapore.² Since congestive heart failure is the common final pathway for a myriad of diseases that affect the heart, its prevalence increases with age. The growing elderly segment of the population, therefore, partly accounts for the rising prevalence of congestive heart failure in Singapore. Experts predict that as more and more people survive acute myocardial infarctions and the resultant pump failure, congestive heart failure will reach epidemic proportions in many developed countries.³ With a 1-year mortality rate of 45% for symptomatic heart failure, congestive heart failure has a worse prognosis than most cancers.^{4,5} In the United States alone, an estimated US\$500 million is spent on congestive heart failure drugs annually. In addition, the cost of congestive heart failure in the

¹ Faculty of Medicine

² Department of Community, Occupational and Family Medicine, Faculty of Medicine

³ Department of Medicine

National University of Singapore, Singapore

Address for Reprints: Dr Carolyn Lam, Cardiac Department, National University Hospital, 5 Lower Kent Ridge Road, Singapore 119074.

Email: mdclamc@nus.edu.sg

United States in 1991 amounted to US\$38.1 billion.¹ This is a reflection of the economic burden that congestive heart failure could have on our society.

Since congestive heart failure is a chronic and progressive disease for most patients, primary care physicians play a critical role in managing the illness. However, making an accurate diagnosis of congestive heart failure can be notoriously difficult. Several studies on the validity of congestive heart failure diagnosis in primary care have reported rates of misdiagnosis as high as 50%.⁶ The occasional difficulty with accurate diagnosis of heart failure stems from the similarities it shares with lung diseases such as pneumonia.^{7,8} New methods, such as the determination of blood levels of brain natriuretic peptide, may help to differentiate if a patient's dyspnoea is due to heart failure or lung disease.⁹ We aimed to assess how primary care physicians in Singapore diagnose congestive heart failure, and to identify the barriers to accurate diagnosis.

There have been important recent advances in congestive heart failure therapy. In particular, randomised controlled clinical trials and meta-analyses have shown that angiotensin-converting enzyme inhibitors and β -blockers prevent hospital admissions and improve survival.¹⁰⁻¹⁴ The extent to which evidence-based treatments are applied in primary care in Singapore is uncertain. We therefore aimed to assess the knowledge, attitudes and practices of primary care physicians in Singapore with regard to congestive heart failure. We hoped to identify obstacles to optimal congestive heart failure management and to propose strategies to overcome these obstacles.

Materials and Methods

A cross-sectional study was conducted on primary care physicians in May 2003. A sample population of 100 primary care physicians was selected from a sampling frame, which consisted of all the doctors currently practising at the primary care level in Singapore. These individuals were chosen from the primary care section of the Singapore Medical Association's directory of doctors. Singapore was divided geographically into 4 zones, namely south and central, north, east and west. Primary care physicians within each location were randomly selected. Selected doctors were replaced if: 1) the information provided in the directory of doctors was inaccurate and the doctors were not contactable at the time of survey; 2) a doctor was found to have retired or passed away; or 3) the doctor did not usually see any congestive heart failure patients.

Telephone interviews were conducted using a 15-part questionnaire that was developed specifically for this study (Appendix 1). The questionnaire was designed based on established guidelines on congestive heart failure management.^{15,16}

The questionnaire was structured, with set responses deliberately hidden from primary care physicians to give the impression of an open-ended interview. Information was sought concerning 1) the characteristics of the primary care physician, including age, gender, any postgraduate training, country of education and years of medical experience calculated from the year of graduation; 2) signs and symptoms as well as the laboratory investigations used by primary care physicians in the diagnosis of congestive heart failure; 3) type of management regimes prescribed, including pharmacological regimes and general lifestyle measures; 4) any obstacles encountered in the course of their work with congestive heart failure patients, in areas such as patient education, accessibility to diagnostic procedures and cost factors.

Primary care physicians were contacted by trained survey personnel over the course of 5 days. Interviewers would first identify themselves and state their purpose before seeking the primary care physicians' verbal consent for the study. All primary care physicians were also informed that their identities would be kept strictly confidential. If consent was given, interviewers proceeded to administer the questionnaire. Primary care physicians who said that they were busy were approached again later. Only doctors who rejected the interviewers outright or after the subsequent call were considered non-respondents.

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS, Version XI, Chicago, Illinois USA). Variables derived from the questionnaire were given as absolute numbers and percentages. Logistic regression analysis was used to determine if various demographic variables were associated with variation in the use of pharmacological agents [usage of inotropes (especially digoxin), β -blockers, ACE-inhibitor and loop diuretics]. Odds ratios (OR) with 95% confidence intervals (95% CI) were provided for this latter analysis.

Results

Of the 100 primary care physicians contacted, 80 completed the interview satisfactorily, giving a response rate of 80%.

Demographic Characteristics of Surveyed Primary Care Physicians (Table 1)

The majority of respondents were older than 30 years of age (98.7%) and male (81.3%). A large proportion had 10 to 20 years of clinical experience (43.7%), only had a basic medical degree (77.5%) and were trained locally (82.5%). We were unable to obtain the demographic characteristics of doctors who refused to take part.

Diagnosis of Congestive Heart Failure (Table 2)

Respondents were asked which signs and symptoms they

Table 1. Demographic Characteristics of Respondents

Variable	No. (%)
Gender	
Male	65 (81.3)
Female	15 (18.7)
Qualification	
Basic medical degree	62 (77.5)
Higher qualification	18 (22.5)
Country of education	
Singapore	66 (82.5)
Foreign	14 (17.5)
Age, y	
20-30	1 (1.3)
31-40	31 (38.7)
41-50	20 (25.0)
>50	28 (35.0)
Experience, y	
<10	11 (13.8)
10-20	35 (43.7)
21-30	22 (27.5)
>30	12 (15.0)

felt were important in establishing a diagnosis of congestive heart failure. The clinical features regarded as most important were dyspnoea (92.5%), lung crackles (52.5%) and peripheral oedema (55.0%). Raised jugular venous pressure (JVP) was named by 31.2% of respondents. Most (86.2%) primary care physicians did not exclude the possibility of heart failure if a patient presented with suggestive symptoms but no signs.

Chest radiography was the most commonly used investigation (76.8%) to diagnose or exclude congestive heart failure, while electrocardiography was commonly ordered by 50.7% of primary care physicians. However, echocardiography was ordered by only 5% of primary care physicians, the primary reason being inaccessibility (44.7%). Most primary care physicians (93.8%) were not aware of the utility of serum B-type natriuretic peptide measurement.

The majority of primary care physicians (88.8%) said that the severe acute respiratory syndrome (SARS) had not affected their confidence in making a diagnosis of congestive heart failure. A quarter took the additional step of scrutinising the contact history to differentiate between the 2 illnesses.

Management of Heart Failure (Table 3)

Poor patient compliance was considered the primary barrier (57.5%) to lifestyle modification. Cost (82.5%) was another major obstacle to optimising care.

Regarding the treatments shown to prolong life in congestive heart failure, 47.5% of primary care physicians were aware of the importance of angiotensin-converting

Table 2. Symptoms and Signs Used to Diagnose Congestive Heart Failure

Variable	No. (%)
Most important diagnostic symptom/s	
Dyspnoea	74 (92.5)
Orthopnoea	2 (2.5)
Poor exercise tolerance	6 (7.5)
Paroxysmal nocturnal dyspnoea	2 (2.5)
Peripheral oedema	12 (15.0)
Fatigue	1 (1.3)
Most important diagnostic sign/s	
Ill and tired appearance	1 (1.3)
Raised JVP	25 (31.2)
S3 gallop rhythm	1 (1.3)
Tachypnoea	4 (5.0)
Peripheral oedema	44 (55.0)
Resting tachycardia	2 (2.5)
Peripheral cyanosis	5 (6.3)
Displaced apex beat	2 (2.5)
Bibasal crackles	42 (52.5)
Others	1 (1.3)

JVP: jugular venous pressure

Table 3. Management of Congestive Heart Failure by Primary Care Physicians

Barriers to patient education	No. (%)
Lack of time	2 (2.5)
Language barrier	3 (3.8)
Patient disinterest	13 (16.2)
Lack of patient compliance	46 (57.5)
Do not know	4 (5.0)
Others	12 (15.0)
Class/classes of drugs considered most important in prolonging life in congestive heart failure	
Loop diuretics	38 (47.5)
Inotropes	17 (21.2)
Angiotensin-converting enzyme inhibitors	38 (47.5)
Beta-blockers	13 (16.2)
Vasodilators	1 (1.3)
Angiotensin II receptor blocker	6 (7.5)
Others	4 (5.0)
Do not know	3 (3.8)

enzyme inhibitors and 16.2% knew about the beneficial effect of β -blockers on mortality. Of the primary care physicians interviewed, 47.5% and 21.2% believed that loop diuretics and inotropes (especially digoxin), respectively, had been shown to save patients' lives, although there is no literature to support this.

When asked to estimate the proportion of their congestive heart failure patients receiving angiotensin-converting enzyme inhibitors, 33.8% of primary care physicians reported usage in less than one-fifth of their patients, while 28.9% reported usage in a great majority (>80%) of their patients. Dry cough was the most commonly reported side

effect of angiotensin-converting enzyme inhibitors therapy. Upon encountering such side effects, 46.2% would switch to an angiotensin II receptor blocker.

Prognosis of Congestive Heart Failure

Almost one-third of all respondents (31.2%) considered the 2-year mortality rate in NYHA stage 4 heart failure to be 41% to 60%.

Causes of Congestive Heart Failure

Hypertension and ischaemic heart disease were the most commonly perceived causes of congestive heart failure in males (52.5% and 41.3%, respectively) and females (53.8% and 32.5%, respectively).

Predictors of Drug Usage

Analyses were carried out to evaluate associations between doctors' demographic variables (age, years of experience, level of qualification and country of education) and their choice of life-saving drugs [angiotensin-converting enzyme inhibitors, β -blockers, loop diuretics and inotropes (especially digoxin)]. For comparison, primary care physicians were stratified by age into a younger group [20 to 40 years (32 doctors)] and an older group [more than 40 years (48 doctors)]. Younger primary care physicians were more likely to recognise the life-saving properties of angiotensin-converting enzyme inhibitors (OR 2.78; 95% CI, 1.10-7.00) and less likely to consider inotropes (especially digoxin) as life-saving (OR 0.15; 95% CI, 0.03-0.70) when compared to the older primary care physicians.

Discussion

Congestive heart failure is a major public health problem in Singapore. Of the hospital admissions from 1991 to 1998, in the 65 years and above age group, 4.5% have been attributed to heart failure. This, coupled with the decreasing mortality of heart failure in Singapore as well as the trend towards an ageing population, means that heart failure will remain a significant contributor to the burden of healthcare in Singapore.²

The primary care physician plays an important role in the management of this chronic disorder, as many patients first present at the primary care level. The primary care physician often has to identify early signs and symptoms of congestive heart failure. Implementation of evidence-based treatments and patient education then follows to maximise prognosis. Importantly, the primary care physician is also involved in the primary prevention of the disease through aggressive management of risk factors. This is the first survey to assess practice patterns for patients with congestive heart failure in the primary care setting in Singapore. We have identified several barriers to optimal management.

Most primary care physicians recognised the cardinal

clinical features of congestive heart failure (breathlessness on exertion and oedema). The clinical features which the primary care physicians considered most important in establishing a diagnosis of congestive heart failure (breathlessness, lung crackles and leg oedema) are unfortunately very non-specific and can accompany non-cardiac conditions. Breathlessness and lung crackles, for example, occur in pneumonia. The more specific signs of raised jugular venous pressure, hepatojugular reflux and the presence of a gallop rhythm were important to only a minority of primary care physicians.¹⁷ Perhaps a greater emphasis on these key features of congestive heart failure could be extolled via Continuing Medical Education (CME).

Chest radiography was the most important diagnostic test used by our primary care physicians. However, chest infiltrates in congestive heart failure may occur in many other conditions and conversely a normal chest X-ray does not exclude congestive heart failure.¹⁸ Electrocardiography was the second most commonly used diagnostic test; and on its own, it is capable of providing clues such as the presence of left ventricular hypertrophy, previous myocardial infarctions, arrhythmias (e.g. atrial fibrillation) as well as other forms of heart pathology.

Echocardiography is recommended in some congestive heart failure guidelines as it allows the evaluation of systolic, diastolic function and potential causes of heart failure,¹⁵ for example, valvular heart diseases. Only 5% of the primary care physicians surveyed would obtain an echocardiogram in the management of a patient with suspected heart failure. The main obstacle to more widespread use of echocardiography was inaccessibility. This is a problem not only in Singapore but also in Europe.¹⁹ Greater accessibility to echocardiography is needed. We hope that the closer links between primary care and hospital practices established via the cluster system in Singapore will facilitate this.

B-type natriuretic peptide is a neurohormone secreted from the cardiac ventricles in response to volume expansion and fluid overload. The levels of B-type natriuretic peptide levels are elevated in patients with heart failure. In conjunction with clinical information, measurement of serum B-type natriuretic peptide level has been shown to be useful in establishing, or ruling out, the diagnosis of heart failure (the negative predictive value of B-type natriuretic peptide at levels of less than 50 pg/mL was found to be 96 percent).⁹ In fact, a study of 1586 breathless patients presenting at the emergency department found that B-type natriuretic peptide levels were more accurate than historical or physical findings in correctly indicating congestive heart failure as the cause of dyspnoea.⁹ The majority of respondents were unaware of the potential utility of B-type serum brain natriuretic peptide measurements. The test is

currently not available at primary care level in Singapore, but available in some hospitals. It may be possible in future for primary care physicians to perform this simple blood test to rule out left ventricular dysfunction. However, greater awareness of the test and its applications are required. The CME programme in Singapore may be one avenue for physicians to keep abreast of this and other important advances in medicine.

Our survey revealed some lack of awareness of therapies shown to reduce hospitalisations and improve survival in congestive heart failure. Less than half of our primary care physicians regarded angiotensin-converting enzyme inhibitors as important in influencing prognosis. In one-third of practices, it was estimated that fewer than 20% of congestive heart failure patients were on angiotensin-converting enzyme inhibitors. As for β -blockers, fewer than half of the primary care physicians were aware of their benefits to the survival of congestive heart failure patients. Instead, almost half of the primary care physicians surveyed thought that loop diuretics and inotropes (especially digoxin) were important in prolonging survival, despite the lack of evidence. Younger primary care physicians appeared to be more aware of the available evidence. A review of congestive heart failure practices elsewhere,¹⁹ revealed similar findings.

Our study carries many of the limitations expected of a survey-based study. The responses were dependent upon the impressions and recalled estimates of the surveyed doctors and may not be an accurate reflection of the true figures. An attempt to reduce interviewer bias was made by standardising the method of interviewing and the format of questions. Interviewer bias was minimised by the training of the interviewers and the use of a uniform set of questions. An effort was made to minimise reporting bias by ensuring confidentiality. The responses of these 80 physicians may not accurately be extrapolated to the hundreds of primary care physicians in Singapore. Given the limited scope of our study, it was also not possible to assess the practical skills of primary care physicians and the results may not be reflective of their actual clinical ability. Nevertheless, this survey serves as a preliminary report that could be validated through a formal audit of primary care physician practices.

With our study as a backdrop, future areas of research should include: the study of the actual prescription pattern of primary care physicians, to better determine the adequacy of medical therapy; the comparison of the number of congestive heart failure patients managed in the private sector and the public sector, as well as the reasons behind this discrepancy; and the reassessment of primary care physician practices following some form of intervention, for example, the publication of a practice guideline.

In conclusion, our survey found that most of our primary care physicians recognised the cardinal clinical features of

congestive heart failure (namely, breathlessness and oedema). Greater emphasis on more specific diagnostic signs, such as raised jugular venous pressure, hepatojugular reflux, and a third heart sound is needed. However, fewer than half of the primary care physicians surveyed knew that angiotensin-converting enzyme inhibitors and β -blockers improve prognosis in congestive heart failure. Instead, many believed that loop diuretics were the most important life-prolonging therapy. The identified obstacles to effective management were lack of accessibility to echocardiography, poor patient compliance and cost restraints. It is hoped that the identification of these obstacles will be a first step towards improving primary care management and the outcomes of this increasingly important disease.

Acknowledgements

We thank all the primary care physicians who kindly participated in this survey.

Appendix 1: Heart Failure Survey 2003

Name: _____

Gender: M F

Age: _____ Years of experience: _____

Qualifications: _____

Country of education: _____

Diagnosis

1. In your experience with patients suspected of heart failure, what is the most useful symptom you base your diagnosis on?
2. In your experience with patients suspected of heart failure, what is the most useful sign you base your diagnosis on?
3. If a patient with a positive history of heart failure does not have any physical signs would you exclude a diagnosis of heart failure?
 - a. If no, this question replaces question 4, if yes move on and ask question 4.
What investigations would you then order?
4. What test would you most commonly order to help you in your diagnosis of heart failure?
5. Do you routinely order 2D echocardiography in your own practice?
 - a. If no, why?
Reason:
 - b. If yes, would a normal ejection fraction still make you suspect heart failure?
6. Have you heard of current advances pertaining to BNP in heart failure?
 - a. If yes, how would you make use of the assay?
Answer:

7. Has the SARS situation affected the way you diagnose patients with heart failure?
 - a. What measures have you taken to ensure accurate diagnosis of heart failure?
Answer:

Management

8. What barriers do you encounter when trying to educate patients on lifestyle modifications?
9. Which class of drugs do you think is/are the most important in prolonging the life of a patient with heart failure?
10. What percentage of your patients receive ACE inhibitor therapy for heart failure?
 - a. What percentage of these patients experience side effects from their medication?
 - b. How many percent of your heart failure patients on ACE inhibitors experience dry cough as a side effect?
 - c. What measures would you take in response to these side effects?

Answer:

11. Do you advocate the use of β -blockers in managing stable heart failure patients?
12. Does cost prevent you from optimizing the treatment of patients with heart failure?

Prognosis

13. What do you think is the 2-year mortality rate of patients with NYHA stage 4 heart failure?

Aetiology

14. What do you think is the most common cause of heart failure in men?
15. What do you think is the most common cause of heart failure in women?

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