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ORIGINAL ARTICLE
Heart Failure

Nationwide Survey of Multidisciplinary Care and Cardiac Rehabilitation for Patients With Heart Failure in Japan

— An Analysis of the AMED-CHF Study —

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Background: The purpose of this study was to clarify the implementation rate of multidisciplinary heart failure (HF) care and cardiac rehabilitation (CR) in Japan, as well as the relationship between implementation rates and characteristics of the facility.

Methods and Results: Survey participants were cardiologists who are members of the Japan Heart Failure Society and belonged to 1 of 845 medical institutions that are members of the Japan Heart Failure Society, as of April 2016. A total of 288 institutions (34.1%) returned the questionnaire. The percentages of hospitals implementing multidisciplinary HF care were 78.5% for inpatients and 32.6% for outpatients with HF. Inpatient and outpatient CR for HF had implementation rates of 80.4% and 56.5%, respectively. In addition, very few HF patients (7.3%, 3,741/51,323 patients) received outpatient CR. Both the presence of nurses certified in chronic HF care and registered CR instructors on staff were consistently associated with implementation of multidisciplinary HF care, and Japanese Circulation Society training hospitals, lower number of hospital beds, and presence of registered CR instructors on staff were consistently associated with implementation of CR.

Conclusions: This first nationwide survey demonstrated that the implementation rates of multidisciplinary care and CR for HF, especially for outpatients, are low in Japan. Skilled healthcare professionals are expected to play important roles in the widespread implementation of this type of HF care in Japan.

Key Words: Cardiac rehabilitation; Heart failure; Multidisciplinary care

A rapid increase in the number of patients with chronic heart failure (HF) is expected with aging of the population in Japan. According to the Japanese Registry of All cardiac and Vascular Diseases (JROAD) survey carried out by the Japanese Circulation Society (JCS), the number of patients hospitalized for HF in 2017 was 260,000, increasing by 10,000 people every year since the survey started in 2013.[1] Once HF becomes severe; the prognosis is extremely poor, activities of daily life are restricted by symptoms, including shortness of breath with exertion, and quality of life (QOL) is markedly decreased. Acute decompensated HF (ADHF) usually leads to hospital admission for intensive care, resulting in enormous medical costs. The hospital readmission rate for patients with HF is high, and observational studies that have followed patients with acute HF in Japan for 9 years have revealed that, although length of hospital stay has decreased remarkably, the hospital readmission rates within 30 days and 1 year after discharge have not been improved, remaining the same over time.[2]

To prevent hospital readmission because of exacerbation of HF, which is an important goal in HF treatment, strengthening treatment and management after discharge from hospital are essential. For instance, it is important to

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implement a disease management program that consists of multidisciplinary interventions, including provision of precise knowledge about HF and its treatment for members of the patient's family, improvement in lifestyle habits of the patient, support for self-care behaviors, exercise therapy, psychological support and readjustment of the living environment.[3] Cardiac rehabilitation (CR), in particular, is a disease management program for patients with heart disease; in Europe and the USA, it has been reported that outpatient CR administered by multidisciplinary professionals for patients at high risk of hospital readmission plays a role in the disease management program, leading to improved exercise tolerance and QOL and reduction of hospital readmission rates.[4] Disease management through CR has already begun in Japan, but neither CR for patients with HF, especially after discharge from the hospital, nor the actual circumstances of such interventions by multidisciplinary healthcare professionals are clear. It is essential to clarify the reality of inpatient and outpatient CR and collaboration among multidisciplinary healthcare professionals in order to establish clinical guidelines for providing appropriate medical care for patients with HF with the aims of improving QOL and avoiding hospital readmission.

The purpose of this study was to clarify the implementation rate of inpatient and outpatient CR by intervention of multidisciplinary professionals for patients with HF in cardiovascular clinics in Japan, as well as the relationship between implementation rates and characteristics of the facility.

Table 1. Hospital Characteristics

n	270
DPC hospital, n (%)	241 (89.3)
JCS training hospital, n (%)	226 (83.7)
JCS associated hospital, n (%)	62 (23.0)
No. of HF hospitalizations (per year)	190.1±159.6
Hospital size	
No. of hospital beds	502.2±283.5
≥500	38 (14.1)
200–499	109 (40.4)
<200	123 (45.6)
Cardiology beds, n (%)	245 (90.7)
No. of cardiology beds	41.9±27.9
CCU beds, n (%)	147 (54.4)
No. of CCU beds	4.3±5.0
Hospital staffing	
Cardiologist (full-time), n (%)	258 (95.6)
No. of cardiologists	11.8±10.8
JCS certified board member, n (%)	254 (94.1)
No. of board-certified members of JCS	7.6±6.6
Registered instructor of CR, n (%)	209 (77.4)
No. of registered instructors of CR	3.6±3.7
Advanced instructor of CR, n (%)	59 (21.9)
No. of advanced instructors of CR	0.3±0.7
Nurses certified in chronic HF nursing, n (%)	113 (41.9)
No. of nurses certified in chronic HF nursing	0.5±0.6

CCU, cardiac care unit; CR, cardiac rehabilitation; DPC, Diagnosis Procedure Combination; HF, heart failure; JCS, Japanese Circulation Society.

Methods

Study Participants

This investigation was a cross-sectional observation survey, and the survey participants were cardiologists who were members of the Japan Heart Failure Society, belonging to 1 of 845 medical institutions that are members of the Japan Heart Failure Society, as of April 2016. This study was conducted with approval from the Tokyo Medical and Dental University Ethics Review Committee. A written explanation about the investigation and a consent form were mailed together with the questionnaire to the participants. Participants were requested to sign the consent form if they agreed to participate in the study and send it back together with the completed questionnaire form to the research secretariat installed within the Department of Cardiovascular Medicine at Tokyo Medical and Dental University. Survey participants were asked to return their questionnaires to the office of the secretariat within 1 month of receipt. No reminders were sent to non-responders. The number of facilities that had patients returning the questionnaire was 288, and the response rate was 34.1%, of which 270 responses were valid.

Data Collection

The survey was a self-administered questionnaire, consisting of information about the hospital and the implementation of inpatient or outpatient multidisciplinary HF care (excluding CR), and of inpatient and outpatient CR for patients with HF.

As for hospital characteristics, the survey investigated whether the facility was a diagnosis procedure combination (DPC) hospital, a JCS training hospital or affiliated hospital, fulfilled the facility standard of cardiac and vascular disease rehabilitation unit (I) or (II), the number of hospital beds and cardiology beds, and the number of inpatients with HF from January 1st to December 31st 2015 (real number) and full-time cardiologists, availability of cardiac care unit (CCU), the number of CCU beds, cardiovascular specialists, CR instructors, registered and advanced CR instructors and nurses certified in chronic HF care.

Questions about inpatient or outpatient interventions of multidisciplinary HF care, the implementation and the methods (case conference, individual HF education, group HF education), and the types of professionals who participated in multidisciplinary HF care were asked. Regarding the implementation status of inpatient and outpatient CR for patients with HF, whether or not CR had been implemented and the number of cases reported from January 1, 2015 to December 31, 2015 were examined.

Statistical Analysis

For the actual hospital characteristics, multidisciplinary HF care and CR, means and standard deviations were calculated for continuous variables, and proportions were calculated for categorical variables. The associations between hospital characteristics, implementation of multidisciplinary HF care and CR were analyzed using a chi-square test and a multivariate logistic regression analysis. In the multivariate model, if the facility was a DPC hospital/JCS training hospital, the number of hospital beds, availability of CCU, number of cardiologists, presence of registered instructors of CR, advanced instructors of CR and nurse certified in chronic HF care were used as independent variables.

A two-tailed P-value <0.05 was taken to indicate statisti-

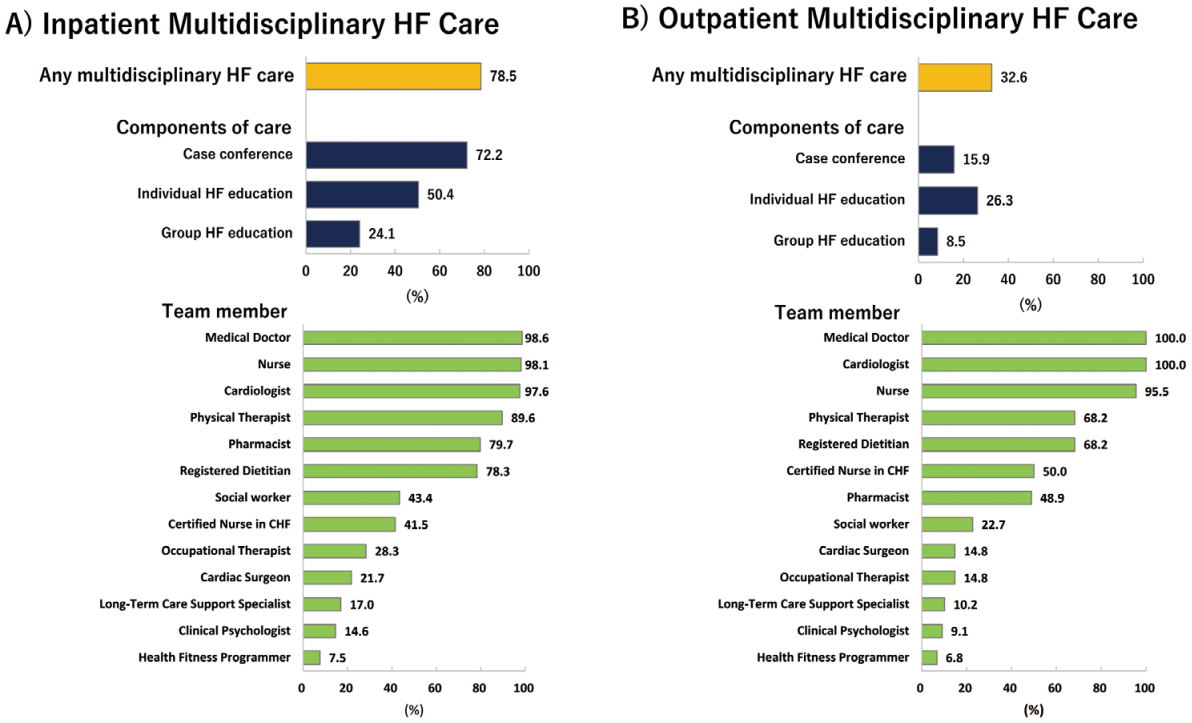

Figure 1. (**A**,**B**) Implementation rates and team members of multidisciplinary heart failure (HF) care. CHF, chronic heart failure. Medical doctor includes both cardiologists and non-cardiologists.

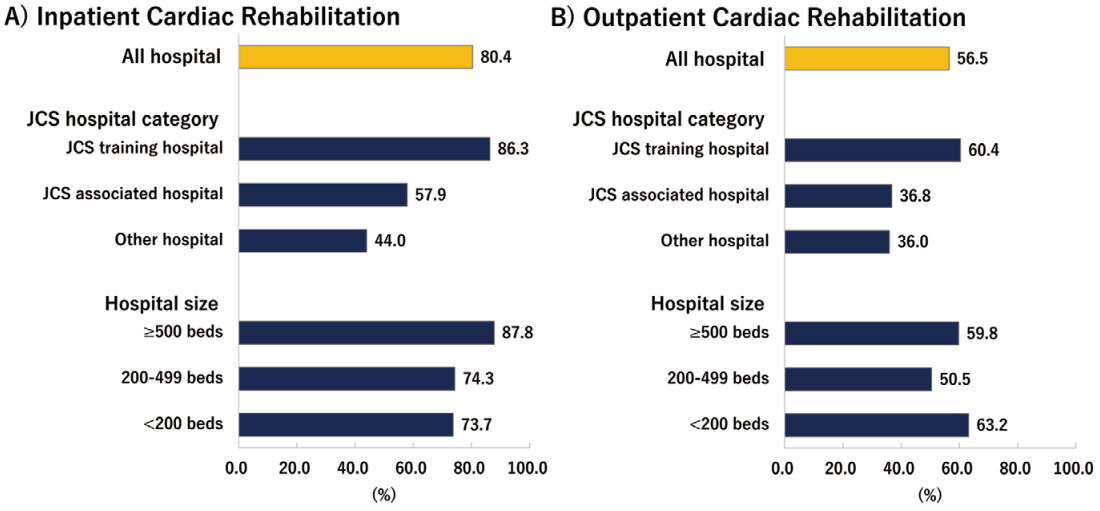

Figure 2. (**A**,**B**) Implementation rates of cardiac rehabilitation per hospital for patients with heart failure. JCS, Japanese Circulation Society.

cal significance. Analyses were performed using SPSS 22.0 (IBM Corporation, New York, NY, USA).

Results

Table 1 is a summary of the hospital data. Effective responses were obtained from 270 hospitals, including 241 DPC hospitals and 226 JCS training hospitals. The mean number of

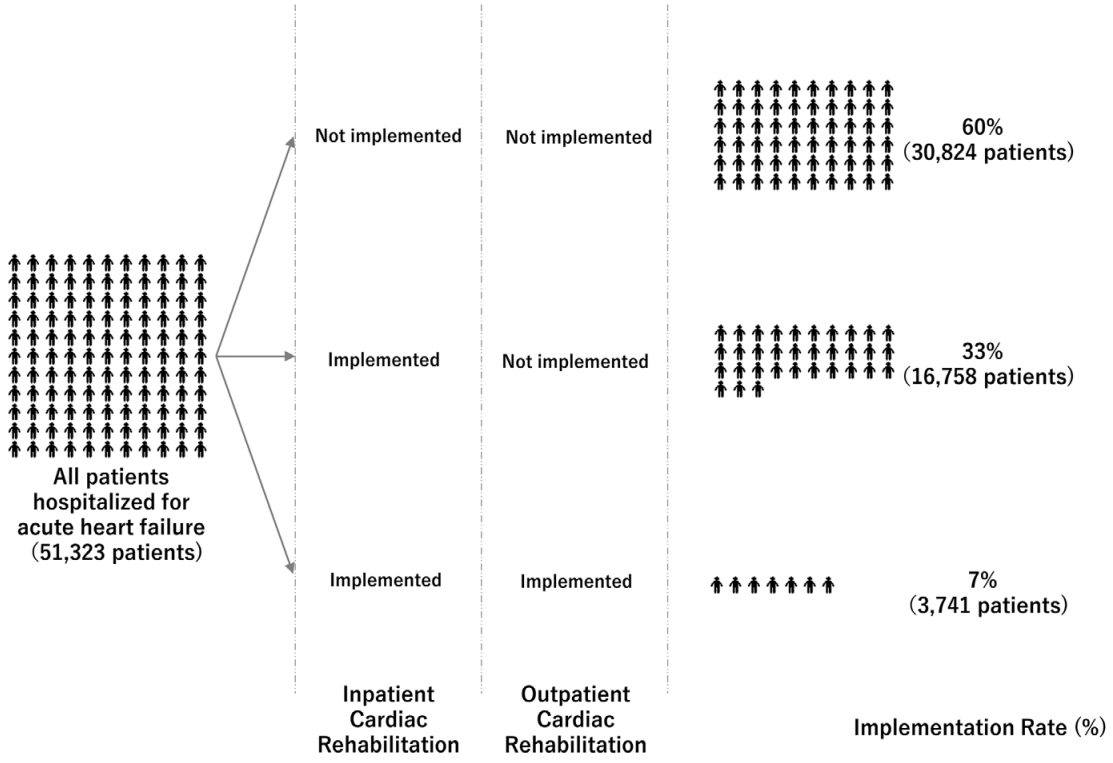

Figure 3. Percentages of heart failure patients referred for inpatient and/or outpatient cardiac rehabilitation.

Table 2. Multivariate Logistic Regression Analysis for Associations of Hospital Characteristics With Implementation of Multidisciplinary HF Care and CR

	Inpatient multidisciplinary HF care			Outpatient multidisciplinary HF care			Inpatient CR			Outpatient CR		
	OR	95% CI	P value	OR	95% CI	P value	OR	95% CI	P value	OR	95% CI	P value
DPC hospital	1.19	0.35–4.10	0.781	0.78	0.27–2.30	0.654	0.96	0.20–4.65	0.961	0.67	0.19–2.29	0.519
JCS training hospital	1.12	0.40–3.14	0.833	0.61	0.24–1.53	0.292	4.65	1.30–16.59	0.018	2.99	1.13–7.91	0.028
No. of hospital beds (per 100 beds)	0.85	0.70–1.03	0.096	0.91	0.78–1.06	0.221	0.70	0.52–0.94	0.019	0.83	0.70–0.97	0.018
CCU bed	1.18	0.59–2.34	0.643	0.91	0.51–1.62	0.741	2.88	1.07–7.76	0.037	1.16	0.65–2.08	0.617
No. of cardiologists	1.02	0.97–1.08	0.483	1.04	1.00–1.07	0.053	1.15	1.03–1.30	0.016	1.02	0.98–1.05	0.443
Registered instructor of CR	5.14	2.35–11.26	<0.001	3.54	1.29–9.69	0.014	27.68	9.82–78.02	<0.001	12.91	4.92–33.91	<0.001
Advanced instructor of CR	3.88	1.08–13.97	0.038	0.96	0.48–1.92	0.898	1.26	0.31–5.16	0.744	1.94	0.92–4.10	0.082
Nurse certified in chronic HF	3.47	1.55–7.76	0.002	3.11	1.70–5.67	<0.001	2.41	0.82–7.09	0.109	1.62	0.87–3.01	0.125

Abbreviations as in Table 1.

total hospital beds and of cardiology beds were 502±284 and 42±28, respectively. Almost all hospitals had cardiologists and board-certified JCS cardiologists on staff (95.6% and 94.1%, respectively). On the other hand, only 77% and 42% of hospitals had registered instructors of CR and chronic HF certified nurses, respectively.

Status of Multidisciplinary HF Care

The implementation rate of multidisciplinary HF care and the team members involved are summarized in **Figure 1**. The rates of implementation of multidisciplinary HF care were 78.5% for inpatients with HF and 32.6% for outpatients with HF. With regard to the components of the multidisciplinary HF care, case conference, individual HF education, and group HF education were implemented in

72.2%, 50.4%, and 24.1% of hospitals for inpatient HF, and in 15.9%, 26.3%, and 8.5% hospitals for outpatient HF, respectively.

Implementation of CR

The implementation rates of inpatient and outpatient CR were 80.4% and 56.5%, respectively. The CR implementation rate was significantly higher in JCS training hospitals than in the other types of facilities (P<0.01 for inpatient CR and P=0.01 for outpatient CR, **Figure 2**).

Rate of Participation in CR

Of 51,323 patients hospitalized for HF in the hospitals included in the survey, 60% did not receive inpatient and outpatient CR, 33% of patients received only inpatient CR, and only 7% of patients received inpatient and outpatient CR (**Figure 3**).

Logistic Regression Analysis for Associations of Hospital Characteristics With Implementation of Multidisciplinary HF Care and CR

The presence of registered CR instructors, advanced CR instructors, and nurses certified in chronic HF care on staff showed significant associations with implementation of inpatient multidisciplinary HF care (**Table 2**). The presence of registered CR instructors and nurses certified in chronic HF care on staff showed significant associations with implementation of outpatient multidisciplinary HF care (P<0.05). JCS training hospital, lower number of hospital beds, availability of CCU beds, number of cardiologists, and presence of registered CR instructors on staff were significantly associated with implementation of inpatient CR (P<0.05). JCS training hospital, lower number of hospital beds, and presence of registered CR instructors on staff showed significant associations with implementation of outpatient CR (P<0.05).

Discussion

Primary Findings

This is the first multicenter survey to examine the implementation rate of multidisciplinary care and CR for patients with HF in Japan. The primary findings of this study were as follows: (1) inpatient and outpatient multidisciplinary HF care had implementation rates of 78.5% and 32.6%, respectively; (2) inpatient and outpatient CR for HF had implementation rates of 80.4% and 56.5%, respectively; (3) very few HF patients (7.3%, 3,741/51,323 patients) received outpatient CR; (4) JCS training hospital, lower number of hospital beds, and presence of registered CR instructors on staff were consistently associated with implementation of inpatient and outpatient CR; and (5) presence of nurses certified in chronic HF care and registered CR instructors on staff were consistently associated with implementation of inpatient and outpatient multidisciplinary HF care.

Implementation Rate and Members of Multidisciplinary HF Care Team

The most effective approach to complex HF care appears to be multidisciplinary care.[5,6] The team-based multidisciplinary approach has been shown to be superior to standard care in HF patients with regard to reducing the risks of death and rehospitalization, length of hospital stay, and QOL.[6–9] Patients receiving multidisciplinary HF care have been reported to show higher proportions of treatment with angiotensin-converting enzyme inhibitors and β-blockers, earlier recognition of the signs and symptoms of HF, increased rates of counseling regarding smoking cessation, shorter length of hospital stay, and reduced medical costs.[10] Therefore, the most recent HF guidelines recommend team-based multidisciplinary HF care. However, the implementation rate of team-based multidisciplinary HF care has not been widely surveyed in Japan.

The present study was performed to investigate the implementation rates and members of inpatient and outpatient multidisciplinary HF care teams and associated factors in Japan. The results indicated that the implementation rate of multidisciplinary HF care was low (inpatient, 78.5%; outpatient, 32.6%), and this HF care were provided by a variety of staff, including cardiologists, nurses, physical therapists, pharmacists, registered dieticians etc. The results of multivariable logistic regression analyses showed that the presence of nurses certified in chronic HF care and registered CR instructors on the hospital staff were consistently associated with implementation of inpatient and outpatient multidisciplinary HF care.

The Japanese Association of Cardiac Rehabilitation established a certification program for registered instructors of CR in 2000 and the Japanese Nursing Association launched a certification in chronic HF nursing in 2012. These skilled healthcare professionals are expected to play important roles in the widespread implementation of multidisciplinary HF care in Japan.[11]

Implementation Rate of CR

The availability of CR care is very low despite increasing trends in cardiovascular disease burden and deaths around the world, with only 38.8% of countries having active CR programs and some middle-income countries having as little as 1 CR program per 6 million inhabitants.[12] In Japan, Goto et al[13] and Arakawa et al[14] performed nationwide surveys of the implementation rate of CR for acute myocardial infarction (AMI) in responding cardiology training hospitals authorized by the JCS. They reported that the implementation rate of percutaneous coronary intervention was high (94% in 2004 and 96% in 2009), but those of inpatient and outpatient CR were very low (inpatient, 55% in 2004 and 64% in 2009; outpatient, 9% in 2004 and 21% in 2009). Although the facilities investigated and sample size were different, the present study's results indicated that the implementation rate of CR in JCS training hospitals increased to 86.3% for inpatients and 60.4% for outpatients. Koyama reported that the number of medical institutions registered for CR in Japan had increased from 186 in 2005, to 495 in 2010, and 788 in 2013.[15] In February 2019, we performed a survey of the number of institutions registered for CR using the same method as in that study, and found that the number of CR facilities had continued to increase steadily to 1,337. Although desirable, this increase in registered CR facilities remains less than optimal, with further increases in outpatient CR facilities needed because the decreasing length of hospital stay prevents patients from receiving sufficient CR care during hospitalization.

The implementation of CR is influenced by a number of factors, including hospital size, procedure volumes, and geographic location, as well as the number of medical staff and staff expertise. In the present study, JCS training hospital, lower number of hospital beds, and presence of registered CR instructors on staff were consistently associated with implementation of inpatient and outpatient CR.

These observations suggest that the implementation of CR programs is influenced by these hospital characteristics and presence of skilled healthcare professionals.

Patient Participation Rate in CR

Despite a hospital outpatient CR implementation rate of 56.5%, inpatient and outpatient CR were implemented for only 7% of the patients included in the present study. Goto et al reported a similar rate in patients suffering from AMI.[13] This gap could be explained at 3 inter-related levels: patient, provider, and system levels.[12] Patient factors related to this gap in the CR implementation rate include older age, low socioeconomic status, time conflicts, patient disinterest, and comorbidities.[16] At the provider level, low levels of physician endorsement of CR and lack of resources to deliver outpatient CR are frequently described as being related to a low rate of CR implementation.[12,17] At the level of the healthcare system, the low CR implementation rate has been reported to be related to financial constraints, distance, and transportation problems.[12,18]

There have been few reports regarding the participation rate in outpatient CR among patients with HF globally. According to the Get With The Guidelines-Heart Failure registry involving >100,000 patients admitted with HF at 338 institutions in the USA, the rates of participation in outpatient CR were reported to be extremely low, with rates of 2.3% among veterans and 2.6% among beneficiaries of Medicare hospitalized for HF in the USA. These observations suggest the vast underutilization of outpatient CR among patients with HF.[18]

To improve this situation, the American College of Cardiology/American Heart Association recently revised the CR performance and quality measure set with 6 new performance measures and 3 new quality measures, including exercise training referral and enrollment for HF with reduced ejection fraction, and CR enrollment and adherence.[19] This new measurement set is expected to improve both the CR participation rate and outcomes.

Study Limitations

First, this was a retrospective questionnaire-based survey of institutions. Therefore, we could not confirm the accuracy of data on an individual patient basis. Second, the survey participants were only cardiologists who are members of the Japan Heart Failure Society and the response rate was relatively low in the present survey (34.1%). This could have led to a potential bias suggesting that a majority of answers were provided by medical doctors interested in HF care. If this was the case, the implementation rate of multidisciplinary HF care and CR may have been overestimated. Finally, this survey allowed us to analyze possible barriers to the implementation of CR. However, we did not collect detailed demographic and/or clinical information regarding the patient populations.

Conclusions

This multicenter survey of multidisciplinary care and CR for HF showed that the rates of implementation of both multidisciplinary care and CR are low in Japan. Considering our aging society and associated future increases in the number of patients with HF,[20] it will be necessary to increase the implementation rates of multidisciplinary care and CR for HF patients. Skilled healthcare professionals, including nurses certified in chronic HF and registered CR instructors, are expected to play important roles in the widespread implementation of multidisciplinary HF care and CR in Japan.

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Disclosures

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