



# Status of Medical Care and Management Requirements of Elderly Patients With Heart Failure in a Comprehensive Community Health System

— Survey of General Practitioners' Views —

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**Background:** Given the high prevalence of heart failure (HF) in the elderly, it is essential to establish medical coordination between general practitioners (GPs) and acute care hospitals (ACHs) in an aging society. The aim of this study was to elucidate the status of acceptance of elderly patients with HF and their management requirements in a comprehensive community health system. Furthermore, we investigated GPs' interest in using information and communications technology (ICT) in patient care.

**Methods and Results:** We sent a questionnaire survey to 1,800 GPs in January 2015 and received 392 replies. The overall prevalence of home visits was 55%, with no differences according to GP background characteristics or geographic area. However, less than half (44%) reported accepting patients with symptomatic HF for treatment in their clinic. In addition, only 3 GPs reported accepting and providing emergency visits for patients with refractory HF. In particular, GPs who were not certificated cardiologists, female, and older showed poorer acceptance of symptomatic HF patients. More than half the GPs wanted the prompt acceptance by ACHs of emergency patients, followed by strengthening of home care support at discharge and support for end-of-life care. Half the GPs were interested in telemedicine.

**Conclusions:** ACHs must promptly accept patients with HF in cases of emergency and strengthen nursing care support at discharge. It is also necessary to consider how to support older and female GPs.

**Key Words:** Chronic heart failure; Comprehensive community care system; Geriatrics

The rapid increase in the proportion of elderly patients with heart failure (HF), the so-called “HF pandemic”, has become a serious problem.<sup>1,2</sup> Patients with HF are frequently hospitalized, and their cardiac function gradually deteriorates, leading to death. With each hospitalization, both activities of daily living and quality of life deteriorate.<sup>3</sup> Because elderly patients require longer treatment periods, HF symptoms need to be managed to allow them to stay at home as comfortably as possible. Further, the refractory symptoms of HF require end-of-life care at home. Based on the Sado Heart Failure Study, the number of patients with left ventricular dysfunction in Japan, which has achieved the status of a superaging society, has already exceeded 1 million and is expected to

reach 1.3 million by 2035.<sup>4</sup>

In addition, long hospital stays of patients with HF incur high medical costs, which the national healthcare policy should seek to prevent. HF accounts for a significant proportion of the financial burden on healthcare systems in developed parts of the world. For example, Europe and the US spend 1–2% of their annual medical budget on HF treatment.<sup>5</sup> In Japan, Kanaoka et al reported that a total of US\$1,187 million per year (44% of the hospitalization costs for acute cardiovascular diseases) was spent on patients with HF.<sup>6</sup> The median cost per patient per episode was US\$8,089 (interquartile range US\$5,362–12,787), and the costs associated with HF for patients aged >75 years accounted for 68% of the total cost.<sup>6</sup>

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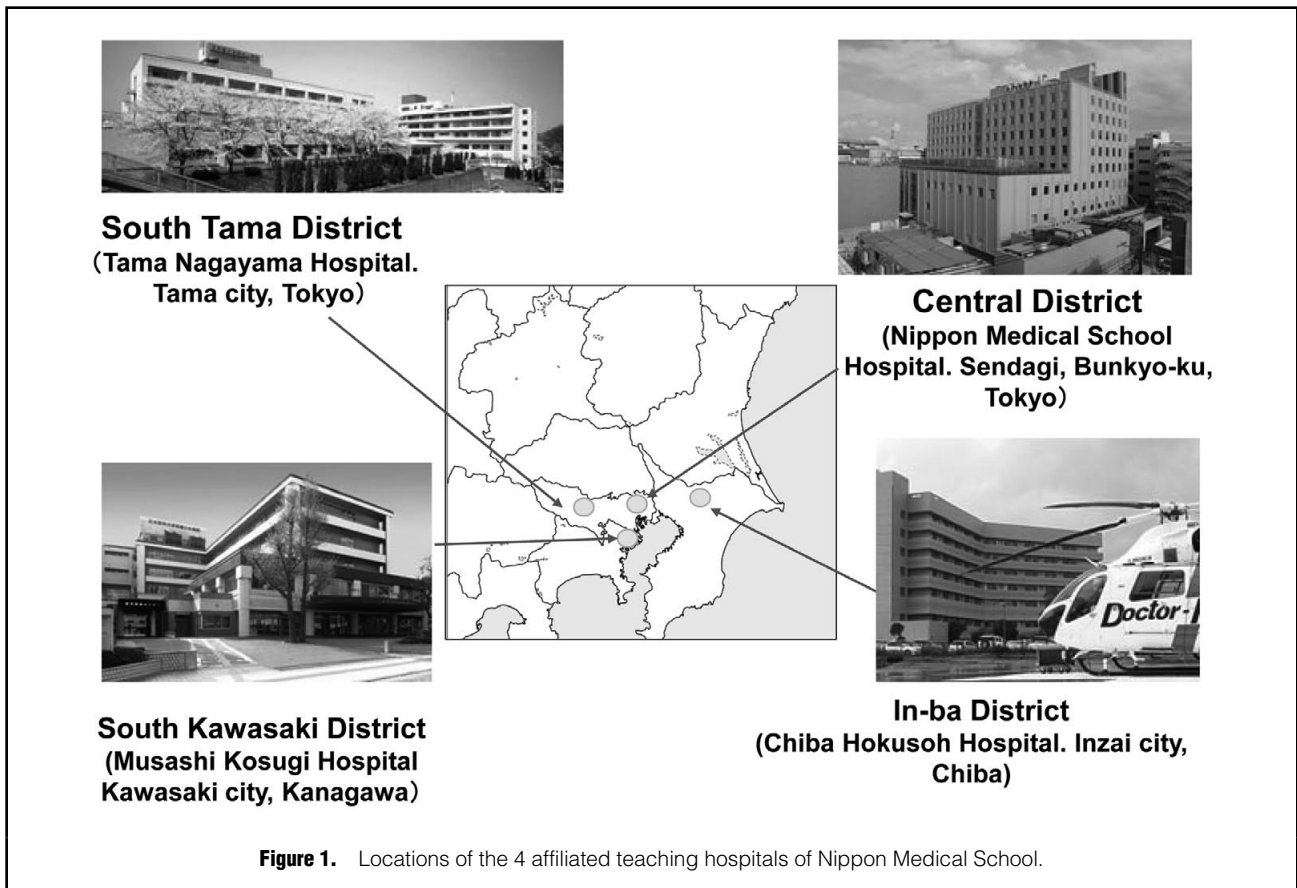
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To prevent deterioration in patients with HF, cardiologists and general practitioners (GPs) need to work closely together. Japan's Ministry of Health, Labour and Welfare promotes cooperation between regional core hospitals and local medical institutions through a comprehensive community care system. In the "5-Year Plan to Stop Cerebro-Cardiovascular Diseases", the Japanese Circulation Society and the Japanese Stroke Society also proposed the development of a seamless medical and nursing care system.<sup>7</sup> Patients with cardiovascular diseases admitted to a comprehensive or primary cardiovascular center should be cared for based on the disease management manual at the local chronic healthcare facility after rehabilitation in a convalescent hospital. Promoting home care for patients with HF requires understanding of the issues associated with HF treatment in the community and building an effective regional cooperation system. However, there is no report on GPs' acceptance of patients with HF and the management requirements for the home care of these patients from the viewpoint of GPs in Japan.

In addition, information and communications technology (ICT) in the medical field has evolved dramatically in recent years. It is expected that ICT will be used particularly for sharing patient information between core hospitals and GPs in regional healthcare networks. Thus, in the present study, we conducted a questionnaire survey of GPs in metropolitan areas of Japan to evaluate medical coordination requirements for supporting elderly patients with HF. Furthermore, we asked about the GPs' interest in using ICT for home-based care.

## Methods

### Setting

Surveys were sent to 1,800 GPs who had referred patients with cardiovascular diseases to 4 affiliated teaching hospitals of Nippon Medical School. GPs were defined as physicians who worked in the following facilities: clinics with no inpatient facilities, clinics with inpatient facilities with  $\leq 19$  beds, small acute care hospitals (ACHs;  $\leq 200$  beds), sub-ACHs, rehabilitation hospitals, and convalescent hospitals. Medium-sized (200–499 beds) and large ( $> 500$  beds) ACHs were excluded.

The 4 affiliated teaching hospitals of Nippon Medical School are located in different secondary medical care service areas in metropolitan areas of Japan. A secondary medical care service area is defined as an area established to meet citizens' general medical needs, excluding specialized clinical care (Article 30-4 of the *Medical Care Acts*). The Japanese government developed a master plan for medical care based on the National Strategy Plan for Medical Care stipulated in the *Medical Care Act* established in 1948. The government of each prefecture is required to prepare a healthcare plan according to the law; specifically, each prefecture must develop a healthcare plan in the secondary-tertiary care area.

Nippon Medical School Hospital is located in the Central Care Area of Tokyo. Tama-Nagayama Hospital is in the South Tama Medical Care Area of Tokyo. The South Tama Area, developed as a bedroom (or commuter) suburb of Tokyo in the 1970s, has recently drawn attention

<b>Table 1. (A) Population Characteristics of Medical Care Areas, (B) Sex and Age of Respondents, and the Type of Healthcare Provider to Which Respondents Belong, According to Medical Care Areas, (C) Specialities and Subspecialities of Respondents</b>						
(A)	Medical care area				National average	
	Central District (Tokyo)	South Tama (Tokyo)	South Kawasaki (Kanagawa)	Inba (Chiba)		
Population (2015)	860,669	1,430,411	631,797	710,071		
Population growth rate 2010–2015 (%)	13.61	0.76	4.35	0.79	–0.75	
Population aging rate 2015 (%)	19.40	25.00	19.40	25.20	26.60	
Population density 2015 (/km <sup>2</sup> )	13,524.00	4,405.20	9,828.80	1,026.60	340.80	
(B)	Medical care area					Total
	Central District (Tokyo)	South Tama (Tokyo)	South Kawasaki (Kanagawa)	Inba (Chiba)	Other	
Number respondents	169 (43)	28 (7)	60 (15)	73 (19)	62 (16)	392 (100)
Female sex	22 (14)	3 (10)	13 (20)	2 (3.9)	0 (0)	40 (13)
Age group (years)						
30 s	11 (6)	1 (3)	2 (3)	3 (4)	3 (5)	20 (5)
40 s	36 (21)	6 (23)	25 (40)	10 (14)	17 (27)	90 (23)
50 s	75 (45)	12 (40)	17 (29)	23 (34)	30 (48)	157 (40)
60 s	42 (23)	7 (27)	11 (20)	28 (36)	11 (18)	99 (25)
≥70	5 (4)	2 (7)	2 (8)	9 (12)	8 (13)	26 (7)
Type of healthcare provider						
Clinic						
No inpatient facilities	142 (84)	24 (83)	50 (83)	62 (85)	43 (69)	321 (82)
Inpatient facilities with ≤19 beds	5 (3)	0 (0)	2 (3)	4 (5)	1 (2)	13 (3)
Hospital						
Acute care; inpatient facilities with ≤200 beds	16 (9)	2 (7)	5 (8)	3 (4)	12 (19)	38 (10)
Subacute care	3 (2)	0 (0)	1 (2)	4 (5)	15 (24)	11 (3)
Rehabilitation	1 (1)	1 (4)	0 (0)	0 (0)	1 (2)	3 (1)
Convalescent care	2 (1)	1 (4)	2 (3)	0 (0)	1 (2)	6 (2)
(C) Major speciality	n (%)	Subspeciality		n (%)		
Internal medicine	170 (43)	Cardiovascular Medicine or Surgery		88 (22)		
Surgery	31 (8)	Gastroenterology		77 (20)		
Emergency medicine	2 (1)	Nephrology, Urology, Dialysis		26 (7)		
Rehabilitation	2 (1)	Neurology, Neurosurgery		14 (4)		
Family medicine	2 (1)	Respiratory Medicine or Surgery		17 (4)		
Orthopedics	3 (1)	Diabetology		13 (3)		
Neurosurgery	8 (2)	Endocrinology		3 (1)		
Urology	9 (2)	Hematology		2 (1)		
Gynecology	3 (1)	Rheumatology		5 (1)		
Radiology	1 (0.3)	Allergy		5 (1)		
Anesthesiology	2 (0.5)					
Pediatrics	3 (1)					
Geriatrics	1 (0.3)					
None	29 (7)					
Not available	126 (32)					

(A) Adapted with permission from reference Takahashi et al.<sup>8</sup> (B) Data are presented as n (%).

for its rapid aging rate. Musashi Kosugi Hospital is in the South Kawasaki Medical Care Area, a newly developed town constituted mostly of young adults, in Kawasaki City, Kanagawa Prefecture. Chiba Hokusoh Hospital is located in the Inba Medical Care Area on the north-west side of Chiba Prefecture, where people of different generations live: older residents who are engaged in farming and newer residents who are corporate employees commuting to

Tokyo (Figure 1). The population background of these medical areas, based on the Japan Medical Analysis Platform of the Japan Medical Association, is presented in Table 1A.<sup>8</sup>

#### Data Collection

Paper-based questionnaires were mailed to GPs in January 2015. GPs were allowed to respond via a website generated

<b>Table 2. Status of Implementation of Home Care Services</b>				
	<b>Regular visits only</b>	<b>Emergency visits only</b>	<b>Regular and emergency visits</b>	<b>No home visits</b>
<b>All respondents</b>	59 (15)	45 (12)	102 (27)	186 (45)
<b>Sex</b>				
Male	52 (15)	36 (11)	94 (28)	159 (47)
Female	7 (14)	9 (18)	8 (16)	27 (53)
				(NS)
<b>GP age (years)</b>				
≥30	2 (10)	0 (0)	7 (35)	11 (50)
40s	13 (14)	16 (18)	13 (14)	48 (53)
50s	29 (18)	13 (8)	51 (32)	64 (41)
60s	13 (13)	13 (13)	27 (27)	46 (46)
≥70	2 (8)	3 (11)	4 (15)	17 (66)
				(NS)
<b>Medical care area</b>				
Central Tokyo	26 (15)	24 (14)	50 (30)	69 (41)
South Tama	9 (21)	2 (4)	12 (32)	35 (39)
South Kawasaki	9 (15)	4 (7)	9 (20)	11 (58)
Inba	6 (8)	13 (18)	18 (25)	36 (49)
Other	26 (15)	2 (4)	13 (17)	35 (46)
				(NS)

Data are given as n (%). GP, general practitioner.

by Google form, mail, or fax. The final completed questionnaire was received on March 31, 2015. Elderly patients were defined as those aged ≥65 years.

The questionnaire included the following items: (1) background characteristics of GPs and clinics; (2) implementation of home-based medical care; (3) barriers to home-based medical care; (4) acceptable patients' severity of HF in elderly patients; (5) items required for regional medical care collaboration between hospitals and clinics for elderly patients with HF; and (6) interest in using ICT for home-based care. The GPs were made to choose an affiliated hospital of the Nippon Medical School to which they always referred patients. If they were away and did not always make referrals to the hospital, their medical care area was categorized as "Other".

The severity of HF was graded according to the 2013 American College of Cardiology Foundation (ACCF)/American Heart Association (AHA) guidelines for the management of HF as follows:<sup>9</sup> Stage A, asymptomatic patients at high risk of developing HF without structural heart disease; Stage B, patients with asymptomatic HF who have structural heart disease; Stage C, patients with symptomatic HF and structural heart disease, including those with a history of HF; and Stage D, patients with refractory HF. Stages A and B were considered "asymptomatic HF" (HF at risk) and Stages C and D were considered "symptomatic HF."

For the question regarding items required for regional medical care collaboration between hospitals and clinics for elderly patients with HF, respondents were asked to choose from the following options: prompt response of emergency room (ER) systems; strengthening home care support at hospital discharge; support for end-of-life care; outpatient clinic education; outpatient cardiopulmonary rehabilitation; a regional critical path; and face-to-face meetings between GPs and ACH staff to share patient

information. For the question concerning barriers to telemedicine implementation for patients with HF, the respondents were asked to choose from the following options: an overly complicated system; widespread use of electronic medical records; no incentives in health insurance; complicated user interface for healthcare workers; personal information protection; complicated user interface for patients; and costs for equipment installation. Similarly, respondents were asked to choose all options that were applicable to their opinion on remote monitoring from the following: patients can receive better care at home through daily monitoring; it is difficult for 1 physician to handle multiple patients; healthcare providers cannot monitor patients all day long; patients can be treated earlier; it is not realistic because so many problems need to be overcome; emergency visits will be reduced; it is useful for efficient medical care; not sure; and being monitored all day is stressful for patients.

This study was approved by the Ethics Committee of Nippon Medical School Musashi Kosugi Hospital (Reference no. 557-2-22).

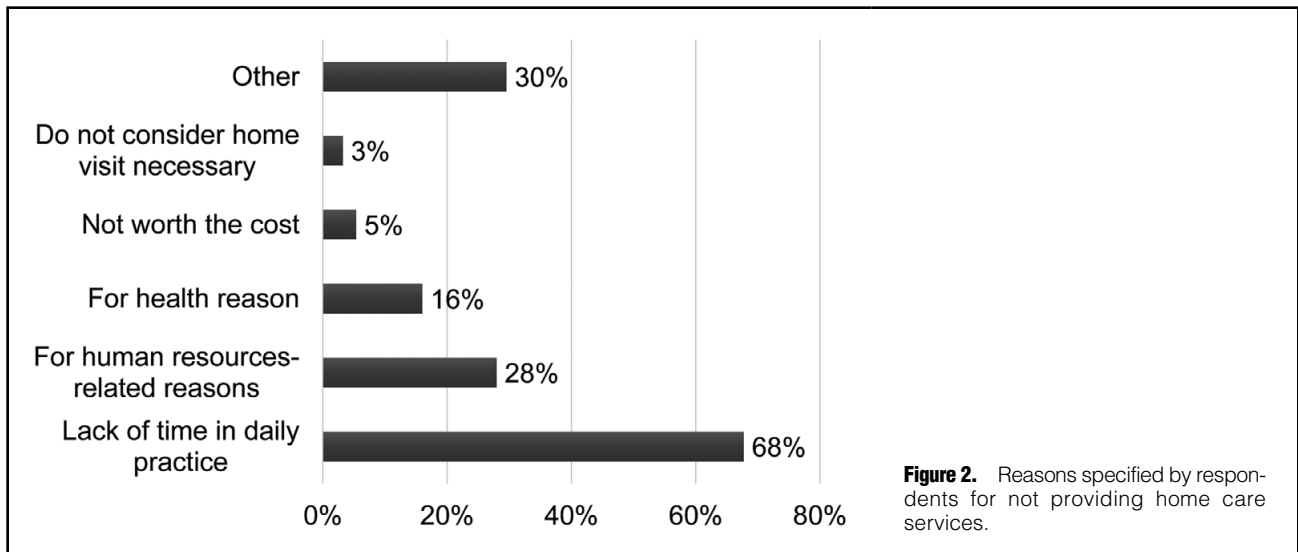
### Statistical Analysis

Data were managed and analyzed using JMP® Version 9 (SAS Institute, Cary, NC, USA). Categorical data are expressed as absolute and relative frequencies, whereas continuous data are expressed as the mean±SD. Chi-squared tests were used in analyses of categorical data. Two-sided P<0.05 was considered significant.

## Results

### Respondents' Characteristics

Of the 1,800 GPs sent questionnaires, 392 responded (response rate: 21.7%). Respondents worked in the Central District (47%), South-Kawasaki (15%), South Tama (7%),



and North-West Chiba (19%) medical care areas. The respondents' characteristics are summarized in **Table 1B**: 32% were aged >60 years and 40% were in their 50s. Of all the physicians, 19% were certified cardiologists. The respondents' major specialities and subspecialties are listed in **Table 1C**. The primary specialty of the respondents was internal medicine (43%), followed by surgery (8%), none (32%), unknown (7%), urology (2%), neurosurgery (2%), family medicine (2%), and pediatrics (2%). The subspecialties were cardiovascular medicine or surgery (22%; n=88), gastroenterology (20%; n=77), nephrology, urology, or dialysis (7%; n=26), and respiratory medicine or surgery (45; n=17; **Table 1C**). Because the current speciality accreditation system had not been established at the time of the survey, there were variations in responses. Forty-eight percent of respondents in the Inba medical care area were >60 years of age, whereas 43% in the South-Kawasaki area were <40 years of age. The age structure of the population was significantly different between these medical care areas ( $P<0.005$ ). The overall proportion of female physicians was 13%, which also differed between the South-Kawasaki and Inba areas (21% vs. 3%, respectively;  $P<0.001$ ). Eighty-two percent of medical institutes where the respondents worked were clinics without beds, whereas 10% of were small ACHs with inpatient facilities with no more than 200 beds. Healthcare provider types did not differ across these areas. Sixty-four percent of the medical care facilities were managed by a single physician. Forty-four percent of the respondents owned electronic medical record systems.

### Implementation of Home-Based Medical Care

In all, 202 (52%) physicians provided home visit services. Fifty-nine (15%) respondents only made regular visits, 102 (26%) made both routine and emergency visits, and 45 (11%) only made emergency visits. By region, the rate of implementation of in-home medical care was high in South Tama and Central Tokyo, whereas the rate was low in the Inba and South Kawasaki areas. In the age group analysis, those in their 50s provided the most home visits, followed by those in their 60s and 40s. Implementation rates were lowest among those aged over >70 years or in their 30s

( $P<0.05$ ; **Table 2**). Of 207 visiting physicians who were asked about how they handled after-hours emergency patients, 31% reported making around-the-clock home visits, 35% referred patients to emergency hospitals, and 34% responded that their course of action was based on individual cases.

The 188 non-visiting physicians were asked their reasons for not providing home care services: 68% reported a lack of time owing to a busy schedule, 28% claimed a shortage of medical staff, and 16% provided health-related reasons (**Figure 2**).

### HF Stages in Respondent's Patients Considered Acceptable for Treatment in the Clinic

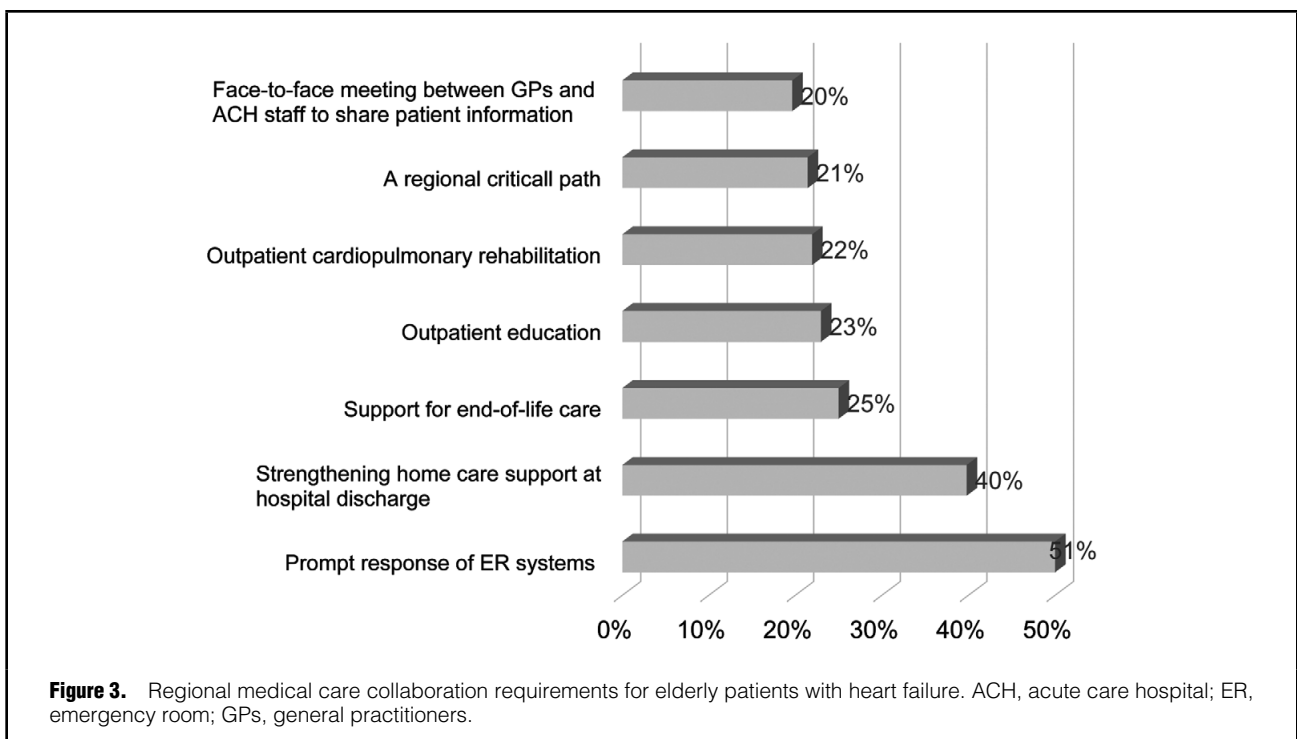
Among respondents, 35% regarded "asymptomatic HF" (Stages A and B) treatable in the clinic. Thirty-two physicians (8%) reported that they felt it is difficult to care for patients with HF. These GPs were most likely to belong to the main surgical specialities, and their subspecialties were more likely to be non-cardiology related. Fewer female than male GPs responded that they felt able to care for patients with symptomatic HF (Stages C and D; 39% vs. 58%, respectively;  $P<0.05$ ; **Table 3**).

There was a significant difference in what was considered an acceptable HF stage for treatment in the clinic according to respondents' ages ( $P<0.05$ ). The proportion of GPs who replied that only Stage A patients were acceptable increased with age; 21% of those in their 60s and 35% of those >70 years of age only treated patients in Stage A HF. In contrast, 60% of GPs in their 50s replied that they were able to manage symptomatic HF (Stages C and D). There was also a significant difference with regard to geographic location ( $P<0.001$ ). In the Inba area, where older and male GPs predominated, a high percentage of GPs (39%) said they were only able to manage asymptomatic HF, whereas only 32% of physicians in the Central Tokyo area gave this response.

Among all respondents, only 3% of GPs accepted patients with refractory (intractable or end-stage) HF (Stage D). In addition, only 3 of 392 GPs accepted patients with refractory HF and provided home visits.

	Heart failure <sup>A</sup>				Too difficult to provide care to patients	NA
	Stage A	Stage B	Stage C	Stage D		
<b>All respondents</b>	51 (13)	86 (23)	207 (53)	11 (3)	32 (8)	5 (2)
	97 (35)		218 (56)			
<b>Sex</b>						
Male	46 (13)	66 (19)	189 (55)	9 (3)	29 (9)	4 (1)
Female	5 (12)	20 (39)	18 (35)	2 (4)	3 (6)	1 (2)
P value						<0.05
<b>GP age (years)</b>						
≥30	1 (3)	6 (30)	12 (60)	1 (5)	0 (0)	0 (0)
40	6 (7)	23 (25)	48 (53)	5 (6)	8 (9)	0 (0)
50	14 (9)	35 (22)	91 (58)	3 (2)	10 (6)	4 (3)
60	21 (21)	21 (21)	44 (44)	2 (2)	10 (10)	1 (1)
≥70	9 (35)	1 (4)	12 (46)	0 (0)	4 (15)	0 (0)
P value						<0.05
<b>Medical care area (%)</b>						
Central Tokyo	11 (7)	43 (25)	104 (62)	3 (2)	7 (4)	1 (0)
South Tama	3 (11)	7 (25)	14 (50)	0 (0)	3 (11)	1 (4)
South Kawasaki	9 (15)	15 (25)	26 (43)	3 (5)	5 (8)	2 (3)
Inba	19 (26)	10 (13)	34 (47)	2 (3)	7 (10)	1 (1)
Other	9 (15)	11 (18)	29 (47)	3 (5)	10 (16)	0 (0)
P value						<0.005
<b>Home care services</b>						
Regular visits only	6 (10)	14 (23)	31 (53)	1 (2)	7 (12)	0 (0)
Emergency visits only	12 (27)	10 (22)	21 (47)	0 (0)	2 (4)	0 (0)
Regular and emergency visits	5 (5)	23 (23)	70 (67)	2 (2)	1 (1)	1 (1)
No home visits	28 (15)	39 (21)	85 (46)	8 (4)	22 (12)	4 (2)
P value						<0.005

Unless indicated otherwise, data are given as n (%). <sup>A</sup>Heart failure was graded according to the 2013 American College of Cardiology Foundation (ACCF)/American Heart Association (AHA) guidelines for the management of heart failure.<sup>9</sup> Stages A and B were considered asymptomatic, whereas Stages C and D were considered symptomatic. GP, general practitioner.



**Table 4. Barriers to Telemedicine Implementation for Patients With Heart Failure**

Barrier	No. respondents (%)
Overly complicated system	54 (14)
Widespread use of electronic medical records	96 (24)
No incentives in health insurance	117 (30)
User interface for healthcare workers	128 (33)
Personal information protection	137 (35)
User interface for patients	168 (43)
Costs for equipment installation	244 (62)

Multiple answers were allowed.

### Requirements for Regional Medical Care Collaboration for Elderly Patients With HF

Regarding regional medical cooperation for patients with HF, approximately half the respondents noted the need for a prompt response from ER systems (51%), followed by strengthening of home care support at hospital discharge (40%), support for end-of-life care (25%), patient education in the outpatient setting (23%), outpatient cardiopulmonary rehabilitation (22%), a regional clinical path (21%), and face-to-face meetings between GPs and cardiovascular staff to share patient information (20%; **Figure 3**).

### GPs' Interest in Applying ICT to Home-Based Care

Among the respondents, 48% expressed interest in implementing telemedicine for patients with HF, 43% were unsure, and 9% reported not being interested (**Supplementary Table**). For more than one-third of physicians, the barriers to implementing telemedicine included the cost of equipment installation (62%), a complicated user interface for patients (43%), protection of personal information (35%), and a complicated user interface for healthcare workers (33%; **Table 4**). Furthermore, with respect to a remote patient monitoring system, although the respondents stated that patients could be relieved by being watched over every day, they also expressed negative opinions, such as "It is difficult for a single physician to handle multiple patients" (35%) and "Healthcare providers cannot monitor patients all day long" (35%; **Table 5**).

## Discussion

The present survey is the first to clarify the current status of GPs' acceptance of patients with HF and to identify the requirements for regional care coordination for this population. Seamless regional partnerships among healthcare providers should be promoted to enable elderly patients with HF to maintain a high quality of life. Furthermore, readmission shortly after discharge should be avoided in the context of medical efficiency. However, in this survey, only 44% of GPs reported accepting patients with symptomatic HF (Stage C and/or D). In addition, only 3 medical institutes accepted patients with refractory HF and provided emergency visits. In the analyses of GPs' background characteristics, female and older physicians showed poorer acceptance of symptomatic HF patients. Consequently, in areas where female and older physicians were prevalent, GPs' acceptance of symptomatic HF was poorer. Further, GPs who did not specialize in internal medicine or cardi-

**Table 5. General Practitioners' Opinions on Implementing a Remote Patient Monitoring System**

	No. respondents (%)
Patients can receive better care at home through daily monitoring	153 (39)
It is difficult for 1 physician to handle multiple patients	139 (35)
Healthcare providers cannot monitor patients all day long	137 (35)
Patients can be treated earlier	129 (33)
It is not realistic, because so many problems need to be overcome	93 (24)
Emergency visits will be reduced	90 (23)
It is useful for efficient medical care	55 (14)
Not sure	44 (11)
Being monitored all day is stressful for patients	33 (8)

Multiple answers were allowed.

ology were less likely to provide care for patients with HF.

### How to Promote Medical Care Collaboration for Elderly Patients With HF

In our survey, GPs who were non-cardiologists, female, and older showed poorer acceptance of symptomatic HF patients. We did not ask for detailed reasons as to why they could not accept patients with HF. In general, it is assumed that this is largely due to differences in health status associated with age and sex. However, these results did not reflect the results regarding differences in the characteristics of age and sex. Educational opportunities may also be needed to support physicians in different specialities (e.g., surgery). According to a survey by the Ministry of Health, Labour and Welfare, the mean age of physicians working in clinics is 60 years.<sup>10</sup> Similarly, the percentage of female physicians is 21.9%, with the proportion higher for the younger generation.<sup>10</sup> The ratio of older people and women among all physicians is expected to increase in the future, hence the imperative to conduct further research and consider specific support measures.

As indicated by the GPs, the most important requirements for successful regional medical care collaboration were prompt responses from ER systems and strengthening of home care support at hospital discharge. Without enough emergency backup, it is hard to feel confident about accepting patients with symptomatic HF for treatment, although adequate emergency admissions do not lead to a reduction in readmissions.

Various methods have been implemented to prevent rehospitalization in elderly patients with HF. Most recently, a transitional care program designed to facilitate safe, smooth, and efficient transitions between settings achieved remarkable outcomes.<sup>11</sup> Transition care programs mainly focus on the change from hospital to home and include discharge planning, predischARGE patient health education, and post-discharge telephone calls or home visits. Large-scale clinical trials have shown that this type of intervention is effective in preventing readmissions and reducing medical costs.<sup>12</sup> Guidelines in other countries have strongly recommended transition care.<sup>13-15</sup> According to the European Society of Cardiology/AHA guidelines, a multidisciplinary

team approach and effectiveness of care coordination are important in preventing the readmission or mortality of patients with HF after hospital discharge.<sup>13,14</sup> In Canada, there is a strong culture of community collaboration for HF care, with specialized HF clinics (HFCs) providing patient-centered care.<sup>15</sup> Canadian HFCs provide the following services to support transitions in HF care:<sup>16</sup> optimization of HF medical therapies before implantable cardioverter defibrillator and cardiac resynchronization therapy (ICD/CRT) referral, medication support and counseling, medication reconciliation, dietary nutrition counseling, involving patients in shared clinical decision making, advanced care and life planning, self-management services and resources, education sessions, exercise training, and support and cardiac rehabilitation. However, for a multidisciplinary team approach to be implemented, human resources must be adequate. In Japan, HFCs are not generalized, and most affiliated clinics are run by a single non-cardiologist. It is not a cost-effective measure to establish a large number of new HFCs. Thus, it is important to incorporate adequate HF care in the existing medical system. To achieve a comprehensive community health system, regional core hospitals should provide transition care interventions for patients with HF not only before, but also after discharge to support affiliated clinics. According to a recent report, the prevalence of multidisciplinary HF care teams in outpatient settings is still low (32.6%), even in medical institutions that are members of the Japanese Heart Failure Society.<sup>17</sup> The Japanese Circulation Society aims to establish an accreditation board (the Certified Heart Failure Educator of Japan) in 2021. In an effective comprehensive community health system, it is important for certified professionals to promote HF care.

Furthermore, to ensure effective treatment in daily clinical practice by educating GPs whose speciality is not cardiology, the Japanese Heart Failure Society published Guidelines for Diagnosis and Treatment of Acute and Chronic Heart Failure Guidance for Family Physicians in 2019.<sup>18</sup> In addition, Japanese Heart Failure Society has published the Heart Failure Notebook for patients and their families to manage and understand their illness; this notebook is also a useful treatment support tool for GPs.<sup>19</sup> Patients can use the notebook to maintain daily records of their body weight, blood pressure, heart rate, and drug adherence. Based on this information, GPs can be up to date on patients' management status at home.

In some areas, the "regional cooperation critical path" has been developed to promote coordination in GPs' medical practice for patients with HF. The regional cooperation critical path not only shares information on a patient's illness and background, but also provides medical instructions based on evidence-based treatment guidelines. The operation of the critical path is expected to promote communication between ACHs and medical staff in the community. Recently, Kitagawa et al reported that institutional approaches for patients with HF with elevated serum N-terminal pro B-type natriuretic peptide (NT-proBNP) may reduce the frequency, period, and medical cost for all-cause hospitalizations.<sup>20</sup> However, too many patients have dropped out because of variances in the clinical path. Furthermore, it requires substantial effort and cost, beyond just medical care, to maintain coordination. Therefore, the clinical pathway is not yet widely implemented. The application of machine- and deep-learning methods is expected to facilitate personalized management

of patients with HF in the future.<sup>21</sup>

### Applying ICT to Home-Based Care for Patients With HF

The sharing of patient information between GPs and regional core hospitals is essential to the operation of a comprehensive regional healthcare system. Recently, ICT has been developed and used as an essential infrastructural element for sharing patient information and monitoring patients in some areas. In the present survey, 48% of GPs were interested in managing patients using ICT. This proportion is lower than that reported in a recent study.<sup>22</sup> ICT infrastructure has evolved dramatically, and telemedicine has been added to Japan's public health insurance coverage. It is assumed that GPs will be more interested in telemedicine today than in 2014–2015. In particular, the 2020 COVID-19 virus pandemic has forced GPs to engage in telemedicine.

Despite its promise, the effectiveness of telemonitoring for chronic HF is inconclusive. Recent large-scale clinical studies conducted in US could not prove the effectiveness of monitoring.<sup>23,24</sup> This is thought to be due largely to low adherence to monitoring. A similar telemonitoring study was also performed in Japan;<sup>25</sup> in that study, adherence to monitoring was favorable, owing to the interventions of home healthcare nurses. Unfortunately, there was no significant difference in the readmission rate compared with the usual care group.<sup>25</sup> The main reason for this was presumably the sample's restriction to young, mildly symptomatic patients. Another recent study that applied monitoring to transition care did not produce great results compared with usual care.<sup>26</sup> In the future, it will be necessary to carefully consider the purpose, timing, and target population when applying telemonitoring to HF care.

### Study Limitations

In this survey, the response rate was only 22%. Although this is comparable to previous studies of other care approaches for HF, the results may be biased toward those interested in managing HF. This analysis is based on the results of only 4 medical areas in the Tokyo metropolitan area and does not reflect the medical system of the entire metropolitan area. Medical functions of regional core hospitals and related medical institutions are often clearly separated in rural areas. Therefore, it is expected that healthcare partnerships in rural areas would be different from those in metropolitan areas. Thus, the findings of the present study should be interpreted with caution.

### Conclusions

In the Tokyo metropolitan area, which is experiencing a rapid rate of aging, it is necessary to accept patients with HF in emergency situations and to strengthen nursing care support upon discharge. GPs who were non-cardiologists, female, and older showed a poorer acceptance of symptomatic HF patients for treatment. Therefore, support for women and older physicians is also needed, and this need is expected to increase in the future. Educational outreach to non-specialists will also be needed. This study is the first to examine the status of elderly patients with HF and the requirements for their care in a comprehensive community health system. The *Stroke and Cardiovascular Disease Control Act* was enacted in Japan in December 2018. One of the basic principles of this law is to ensure that acute medical care is promptly started by appropriate emergency



transport and consultation anywhere in the country and continued seamlessly through the supportive care period. To establish seamless medical cooperation for elderly patients with HF, a nationwide survey of HF care should be conducted in the near future.

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E.K. is a member of *Circulation Reports'* Editorial Team. The remaining authors have no conflicts of interest to declare.

### IRB Information

This study was approved by the Ethics Committee of Nippon Medical School Musashi Kosugi Hospital (Reference no. 557-2-22).

### References

- Savarese G, Lund LH. Global public health burden of heart failure. *Card Fail Rev* 2017; **3**: 7–11.
- Shimokawa H, Miura M, Nochioka K, Sakata Y. Heart failure as a general pandemic in Asia. *Eur J Heart Fail* 2015; **17**: 884–892.
- Tsutsui H, Isobe M, Ito H, Ito H, Okumura K, Ono M, et al. JCS 2017/JHFS 2017 guideline on diagnosis and treatment of acute and chronic heart failure: Digest version. *Circ J* 2019; **83**: 2084–2184.
- Okura Y, Ramadan MM, Ohno Y, Mitsuma W, Tanaka K, Ito M, et al. Impending epidemic: Future projection of heart failure in Japan to the year 2055. *Circ J* 2008; **72**: 489–491.
- Liao L, Allen LA, Whellan DJ. Economic burden of heart failure in the elderly. *Pharmacoeconomics* 2008; **26**: 447–462.
- Kanaoka K, Okayama S, Nakai M, Sumita Y, Nishimura K, Kawakami R, et al. Hospitalization costs for patients with acute congestive heart failure in Japan. *Circ J* 2019; **83**: 1025–1031.
- The Japan Stroke Society, Japanese Circulation Society. Five-year plan to overcome stroke and cardiovascular diseases [in Japanese]. 2016. [http://www.j-circ.or.jp/five\\_year/files/five\\_year\\_plan.pdf](http://www.j-circ.or.jp/five_year/files/five_year_plan.pdf) (accessed March 12, 2020).
- Takahashi Y, Eguchi N, Ishikawa M. Current status and future of regional healthcare provision system-data collection by prefecture and secondary healthcare area [Internet]. Japanese Medical Association Research Institute [cited 2019 Mar 12]. Available from: [https://www.jmari.med.or.jp/research/working/wr\\_669.html](https://www.jmari.med.or.jp/research/working/wr_669.html) [in Japanese]. JMARI Working Paper 2019; 427.
- Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, et al. 2013 ACCF/AHA guideline for the management of heart failure: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol* 2013; **62**: e147–e239.
- Health Statistics Office, Minister of Health, Labour and Welfare. Survey of physicians, dentists and pharmacists [in Japanese]. 2018. <https://www.mhlw.go.jp/toukei/saikin/hw/ishi/18/index.html> (accessed November 30, 2020).
- Naylor MD, Sochalski JA. Scaling up: Bringing the transitional care model into the mainstream. *Issue Brief (Commonw Fund)* 2019; **103**: 1–12.
- Van Spall HGC, Rahman T, Mytton O, Ramasundarahettige C, Ibrahim Q, Kabali C, et al. Comparative effectiveness of transitional care services in patients discharged from the hospital with heart failure: A systematic review and network meta-analysis. *Eur J Heart Fail* 2017; **19**: 1427–1443.
- Albert NM, Barnason S, Deswal A, Hernandez A, Kociol R, Lee E, et al. Transitions of care in heart failure: A scientific statement from the American Heart Association. *Circ Heart Fail* 2015; **8**: 384–409.
- Piepoli MF, Hoes AW, Agewall S, Albus C, Brotons C, Catapano AL, et al. 2016 European guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts): Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur J Prev Cardiol* 2016; **23**: NP1–NP96.
- Howlett JG, Chan M, Ezekowitz JA, Harkness K, Heckman GA, Kouz S, et al. The Canadian Cardiovascular Society heart failure companion: Bridging guidelines to your practice. *Can J Cardiol* 2016; **32**: 296–310.
- Virani SA, Zieroth S, Bray S, Ducharme A, Harkness K, Koshman SL, et al. The status of specialized ambulatory heart failure care in Canada: A joint Canadian Heart Failure Society and Canadian Cardiovascular Society heart failure guidelines survey. *CJC Open* 2020; **2**: 151–160.
- Kamiya K, Yamamoto T, Tsuchihashi-Makaya M, Ikegame T, Takahashi T, Sato Y, et al. Nationwide survey of multidisciplinary care and cardiac rehabilitation for patients with heart failure in Japan: An analysis of the AMED-CHF study. *Circ J* 2019; **83**: 1546–1552.
- Japanese Society of Heart Failure. Guidelines for diagnosis and treatment of acute and chronic heart failure guidance for family physician. Tokyo: Life Science Publishing, 2019.
- Tsutsui H. About the Heart Failure Notebook. [Internet]. 2018 [cited 2020 Mar 12]. Available from: <http://www.asas.or.jp/jhfs/topics/shinhuzentechu.html> [in Japanese].
- Kitagawa T, Oda N, Mizukawa M, Hidaka T, Naka M, Nakayama S, et al. Hospitalization and medical cost of patients with elevated serum N-terminal pro-brain natriuretic peptide levels. *PLoS One* 2018; **13**: e0190979.
- Awan SE, Sohel F, Sanfilippo FM, Bennamoun M, Dwivedi G. Machine learning in heart failure: Ready for prime time. *Curr Opin Cardiol* 2018; **33**: 190–195.
- Tsuchikawa YA, Ashikawa T, Urano H, Yamada S. A survey of disease management of home visit nursing care service for patients with heart failure. *Official Journal of the Japanese Association of Cardiac Rehabilitation* 2018; **24**: 10 [in Japanese].
- Chaudhry SI, Barton B, Mattered J, Spertus J, Krumholz HM. Randomized trial of telemonitoring to improve heart failure outcomes (Tele-HF): Study design. *J Card Fail* 2007; **13**: 709–714.
- Gallagher BD, Moise N, Haerizadeh M, Ye S, Medina V, Kronish IM. Telemonitoring adherence to medications in heart failure patients (TEAM-HF): A pilot randomized clinical trial. *J Card Fail* 2017; **23**: 345–349.
- Kotooka N, Kitakaze M, Nagashima K, Asaka M, Kinugasa Y, Nochioka K, et al. The first multicenter, randomized, controlled trial of home telemonitoring for Japanese patients with heart failure: Home telemonitoring study for patients with heart failure (HOMES-HF). *Heart Vessels* 2018; **33**: 866–876.
- Ong MK, Romano PS, Edgington S, Aronow HU, Auerbach AD, Black JT, et al. Effectiveness of remote patient monitoring after discharge of hospitalized patients with heart failure: The better effectiveness after transition – heart failure (BEAT-HF) randomized clinical trial. *JAMA Intern Med* 2016; **176**: 310–318.

### Supplementary Files

Please find supplementary file(s);  
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