



## Second Nationwide Survey of Japanese Cardiac Rehabilitation Training Facilities During the Coronavirus Disease 2019 (COVID-19) Outbreak

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**Background:** We previously reported the results of a questionnaire survey of 37 cardiac rehabilitation (CR) training facilities conducted during April 2020, in Japan.

**Methods and Results:** We conducted a second questionnaire survey in 38 CR training facilities to explore the preventive measures against Coronavirus Disease 2019 (COVID-19) after a nationwide state of emergency was declared and to investigate differences between the 2 surveys. No significant differences were observed, except for the requirement for patients to wear surgical masks during CR ( $P=0.01$ ) in the second survey. Thirty-four facilities (89%) continued CR with innovations, 61% revised their instruction manuals (vs. 46% in the first survey), and, in 39%, patients requested resumption of ambulatory CR and training videos.

**Conclusions:** In the second survey, 74% of facilities were unable to continue conventional group ambulatory CR; however, patients maintained their physical activity and exercise regimens and managed their illnesses with the aid of telephones and mobile devices.

**Key Words:** Cardiac rehabilitation; Exercise testing; Patient requests; Questionnaire survey; Staff response

The effects of Coronavirus Disease 2019 (COVID-19) on cardiovascular diseases in Japan have been reported.<sup>1-3</sup> Moreover, reports on the healthcare system have been issued by the Japanese Society of Cardiology.<sup>4,6</sup> These reports found that transesophageal echocardiography (TEE) and catheterizations were restricted (61.2% and 55.1%, respectively), with restriction rates, including cardiopulmonary exercise testing (CPX), peaking between the end of April and early May 2020.<sup>5</sup>

We previously reported the results of a questionnaire survey of 40 nationwide cardiac rehabilitation (CR) training facilities, in April 2020,<sup>7</sup> when only 7 prefectures were declared to be in a state of emergency. Subsequently, a nationwide state of emergency was declared. Therefore, we conducted a second questionnaire survey in CR training facilities in Japan to examine the measures taken due to the

COVID-19 outbreak after the government had declared a nationwide state of emergency and investigated differences between the 2 surveys.

### Methods

An online questionnaire survey was conducted using Google Forms. Surveys were emailed to 40 Japanese CR training facilities during May 2020, after the declaration of the nationwide emergency. The collected data were compiled by the Public Relations Committee of the Japanese Association of Cardiac Rehabilitation (JACR). The questionnaire survey included basic information on the facilities, exercise therapy implementation and testing, cardiac telerehabilitation, patient guidance, and other aspects pertaining to CR implementation and education.

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Table. Comparisons Between the First and Second Surveys of CR Facilities During the COVID-19 Outbreak			
Survey items	First survey (n=37)	Second survey (n=38)	P value
Continuing group ambulatory CR: Yes	11 (30)	10 (26)	0.74
Continuing group inpatient CR: Yes	19 (51)	18 (47)	0.73
Continuing individual inpatient CR: Yes	37 (100)	38 (100)	–
Cancellations of ambulatory CR from patients: Yes	29 (78)	28 (74)	0.63
Requirement for CR staff to wear surgical masks during CR: Yes	35 (95)	38 (100)	0.15
Requirement for patients to wear surgical masks during CR: Yes	17 (46)	28 (74)	0.01
Disinfection before and after CR: Yes	33 (89)	36 (95)	0.38
Modified regular CR: Yes	33 (89)	34 (89)	0.97
Continuing treadmill test: Yes	24 (65)	22 (58)	0.54
Continuing CPX: Yes	21 (57)	20 (53)	0.72
Modified regular CPX: Yes	21 (57)	23 (61)	0.74
Conducting remote CR programs: Yes	3 (8)	6 (16)	0.31
Continuing patient education for inpatients: Yes	6 (16)	11 (29)	0.19
Changes in instructional content: Yes	17 (46)	23 (61)	0.21

Unless indicated otherwise, data are presented as n (%). CPX, cardiopulmonary exercise testing; CR, cardiac rehabilitation.

Patients	CR staff	CR room and equipment
<ul style="list-style-type: none"> <li>Separate inpatients and outpatients</li> <li>Limit the number of participants</li> <li>Wearing masks for patients</li> <li>When using cycle ergometers and treadmills, keep a minimum distance of 2 m between patients</li> </ul>	<ul style="list-style-type: none"> <li>Reinforcement of PPE for CR staff</li> <li>Completely separate inpatient and outpatient CR staff</li> <li>Reinforcement of medical interview</li> </ul>	<ul style="list-style-type: none"> <li>Separate times and locations for implementation</li> <li>Thorough disinfection</li> <li>Temporary removal of magazines, pamphlets</li> </ul>

**Figure 1.** Inventive measures used to continue cardiac rehabilitation (CR). PPE, personal protective equipment.

### Ethical Considerations

The study protocol was approved by the St. Marianna University School of Medicine Institutional Committee on Human Resource, Kawasaki, Japan (No. 4863), and the study was performed in accordance with the Declaration of Helsinki.

### Statistical Analysis

The first survey, conducted in April 2020, and the second survey included some similar questions; these questions were used to illustrate differences in conditions between April and May. Categorical data are presented as numbers and percentages, and intergroup differences were evaluated using Fisher's exact test. Statistical analyses were conducted using JMP® Pro 15.2.0.

### Results

Thirty-eight of the 40 (95%) Japanese CR training facilities

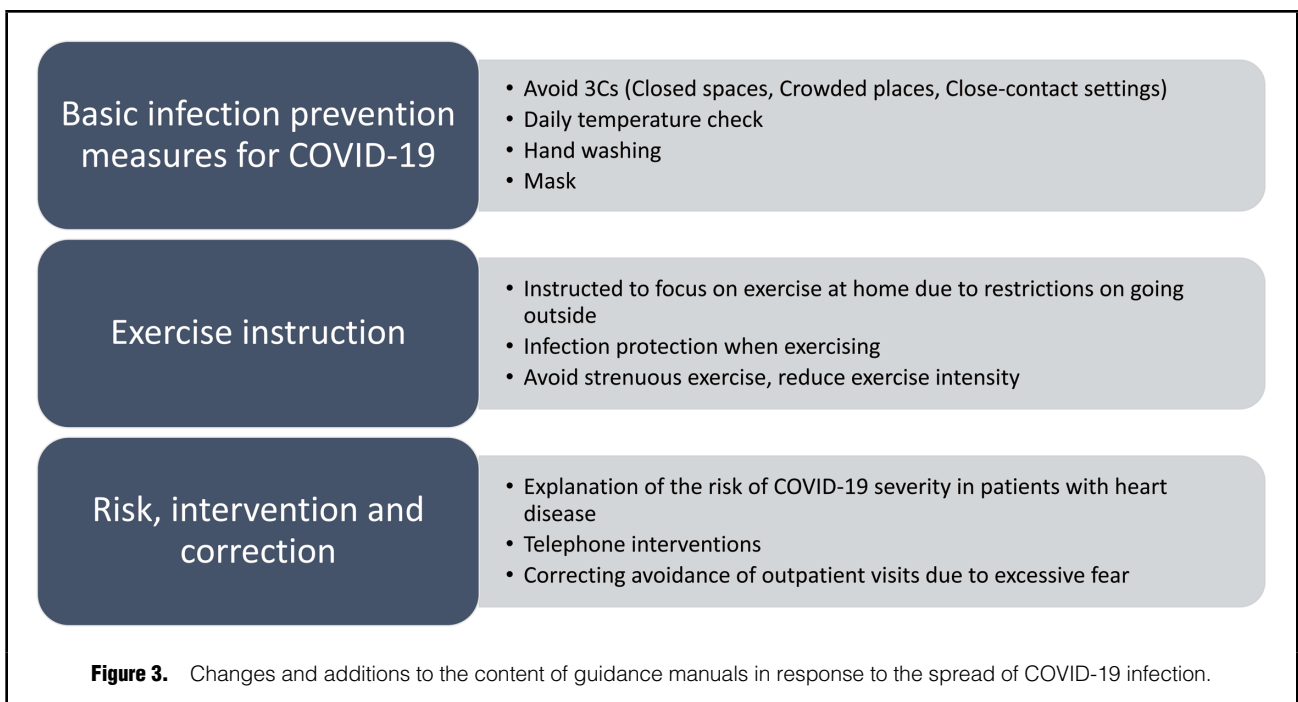
completed the questionnaire: 13 facilities were in the Kanto region, 7 each were in the Kinki and Kyushu regions, 3 each were in the Hokkaido and Tohoku regions, 2 were in Chugoku region, and 1 each was in the Tokai, Hokuriku, and Shikoku regions. Of the 38 facilities (22 university and 16 general hospitals), 31 (82%) accepted patients with COVID-19 and 28 (74%) had experience in managing COVID-19. The number of facilities accepting patients with COVID-19 increased from 28 (76%) in the first survey to 31 (82%) in the second survey.

Of the 38 facilities responding to the second survey, 10 (26%) had continued group ambulatory CR, which was not significantly different from first survey (n=11; 30%). Of the 10 facilities that continued group ambulatory CR, 7 were receiving facilities for patients with COVID-19. There were no significant differences between the first and second surveys, except for the requirement for patients to wear surgical masks during CR (P=0.01; **Table**).

Thirty-four (89%) facilities reported that they imple-

Patients	CR staff	CR room and equipment
<ul style="list-style-type: none"> <li>Limited number of testing per day</li> <li>Limited to inpatients</li> <li>Only for patients who have been hospitalized for more than 10 days and have no fever</li> <li>Patient wear surgical mask if on treadmill</li> </ul>	<ul style="list-style-type: none"> <li>Strengthen screening by interviewing before testing</li> <li>Staff wear surgical masks, goggles, and gloves</li> </ul>	<ul style="list-style-type: none"> <li>Disinfection of all equipment used before and after testing</li> <li>Disposing of equipment</li> <li>Mask sterilization</li> <li>Limited to low load testing</li> </ul>

**Figure 2.** Inventive measures used to continue exercise stress testing. CR, cardiac rehabilitation.



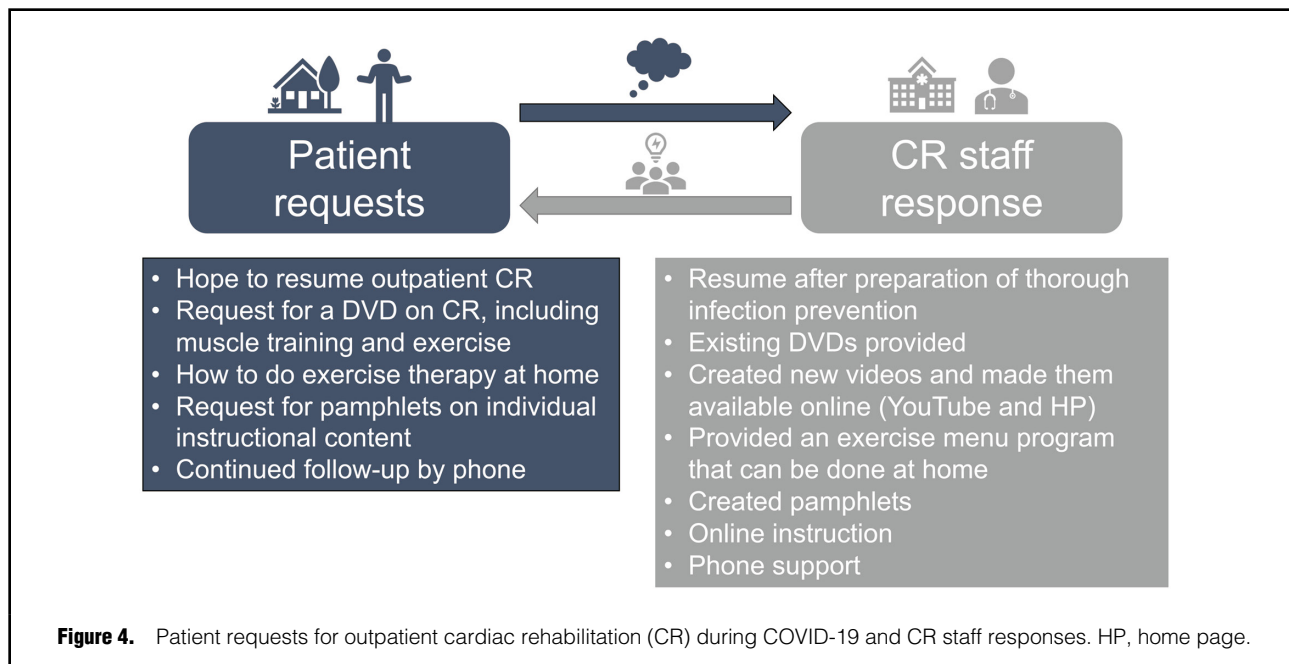
mented the innovations presented in **Figure 1** compared with pre-COVID-19 conventional CR. Twenty-six facilities (68%) ceased ambulatory CR altogether and shifted to home-based CR using DVDs, or stopped ambulatory CR after the outbreak of COVID-19 infection in the hospital or facility. However, 10 facilities used inventive measures to continue to offer ambulatory CR. Although some facilities postponed the test if it was not urgent, 61% performed exercise stress testing, including treadmills and CPX, adhering to the hospital’s infection control manual (**Figure 2**). In response to the spread of COVID-19, more facilities in the second than first surveys (61% vs. 46%, respectively) revised or added some points to their instruction manual (**Figure 3**). In 39% of facilities, the

patients requested the items presented in **Figure 4**; the resumption of ambulatory CR and videos were primarily requested.

Of the 32 facilities that had stopped or restricted ambulatory CR, 29 (91%) discussed the appropriate time for the resumption of ambulatory CR, such as after the state of emergency was lifted or based on the infection situation in the community. Similar results were obtained regarding the resumption of exercise stress tests.

**Discussion**

This questionnaire survey is significant because it was conducted on May 11, 2020 during a nationwide state of



emergency; to the best of our knowledge, this is the first time that data were collected during such a situation. The survey was mostly conducted before the state of emergency was lifted, except for a few cases, when the number of newly infected people was decreasing, and before this number started to increase towards the end of June. Because the survey period was extended, the number of facilities responding in the second survey increased to 38 (from 37 in the first survey).

### Comparisons Between Surveys

The basic policy of the JACR intended that group ambulatory CR was discontinued to prevent disease transmission from outpatient subclinical cases in endemic areas and facilities where nosocomial infection occurred to CR staff and inpatients. Although this policy was also in response to the timing of the prevaccination period, 26% of facilities continued ambulatory CR, with many continuing inpatient group CR. There was a slight increase in the number of discontinuations during the second survey in the inpatient group CR, although there was a dichotomy between implementation and discontinuation during the first survey. The rate of individual inpatient CR was 100% during both surveys, indicating that there was a shift from group to individual CR. Furthermore, the survey by the Japanese Circulation Society reported that treadmill exercise testing and CPX were restricted due to the first and second waves of COVID-19.<sup>5</sup> These tests are not unnecessary; however, it was suggested that they may not be urgent and could be postponed or substituted by other tests to cope with the situation.

In the first survey, 95% of facilities required medical personnel to wear surgical masks during CR; however, this was mandatory in all facilities during the second survey. In the second survey, 74% of facilities required patients to wear surgical masks during CR, a significant increase from 46% in the first survey. According to recommendations for allowing patient access to on-site outpatient Phase II CR

at the Cleveland Clinic health system, patients were required to cover their nose and mouth at all times during CR exercise. Hence, they were strongly encouraged to wear the surgical masks provided instead of cloth masks.<sup>8</sup>

### How to Implement CR and CPX During the COVID-19 Pandemic

In the second survey we investigated the methods used to continue CR and CPX. Although recommendations had already been reported from Europe and the US, information in Japan is limited.<sup>8,9</sup> In contrast to echocardiography and cardiac catheterization, CPX is not performed on patients who are COVID-19 positive; however, there may be asymptomatic patients, especially those managed in outpatient clinics. **Figures 1 and 2** summarize the inventive measures used to continue CR and exercise stress testing based on 3 categories: the patient perspective, CR staff perspective, and CR room or equipment. These measures, for both CR and CPX, included basic COVID-19 infection-prevention practices, as shown in **Figure 3**, such as avoiding the 3Cs (Closed spaces, Crowded places, and Close-contact settings), wearing masks, and disinfection.

Patient education on the prevention of COVID-19 infection was another vital role of CR during the pandemic. The patients and CR staff were unvaccinated at the time this study was conducted; hence, providing information on basic infection prevention measures for COVID-19, exercise instruction, and counseling patients not to refrain from visiting outpatient clinics was important.<sup>10</sup>

The frailty status may have worsened in elderly patients with heart failure whose outpatient CR was interrupted during the COVID-19 pandemic; in addition, it has been demonstrated that there is no significant improvement in frailty, physical function, and physical activity if CR is resumed after 3 months.<sup>11</sup> Gardening has been recommended as an activity that can maintain or improve physical function in older Phase 2 CR patients during the COVID-19 pandemic.<sup>12</sup>

## Requests From Patients and Responses From Medical Professionals

Before the COVID-19 pandemic, the rate of patient participation in inpatient and outpatient (after discharge) CR among patients with heart failure was 40% and 7%, respectively.<sup>13</sup> There were many reasons why patients avoided participating in CR, including: physicians not recommending CR; insufficient time during hospitalization for the process to be explained to patients; rehabilitation facilities being inaccessible; cost; lack of time; comorbid conditions; low income; female sex; age (elderly); being unmarried or unemployed; and a lack of social support. Moreover, the spread of COVID-19 has made it difficult to conduct outpatient CR; however, the second survey revealed that patients preferred at-home CR. In particular, DVD or Internet-based videos and other media have been developed as a result of the pandemic. Cardiac telerehabilitation has the potential to increase the low CR participation rate in Japan.<sup>14,15</sup> In the UK, nearly half of all CR programs have been suspended due to COVID-19 restrictions. Technology was rapidly adopted by CR services; this may increase participation beyond COVID-19.<sup>16</sup>

## Conclusions

In the second survey, 74% of facilities were unable to continue with conventional group ambulatory CR; however, patients were able to maintain their physical activity and exercise regimen as secondary prevention measures, and manage their illnesses with the aid of telephones and mobile devices.

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## Disclosures

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## IRB Information

The study protocol was approved by the St. Marianna University School of Medicine Institutional Committee on Human Resource, Kawasaki, Japan (No. 4863).

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## Supplementary Files

Please find supplementary file(s);  
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